



European Network of  
Transmission System Operators  
for Electricity

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# EQUIPMENT RELIABILITY PROFILE SPECIFICATION

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2026-09-10  
VERSION 2.5.0

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## Revision History

| Version     | Date       | Paragraph | Comments                                                                                                                                                                  |
|-------------|------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.1.0       | 2021-10-12 |           | For CIM EG review. This profile replaces Available Remedial Action Profile. These new profiles include also information on SIPS, GLSK, limits, area and overlapping zone. |
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## 1093 1 Introduction

1094 The equipment reliability profile enables exchanges of additional information related to  
1095 equipment as well as FACTS, limits, area and GLSK amongst others.

## 1096 2 Application profile specification

### 1097 2.1 Version information

1098 The content is generated from UML model file CIM17-2\_CGMES31v01\_PROF-  
1099 20v03\_NC25v25\_MS10v12\_DES10v01.qea.

1100 This edition is based on the IEC 61970 UML version “”, dated “”.

- 1101 - Title:
- 1102 - Keyword:
- 1103 - Description:
- 1104 - Version IRI:
- 1105 - Version info:
- 1106 - Prior version:
- 1107 - Conforms to:
- 1108 - Identifier:

1109

### 1110 2.2 Constraints naming convention

1111 The naming of the rules shall not be used for machine processing. The rule names are just a  
1112 string. The naming convention of the constraints is as follows.

1113 “{rule.Type}:{rule.Standard}:{rule.Profile}:{rule.Property}:{rule.Name}”

1114 where

1115 rule.Type: C – for constraint; R – for requirement

1116 rule.Standard: the number of the standard e.g. 301 for 61970-301, 456 for 61970-456, 13 for  
1117 61968-13. 61970-600 specific constraints refer to 600 although they are related to one or  
1118 combination of the 61970-450 series profiles. For NC profiles, NC is used.

1119 rule.Profile: the abbreviation of the profile, e.g. TP for Topology profile. If set to “ALL” the  
1120 constraint is applicable to all IEC 61970-600 profiles.

1121 rule.Property: for UML classes, the name of the class, for attributes and associations, the name  
1122 of the class and attribute or association end, e.g. EnergyConsumer, IdentifiedObject.name, etc.  
1123 If set to “NA” the property is not applicable to a specific UML element.

1124 rule.Name: the name of the rule. It is unique for the same property.

1125 Example: C:600:ALL:IdentifiedObject.name:stringLength

### 1126 2.3 Profile constraints

1127 This clause defines requirements and constraints that shall be fulfilled by applications that  
1128 conform to this document.

1129 This document is the master for rules and constraints tagged "NC". For the sake of self-  
1130 containment, the list below also includes a copy of the relevant rules from IEC 61970-452,  
1131 tagged "452".

- 1132 • C:452:ALL:NA:datatypes

1133 According to 61970-501, datatypes are not exchanged in the instance data. The  
1134 UnitMultiplier is 1 in cases none value is specified in the profile.

- 1135 • R:452:ALL:NA:exchange

1136 Optional and required attributes and associations must be imported and exported if they  
1137 are in the model file prior to import.

- 1138 • R:452:ALL:NA:exchange1

1139 If an optional attribute does not exist in the imported file, it does not have to be exported  
1140 in case exactly the same data set is exported, i.e. the tool is not obliged to automatically  
1141 provide this attribute. If the export is resulting from an action by the user performed after  
1142 the import, e.g. data processing or model update the export can contain optional  
1143 attributes.

- 1144 • R:452:ALL:NA:exchange2

1145 In most of the profiles the selection of optional and required attributes is made so as to  
1146 ensure a minimum set of required attributes without which the exchange does not fulfil  
1147 its basic purpose. Business processes governing different exchanges can require  
1148 mandatory exchange of certain optional attributes or associations. Optional and required  
1149 attributes and associations shall therefore be supported by applications which claim  
1150 conformance with certain functionalities of the IEC 61970-452. This provides flexibility  
1151 for the business processes to adapt to different business requirements and base the  
1152 exchanges on IEC 61970-452 compliant applications.

- 1153 • R:452:ALL:NA:exchange3

1154 An exporter may, at his or her discretion, produce a serialization containing additional  
1155 class data described by the CIM Schema but not required by this document provided  
1156 these data adhere to the conventions established in Clause 5.

- 1157 • R:452:ALL:NA:exchange4

1158 From the standpoint of the model import used by a data recipient, the document  
1159 describes a subset of the CIM that importing software shall be able to interpret in order  
1160 to import exported models. Data providers are free to exceed the minimum requirements  
1161 described herein as long as their resulting data files are compliant with the CIM Schema  
1162 and the conventions established in Clause 5. The document, therefore, describes  
1163 additional classes and class data that, although not required, exporters will, in all  
1164 likelihood, choose to include in their data files. The additional classes and data are  
1165 labelled as required (cardinality 1..1) or as optional (cardinality 0..1) to distinguish them  
1166 from their required counterparts. Please note, however, that data importers could  
1167 potentially receive data containing instances of any and all classes described by the  
1168 CIM Schema.

- 1169 • R:452:ALL:NA:cardinality

1170 The cardinality defined in the CIM model shall be followed, unless a more restrictive  
1171 cardinality is explicitly defined in this document. For instance, the cardinality on the  
1172 association between VoltageLevel and BaseVoltage indicates that a VoltageLevel shall

- 1173 be associated with one and only one BaseVoltage, but a BaseVoltage can be associated  
1174 with zero to many VoltageLevels.
- 1175 • R:452:ALL:NA:associations
- 1176 Associations between classes referenced in this document and classes not referenced  
1177 here are not required regardless of cardinality.
- 1178 • R:452:ALL:IdentifiedObject.name:rule
- 1179 The attribute “name” inherited by many classes from the abstract class IdentifiedObject  
1180 is not required to be unique. It must be a human readable identifier without additional  
1181 embedded information that would need to be parsed. The attribute is used for purposes  
1182 such as User Interface and data exchange debugging. The MRID defined in the data  
1183 exchange format is the only unique and persistent identifier used for this data exchange.  
1184 The attribute IdentifiedObject.name is, however, always required for CoreEquipment  
1185 profile and Short Circuit profile.
- 1186 • R:452:ALL:IdentifiedObject.description:rule
- 1187 The attribute “description” inherited by many classes from the abstract class  
1188 IdentifiedObject must contain human readable text without additional embedded  
1189 information that would need to be parsed.
- 1190 • R:452:ALL:NA:uniqueIdentifier
- 1191 All IdentifiedObject-s shall have a persistent and globally unique identifier (Master  
1192 Resource Identifier - mRID).
- 1193 • R:452:ALL:NA:unitMultiplier
- 1194 For exchange of attributes defined using CIM Data Types (ActivePower, Susceptance,  
1195 etc.) a unit multiplier of 1 is used if the UnitMultiplier specified in this document is “none”.
- 1196 • C:452:ALL:IdentifiedObject.name:stringLength
- 1197 The string IdentifiedObject.name has a maximum of 128 characters.
- 1198 • C:452:ALL:IdentifiedObject.description:stringLength
- 1199 The string IdentifiedObject.description is maximum 256 characters.
- 1200 • C:452:ALL:NA:float
- 1201 An attribute that is defined as float (e.g. has a type Float or a type which is a Datatype  
1202 with .value attribute of type Float) shall support ISO/IEC 60559:2020 for floating-point  
1203 arithmetic using single precision floating point. A single precision float supports 7  
1204 significant digits where the significant digits are described as an integer, or a decimal  
1205 number with 6 decimal digits. Two float values are equal when the significant with 7  
1206 digits are identical, e.g. 1234567 is equal 1.234567E6 and so are 1.2345678 and  
1207 1.234567E0.
- 1208 • C:NC:ER:AreaReserveResource:interconnection
- 1209 An AreaReserveResource shall be associated with either a SchedulingArea or a  
1210 TieCorridor, but not both.
- 1211 • C:NC:ER:AreaReserveResource:associations

1212 The AreaReserveResource shall be associated with either GeneratingUnit,  
1213 PowerElectronicsUnit, ScheduleResource or HydroPump.

1214 • C:NC:ER:EnergyComponent:associations

1215 The EnergyComponent shall be associated with either GeneratingUnit,  
1216 PowerElectronicsUnit, EnergyConsumer or HydroPump.

1217 • R:NC:ER:VoltageAngleLimit:AngleReferenceTerminal

1218 Due to the nature of the exchange and requirements it is allowed that the association  
1219 VoltageAngleLimit.AngleReferenceTerminal provides a dangling reference. This occurs  
1220 when the referenced Terminal is in another MAS. Validation of this association is only  
1221 performed when all dangling references are completed.

1222 • R:NC:ALL:NA:serialization

1223 The profiles are defined in the EnterpriseArchitect application and have multiple artifacts  
1224 that describe them. The main artifacts are:

- 1225 1) the EAP file (EnterpriseArchitect project file),  
1226 2) the profiles' specification document and  
1227 3) the application profiles (RDFS and SHACL).

1228 Due to the complexity of the profiles, there are various cross profile associations that,  
1229 from profiling and profile maintenance point of view, it is not practical to include the  
1230 complete inheritance structure in all profiles. If this is done the documentation provided  
1231 for all profiles would also include duplicated information on the description of classes  
1232 defined in other profiles. The following cases are often observed in profiles:

- 1233 ○ Case 1: An association end refers to an abstract class  
1234 ○ Case 2: An abstract class (stereotyped with "Description") has an association  
1235 (direction to another class)  
1236 ○ Case 3: An abstract class (not stereotyped with "Description") has an  
1237 association (direction to another class)  
1238 ○ Case 4: An abstract class has attributes and subclasses are not in the profile

1239 In all cases, the datasets shall only include the subtypes of the abstract classes with  
1240 the related properties (i.e. association or attributes) defined in the profile. The  
1241 information is taken from either canonical model or the profiles where complete  
1242 (expected) inheritance structure for the related abstract class is described. SHACL  
1243 based constraints include constraints only for the concrete classes that are subtypes of  
1244 the abstract class in the profile, and this can be used to inform which are the concrete  
1245 classes expected in a dataset that conforms to this profile.

1246 It should be taken into account that this approach deviates from MVAL5 (IEC 61970-  
1247 600-1:2021), which creates multiple inheritance at serialization. For instance, with this  
1248 more explicit exchange the serialization of the association between abstract class  
1249 Equipment and abstract class Circuit for a PowerTransformer will be serialized as  
1250 follows:

- 1251 ○ for association

1252 <cim:PowerTransformer rdf:about="\_c328f787-bc17-47ad-a59f-6ba7133340d0">

1253 <nc:Equipment.Circuit rdf:resource="#\_9ced16ac-d076-4ef9-a241-a998a579e77b"/>

1254 </cim:PowerTransformer>

- 1255 ○ for attribute

- 1256            <cim:ACLineSegment rdf:about="\_04f681aa-6999-4fb3-9775-acaa5eb7ceff">
- 1257            <cim:Equipment.inService>true</cim:Equipment.inService>
- 1258            </cim:ACLineSegment>
- 1259            The usage of rdf:ID or rdf:about depends on the stereotype of the class. rdf:about is
- 1260            used if the class has the stereotype "Description".
- 1261            An example of not allowed serialization, as the Equipment is an abstract class
- 1262            <cim:Equipment rdf:about="\_c328f787-bc17-47ad-a59f-6ba7133340d0">
- 1263            <nc:Equipment.Circuit rdf:resource="#\_9ced16ac-d076-4ef9-a241-a998a579e77b"/>
- 1264            </cim:Equipment>
- 1265            • C:NC:ER:HydroPowerPlant:operatingMode
- 1266            The SynchronousMachine.operatingMode of all SynchronousMachine objects part of a
- 1267            HydroPowerPlant shall be consistent.
- 1268            • C:NC:ER:Circuit:associations
- 1269            The Circuit shall be associated with either Equipment or Terminal.
- 1270            • C:NC:ER:FunctionOutputVariable.PropertyReference:value
- 1271            The value of the association end FunctionOutputVariable.PropertyReference shall be
- 1272            one of the values published in the PropertyReference collection.
- 1273            • C:NC:ER:RotatingMachine.GeneratingUnit:associationApplicability
- 1274            An EquivalentGeneratingUnit shall not be referenced by a RotatingMachine via the
- 1275            association end RotatingMachine.GeneratingUnit.
- 1276            • C:NC:ER:InfeedLimit:requiredAttributes
- 1277            An InfeedLimit shall have either .normalValueA or .normalValueW.
- 1278            • C:NC:ER:BoundaryPoint:requiredAssociation
- 1279            A BoundaryPoint shall have association to BoundaryPointBorder or
- 1280            BoundaryPointBorderLink and not both.
- 1281            • C:NC:ER:CommonResponsibilityPoint:requiredAssociation
- 1282            CommonResponsibilityPoint shall have association to either DCNode or
- 1283            ConnectivityNode not both.
- 1284            • C:NC:ER:BoundaryPointBorderLink:usage
- 1285            BoundaryPointBorderLink shall only be used when a BoundaryPoint is associated with
- 1286            more than one BoundaryPointBorder.
- 1287            If a BoundaryPoint is associated with exactly one BoundaryPointBorder, the
- 1288            BoundaryPointBorderLink class shall not be used.
- 1289            • C:NC:ER:BoundaryPoint:naming

- 1290 If both partyOneResourceName and partyTwoResourceName are provided,  
1291 IdentifiedObject.name shall be <partyOneResourceName>-<partyTwoResourceName>.
- 1292 • C:NC:ER:BoundaryPointBorder:naming
- 1293 If both partyOneName and partyTwoName are provided, IdentifiedObject.name shall be  
1294 <partyOneName>-<partyTwoName>.
- 1295 • C:NC:ER:BoundaryPointBorder:requiredAssociation
- 1296 A BoundaryPointBorder shall have minimum one BoundaryPoint or one  
1297 BoundaryPointBorderLink.
- 1298 • C:NC:ER:CrossZonalNetworkElement.BiddingZoneBorder:usage
- 1299 A CrossZonalNetworkElement shall be associated with exactly two BiddingZoneBorder  
1300 instances. The two associated BiddingZoneBorder instances shall represent the same  
1301 pair of bidding zones, but in opposite directions. This means that the FromBiddingZone  
1302 of one BiddingZoneBorder shall be equal to the ToBiddingZone of the other  
1303 BiddingZoneBorder, and the ToBiddingZone of the first BiddingZoneBorder shall be  
1304 equal to the FromBiddingZone of the other. The two bidding zones shall be different.
- 1305 • C:NC:ER:PeerTemporalDependency.finishToFinishLagKind:required  
1306 If PeerTemporalDependency.finishToFinishLag is present  
1307 PeerTemporalDependency.finishToFinishLagKind is required.
- 1308 • C:NC:ER:PeerTemporalDependency.finishToStartLagKind:required  
1309 If PeerTemporalDependency.finishToStartLag is present  
1310 PeerTemporalDependency.finishToStartLagKind is required.
- 1311 • C:NC:ER:PeerTemporalDependency.overlapKind:required  
1312 If PeerTemporalDependency.overlap is present PeerTemporalDependency.overlapKind  
1313 is required.
- 1314 • C:NC:ER:PeerTemporalDependency.startToStartLagKind:required  
1315 If PeerTemporalDependency.startToStartLag is present  
1316 PeerTemporalDependency.startToStartLagKind is required.
- 1317 • C:NC:ER:PeerTemporalDependency.constraintKind:exclusive  
1318 If PeerTemporalDependency.constraintKind is set to  
1319 DependencyConstraintKind.exclusive, the following attributes shall not be defined:  
1320 PeerTemporalDependency.overlap, PeerTemporalDependency.startToStartLag,  
1321 PeerTemporalDependency.finishToStartLag,  
1322 PeerTemporalDependency.finishToFinishLag.

1323

## 1324 2.4 Metadata

1325 ENTSO-E agreed to extend the header and metadata definitions by IEC 61970-552 Ed2. This  
1326 new header definitions rely on W3C recommendations which are used worldwide and are  
1327 positively recognised by the European Commission. The new definitions of the header mainly  
1328 use Provenance ontology (PROV-O), Time Ontology and Data Catalog Vocabulary (DCAT). The  
1329 global new header applicable for this profile is included in the metadata and document header  
1330 specification document.

1331 The header vocabulary contains all attributes defined in IEC 61970-552. This is done only for  
1332 the purpose of having one vocabulary for header and to ensure transition for data exchanges

that are using IEC 61970-552:2016 header. This profile does not use IEC 61970-552:2016 header attributes and relies only on the extended attributes.

### 2.4.1 Constraints

The identification of the constraints related to the metadata follows the same convention for naming of the constraints as for profile constraints.

- R:NC:ALL:wasAttributedTo:usage

The prov:wasAttributedTo should normally be the “X” EIC code of the actor or their URI (prov:Agent).

### 2.4.2 Reference metadata

The header defined for this profile requires availability of a set of reference metadata. For instance, the attribute prov:wasGeneratedBy requires a reference to an activity which produced the model or the related process. The activities are defined as reference metadata and their identifiers are referenced from the header to enable the receiving entity to retrieve the “static” (reference) information that it is not modified frequently. This approach imposes a requirement that both the sending entity and the receiving entity have access to a unique version of the reference metadata. Therefore, each business process shall define which reference metadata is used and where it is located.

## 3 Detailed Profile Specification

### 3.1 General

This package contains equipment reliability profile.

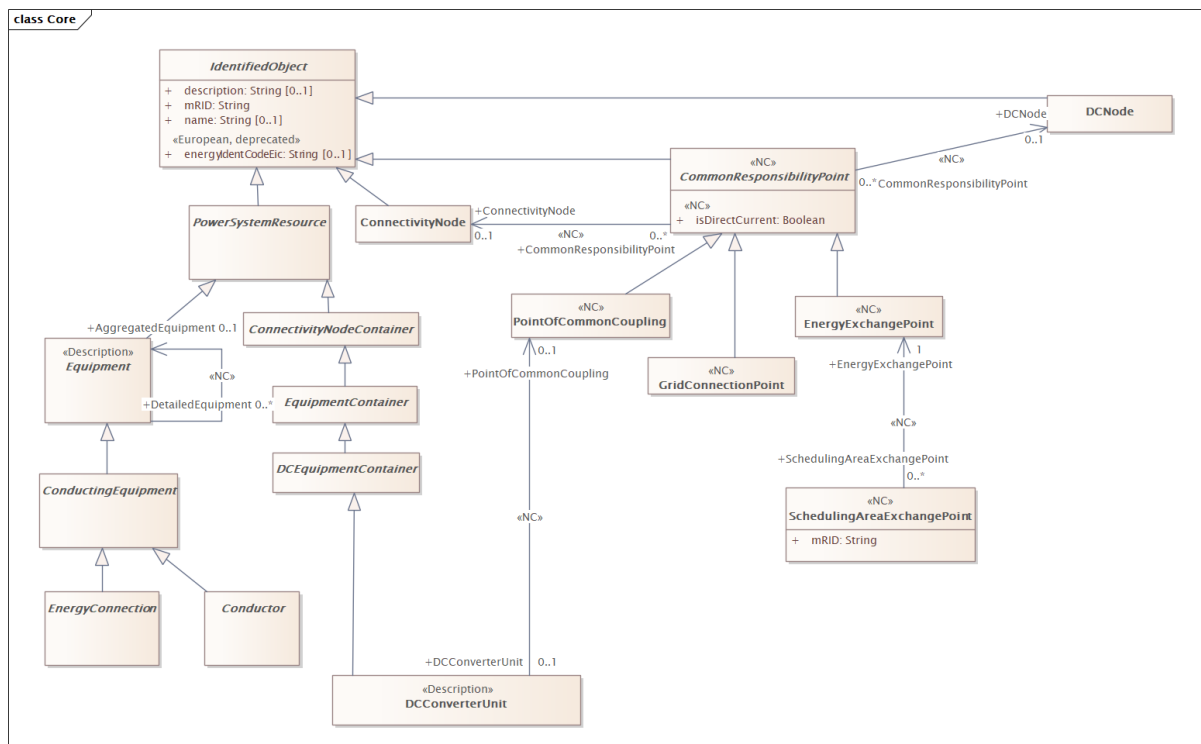


Figure 1 – Class diagram EquipmentReliabilityProfile::Core

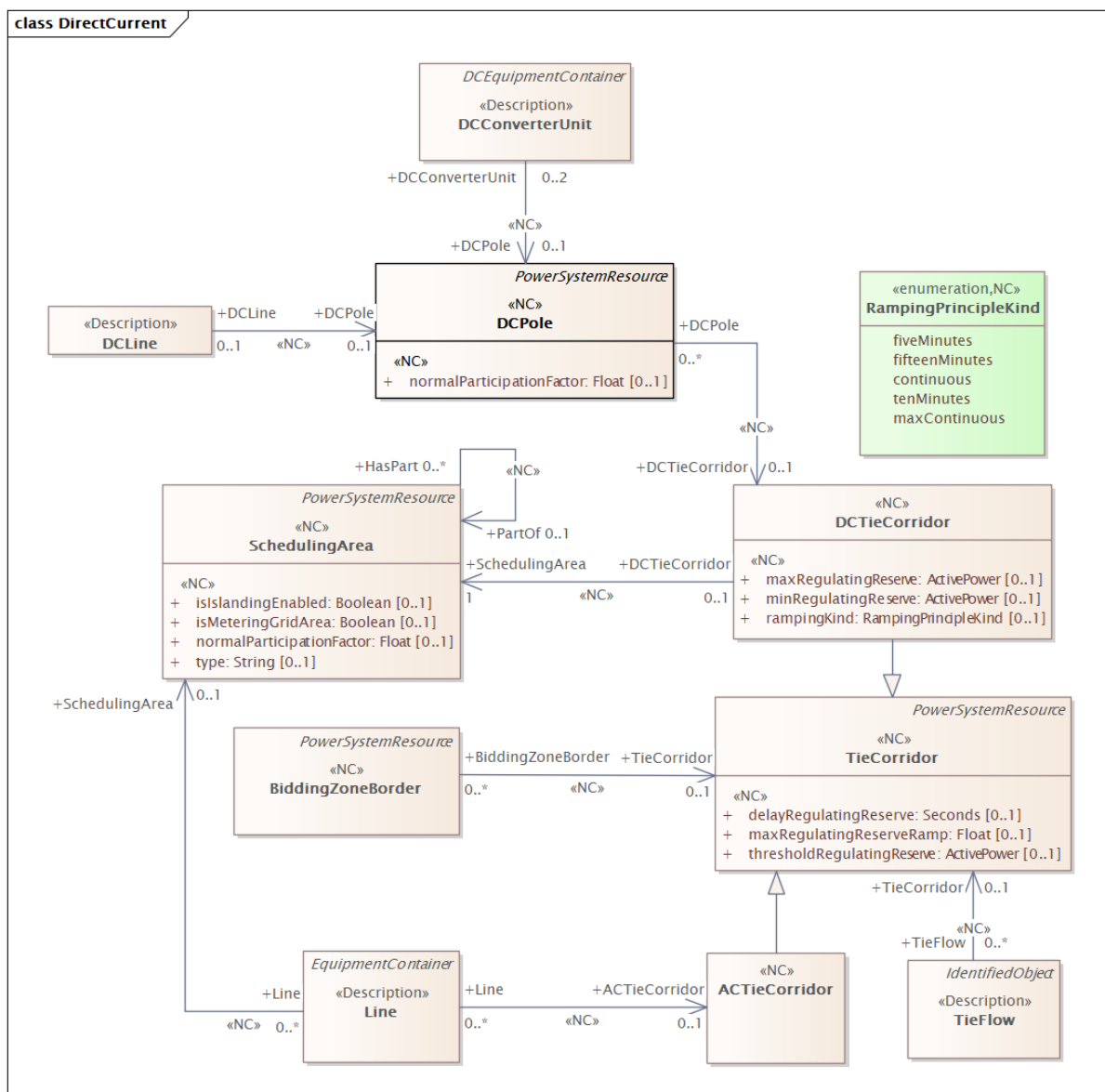
Figure 1: The diagram shows classes from Base CIM used in the profile.



Figure 2:

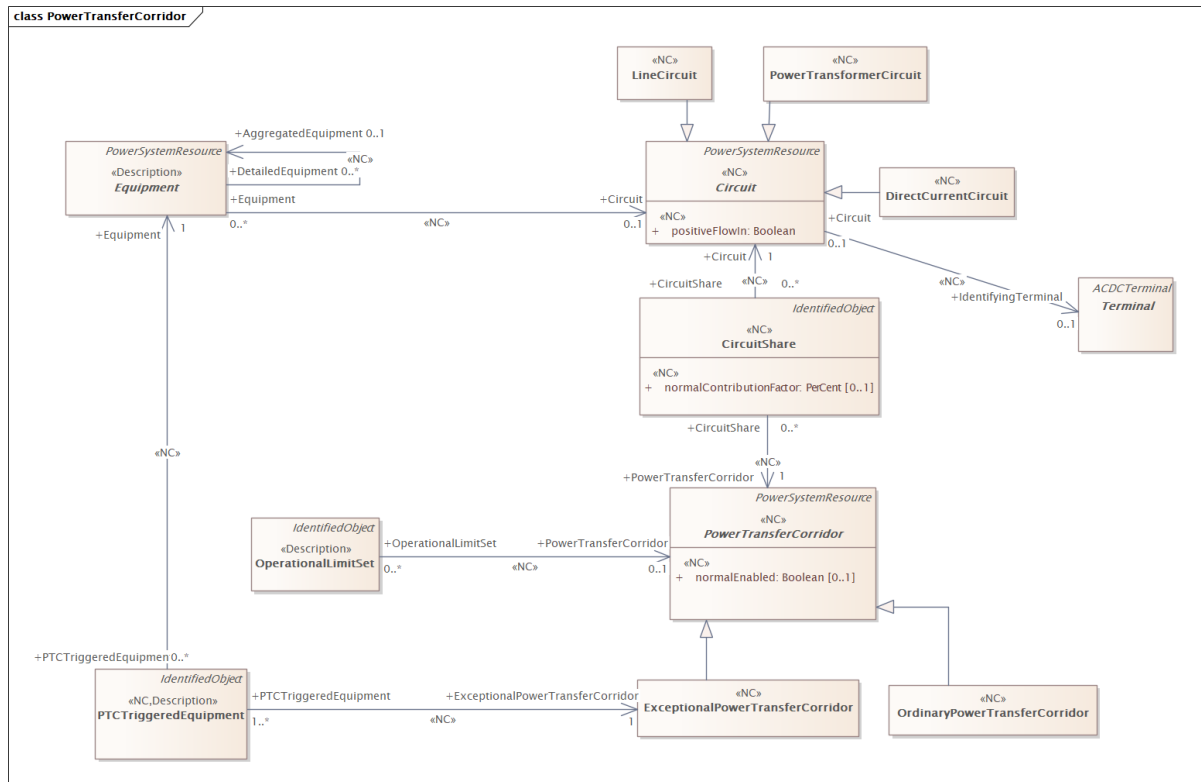


Figure 4: The diagram shows generation and load shift keys related classes.



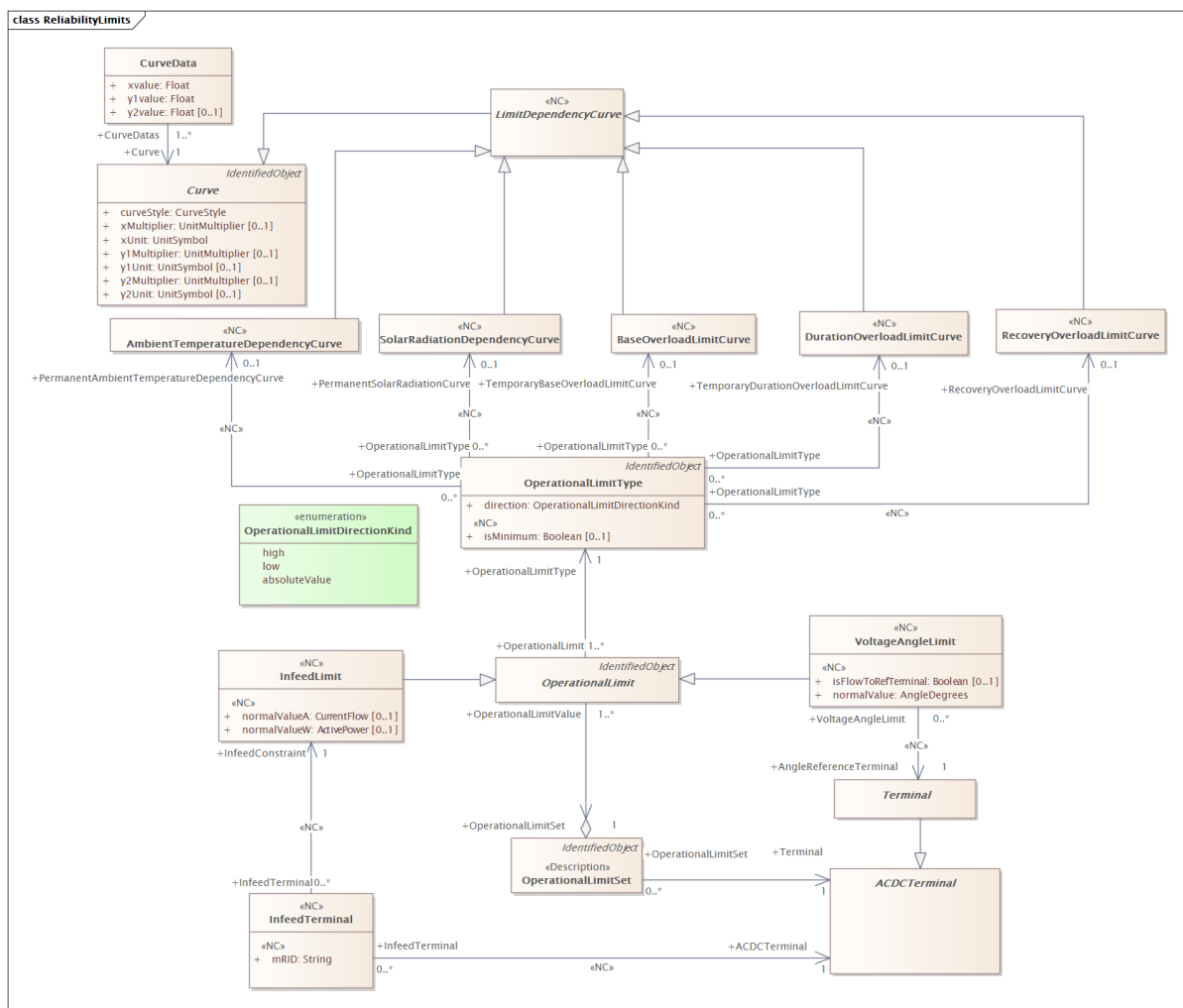
**Figure 5 – Class diagram EquipmentReliabilityProfile::DirectCurrent**

Figure 5: The diagram shows direct current related classes.



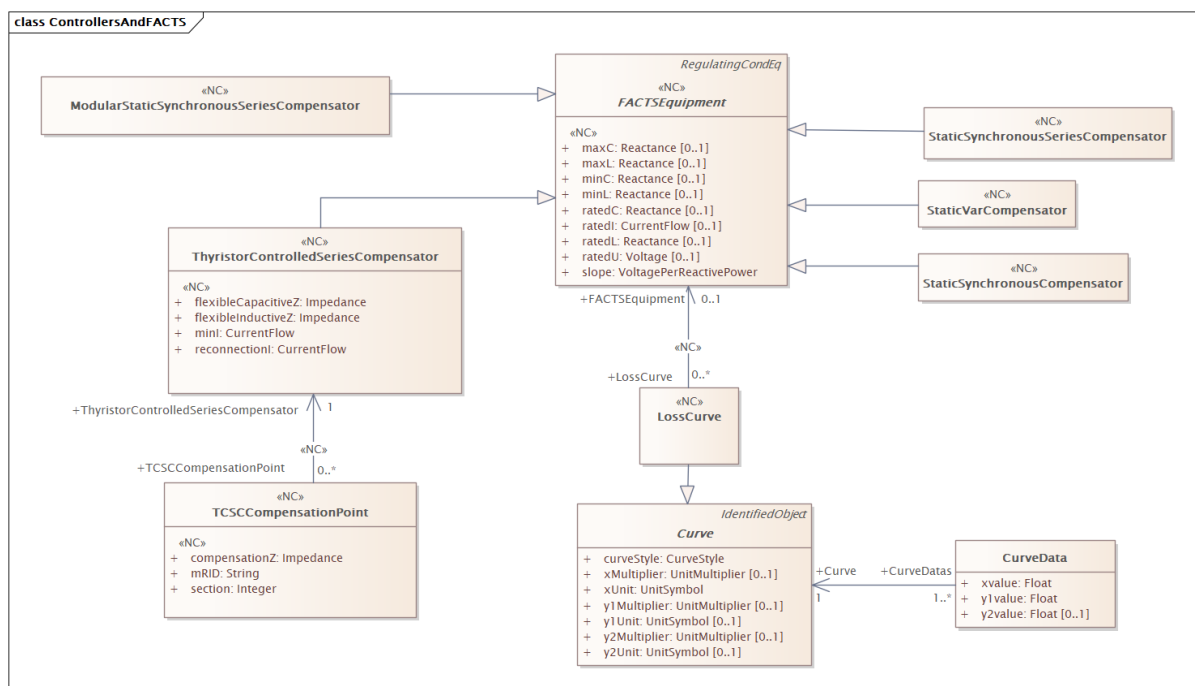
**Figure 6 – Class diagram EquipmentReliabilityProfile::PowerTransferCorridor**

Figure 6: The diagram shows power transfer corridor related classes.



**Figure 7 – Class diagram EquipmentReliabilityProfile::ReliabilityLimits**

Figure 7: The diagram contains main classes related to the reliability limits.



**Figure 8 – Class diagram EquipmentReliabilityProfile::ControllersAndFACTS**

Figure 8: The diagram shows Controllers and FACTS related classes.

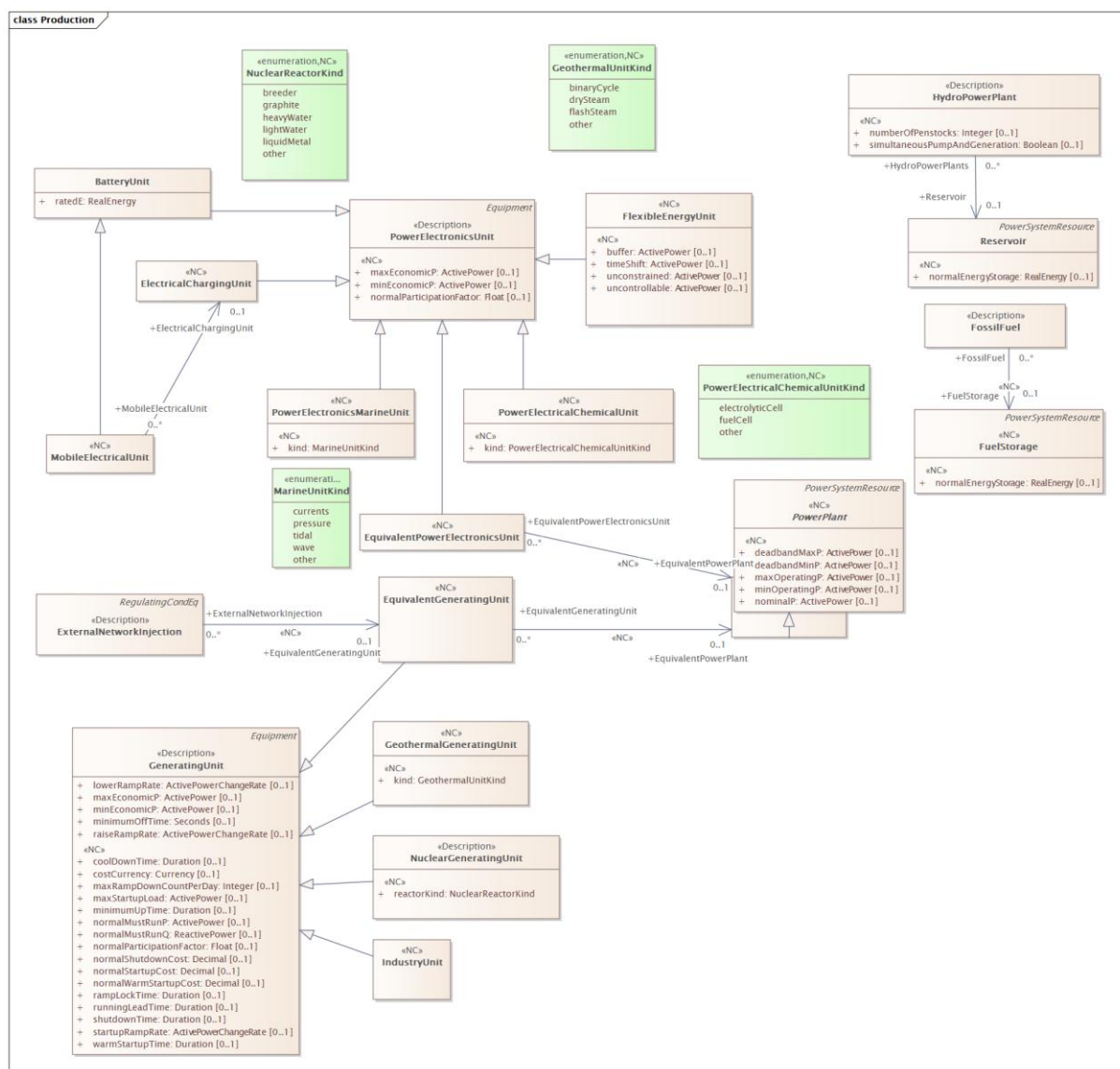
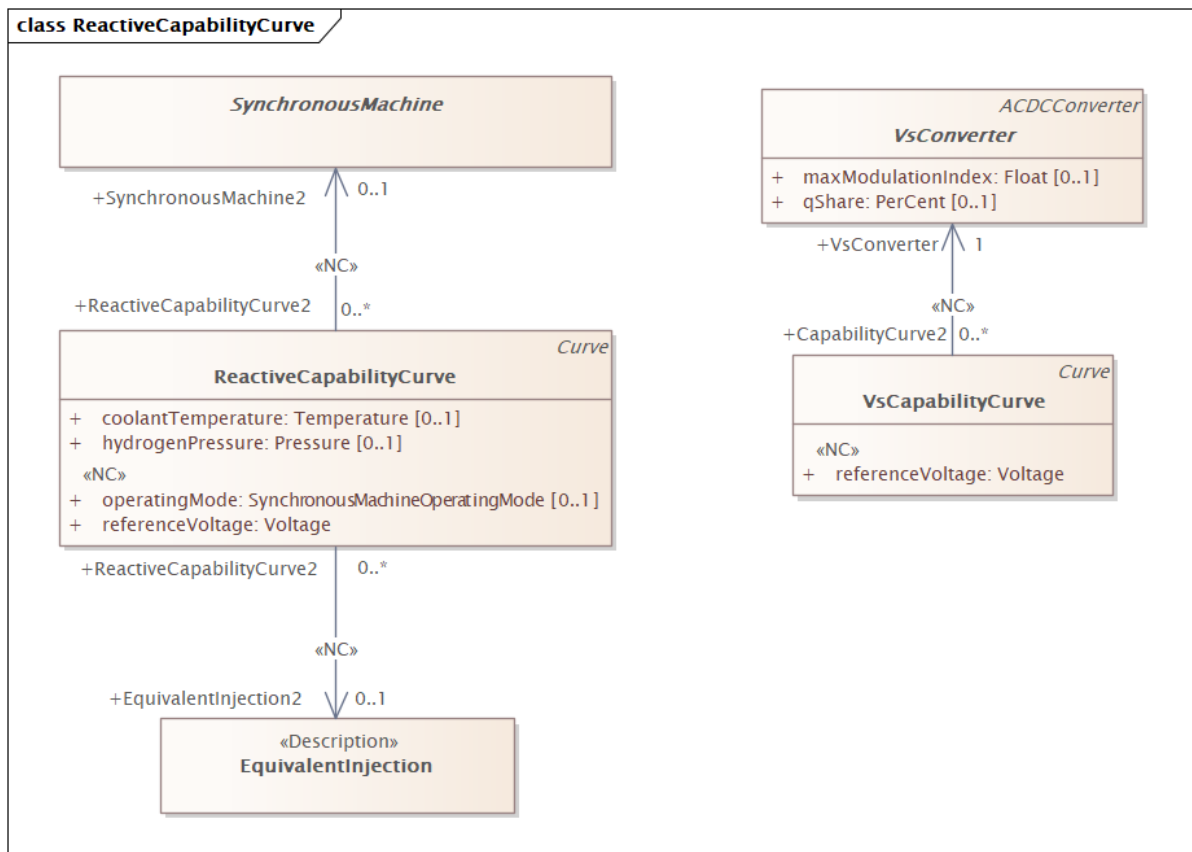


Figure 9 – Class diagram EquipmentReliabilityProfile::Production

Figure 9: The diagram shows production related classes.



**Figure 10 – Class diagram EquipmentReliabilityProfile::ReactiveCapabilityCurve**

Figure 10: The diagram shows classes related to reactive capability curve.

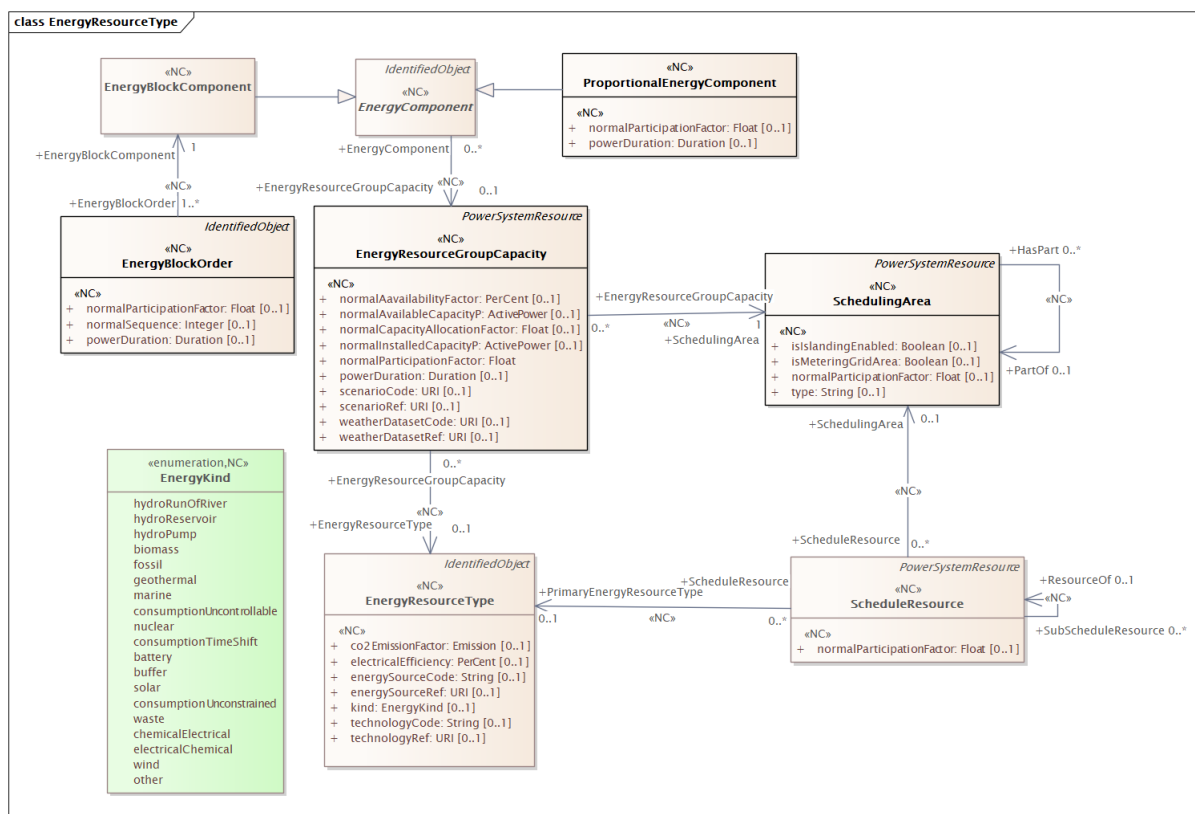
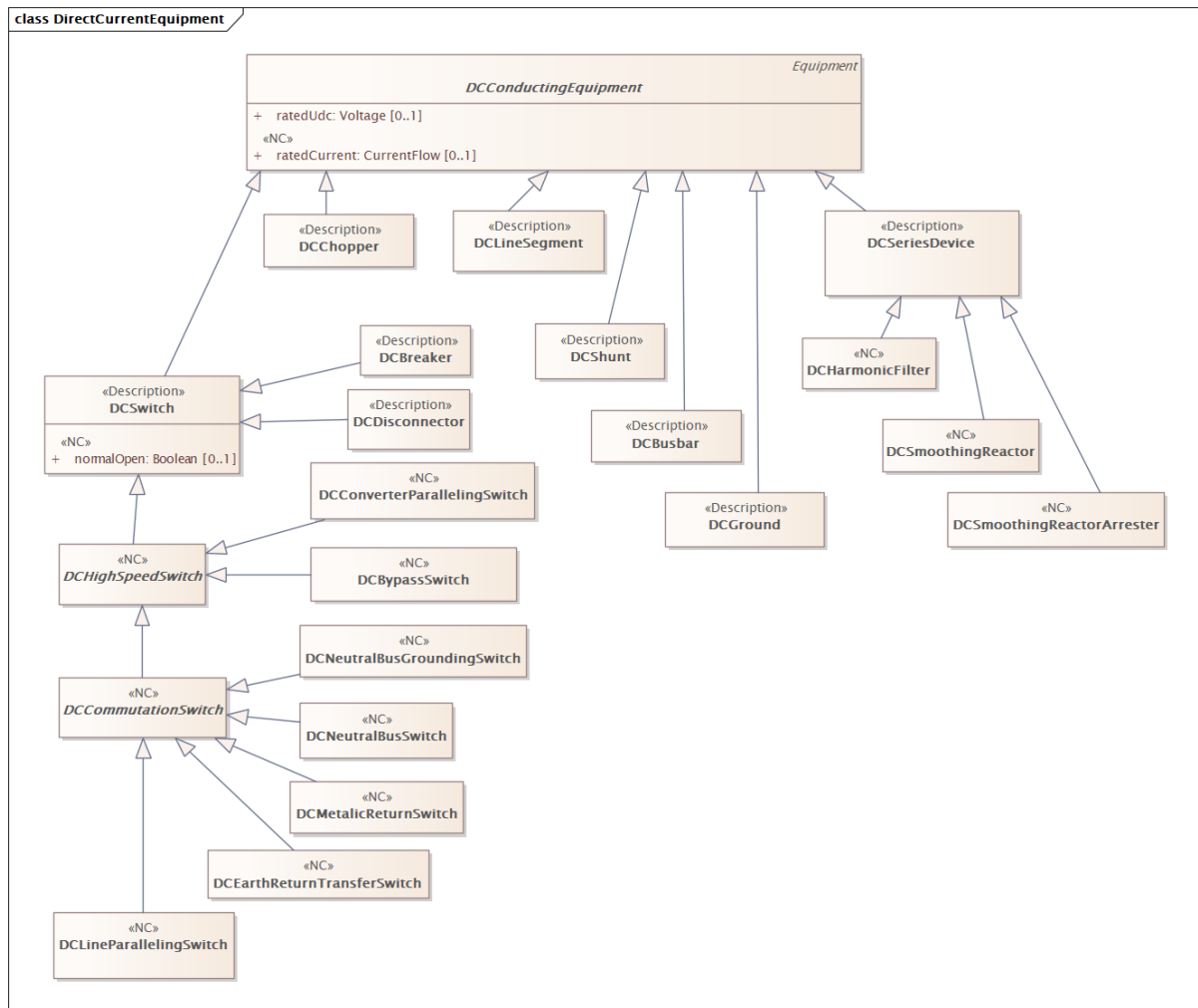


Figure 11 – Class diagram EquipmentReliabilityProfile::EnergyResourceType

Figure 11:



**Figure 12 – Class diagram EquipmentReliabilityProfile::DirectCurrentEquipment**

Figure 12: The diagram shows the DC equipment model.

Figure 13: The diagram contains classes related to direct current control.

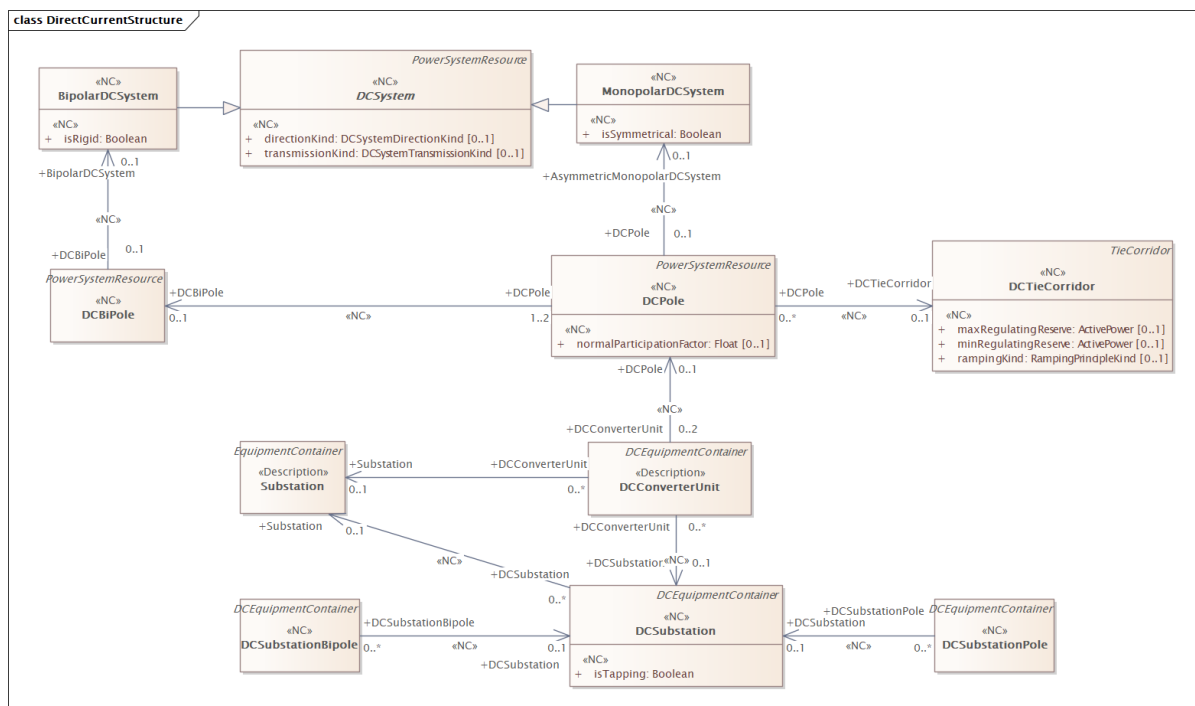
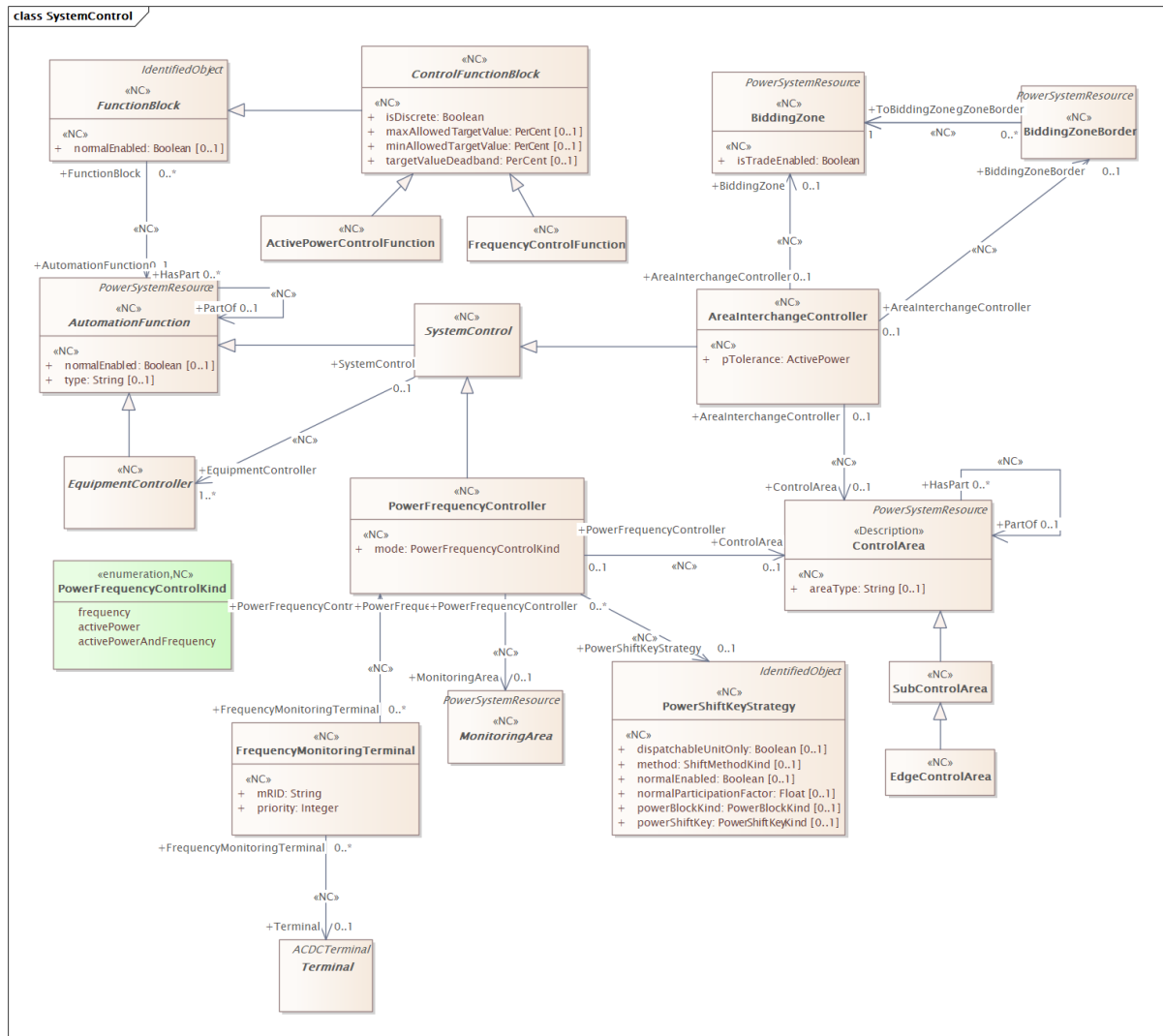
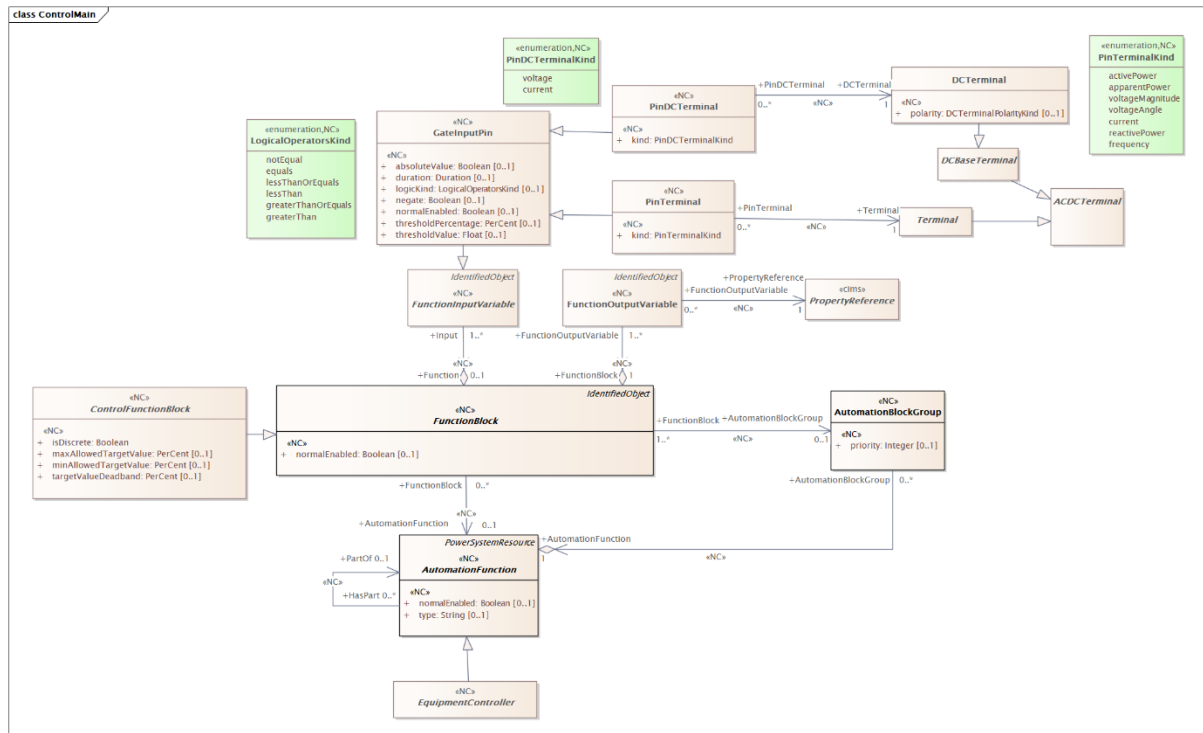


Figure 14: The diagram contains classes related to direct current structure.



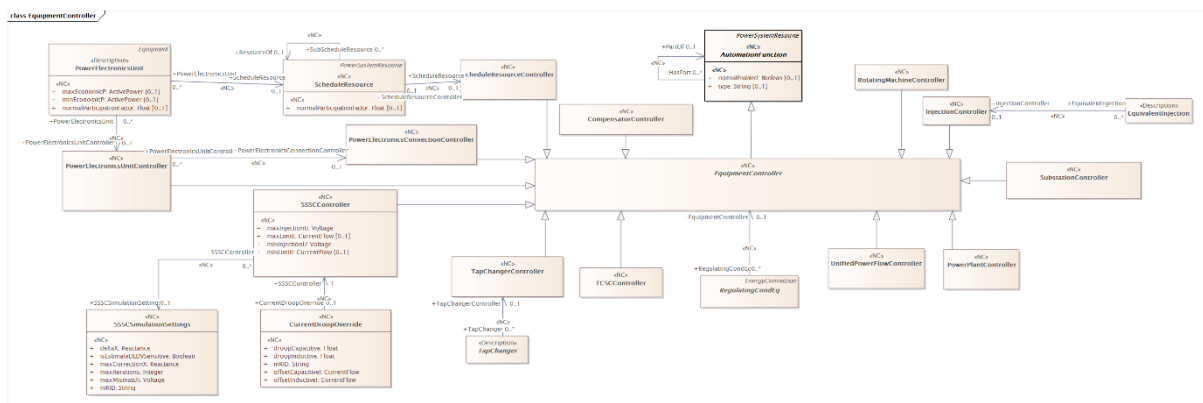
**Figure 15 – Class diagram EquipmentReliabilityProfile::SystemControl**

Figure 15: The diagram contains classes related to system control.



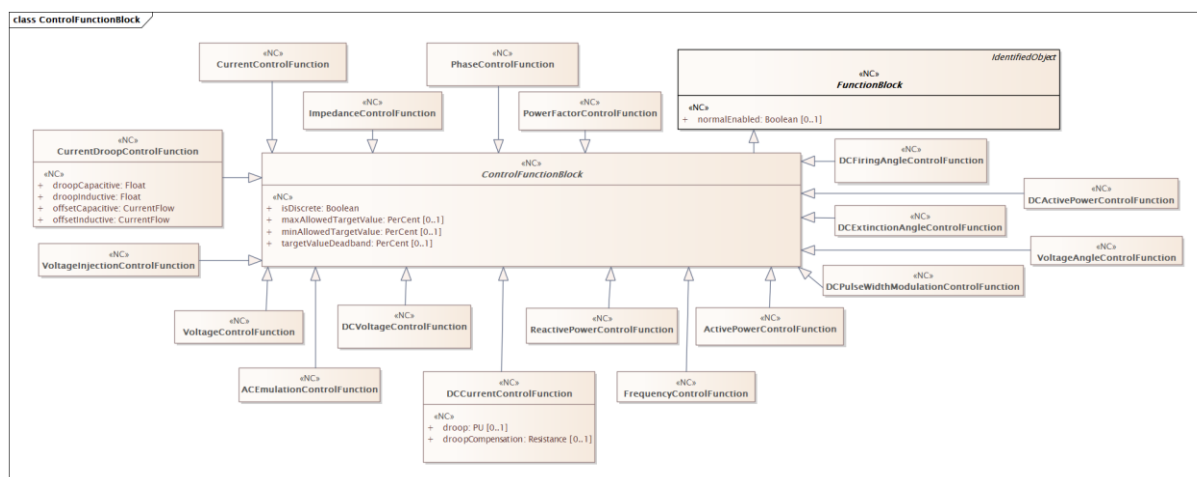
**Figure 16 – Class diagram EquipmentReliabilityProfile::ControlMain**

Figure 16: The diagram shows main structure of the control related classes.



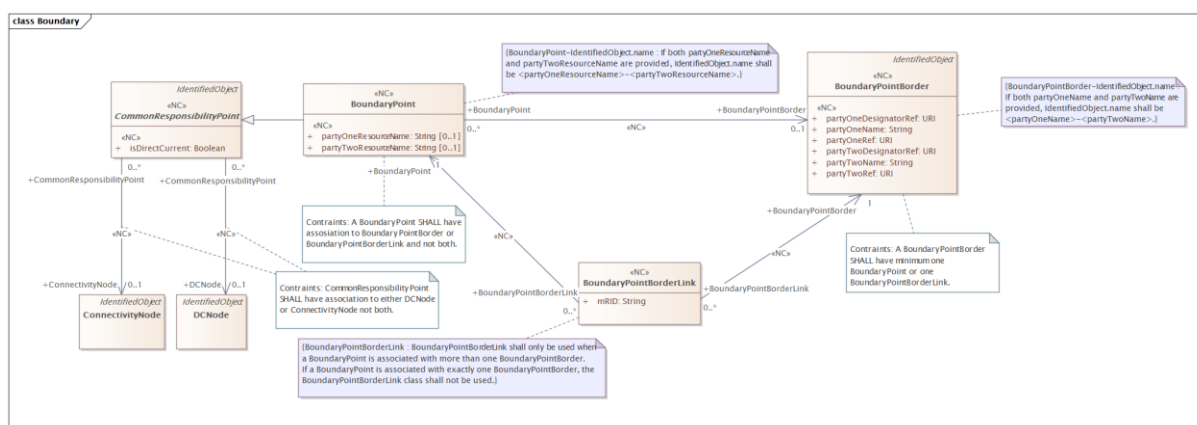
**Figure 17 – Class diagram EquipmentReliabilityProfile::EquipmentController**

Figure 17: The diagram shows equipment controller related classes.



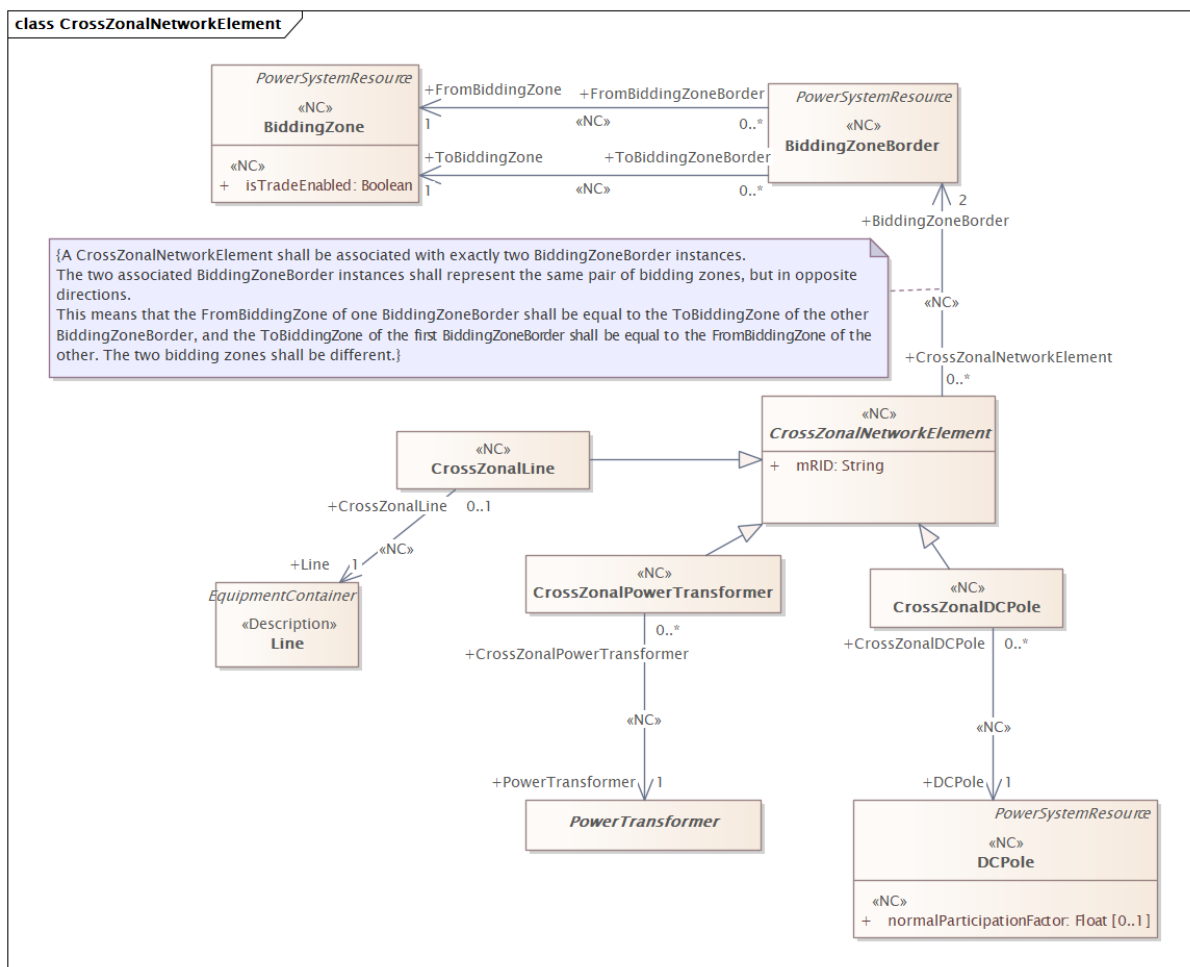
**Figure 18 – Class diagram EquipmentReliabilityProfile::ControlFunctionBlock**

Figure 18: The diagram shows control function block related classes.



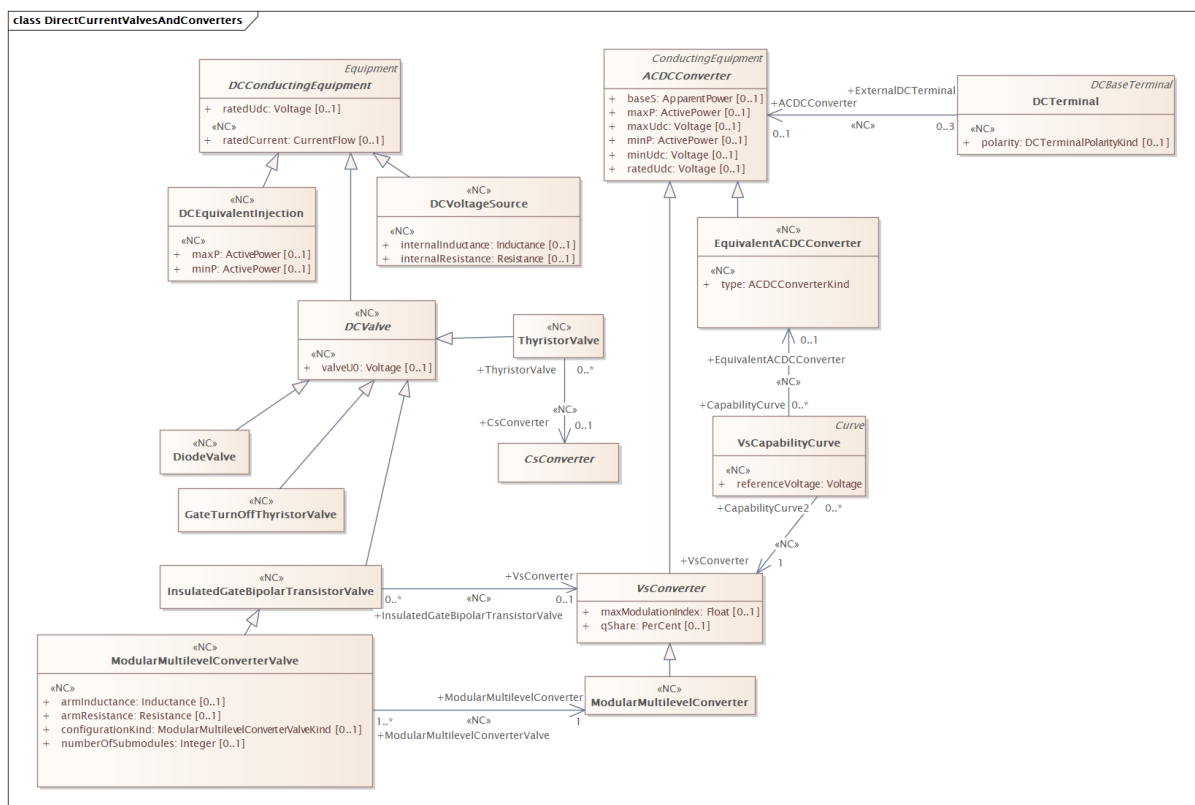
**Figure 19 – Class diagram EquipmentReliabilityProfile::Boundary**

Figure 19: The diagram shows main structure of the boundary related classes.



**Figure 20 – Class diagram EquipmentReliabilityProfile::CrossZonalNetworkElement**

Figure 20: The diagram shows main structure of the cross zonal network element.



**Figure 21 – Class diagram**  
**EquipmentReliabilityProfile::DirectCurrentValvesAndConverters**

Figure 21: The diagram shows main structure of the DC valves and converters.

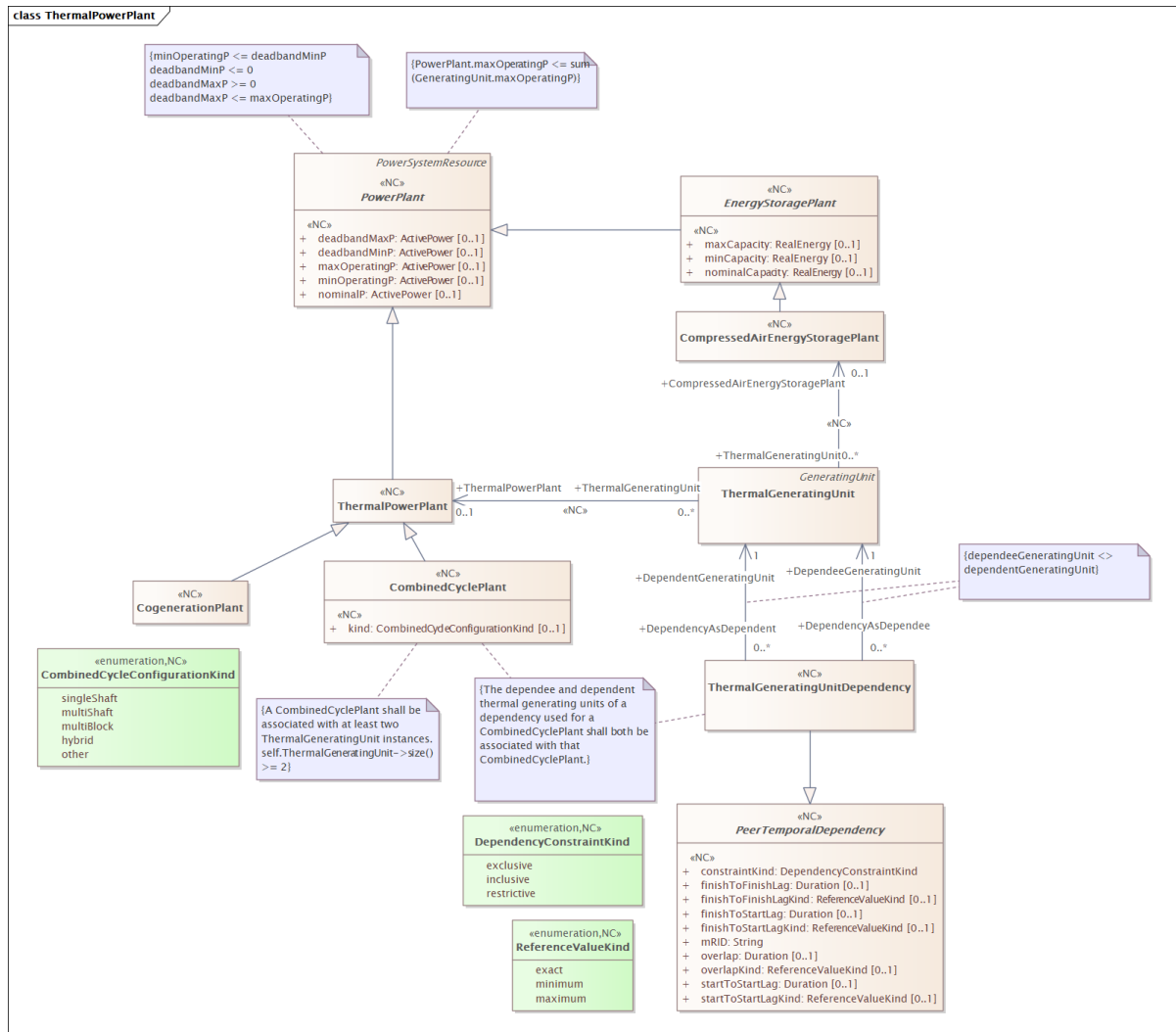


Figure 22 – Class diagram EquipmentReliabilityProfile::ThermalPowerPlant

Figure 22:

### 3.2 (abstract) ACDCCConverter

Inheritance path = [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A unit with valves for three phases, together with unit control equipment, essential protective and switching devices, DC storage capacitors, phase reactors and auxiliaries, if any, used for conversion.

Table 1 shows all attributes of ACDCCConverter.

Table 1 – Attributes of EquipmentReliabilityProfile::ACDCCConverter

| name   | mult | type                          | description                                                                                                                                                                 |
|--------|------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| baseS  | 0..1 | <a href="#">ApparentPower</a> | Base apparent power of the converter pole. The attribute shall be a positive value.                                                                                         |
| maxUdc | 0..1 | <a href="#">Voltage</a>       | The maximum voltage on the DC side at which the converter should operate. It is converter's configuration data used in power flow. The attribute shall be a positive value. |
| minUdc | 0..1 | <a href="#">Voltage</a>       | The minimum voltage on the DC side at which the converter should operate. It is converter's                                                                                 |

| name               | mult | type                        | description                                                                                                                                                                                                                                    |
|--------------------|------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |      |                             | configuration data used in power flow. The attribute shall be a positive value.                                                                                                                                                                |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | Rated converter DC voltage, also called UdN. The attribute shall be a positive value. It is converter's configuration data used in power flow. For instance a bipolar HVDC link with value 200 kV has a 400kV difference between the dc lines. |
| maxP               | 0..1 | <a href="#">ActivePower</a> | Maximum active power limit. The value is overwritten by values of VsCapabilityCurve, if present.                                                                                                                                               |
| minP               | 0..1 | <a href="#">ActivePower</a> | Minimum active power limit. The value is overwritten by values of VsCapabilityCurve, if present.                                                                                                                                               |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                         |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                               |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                               |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                               |

Table 2 shows all association ends of ACDCCConverter with other classes.

**Table 2 – Association ends of EquipmentReliabilityProfile::ACDCCConverter with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.3 (abstract) ACDCTerminal root class

An electrical connection point (AC or DC) to a piece of conducting equipment. Terminals are connected at physical connection points called connectivity nodes.

### 3.4 BatteryUnit

Inheritance path = [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

An electrochemical energy storage device.

Table 3 shows all attributes of BatteryUnit.

**Table 3 – Attributes of EquipmentReliabilityProfile::BatteryUnit**

| name                      | mult | type                        | description                                                                           |
|---------------------------|------|-----------------------------|---------------------------------------------------------------------------------------|
| ratedE                    | 1..1 | <a href="#">RealEnergy</a>  | Full energy storage capacity of the battery. The attribute shall be a positive value. |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>       | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>                             |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>                             |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>                             |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                |
| description               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                      |
| mRID                      | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                      |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 4 shows all association ends of BatteryUnit with other classes.

**Table 4 – Association ends of EquipmentReliabilityProfile::BatteryUnit with other classes**

| mult from | name                           | mult to | type                                           | description                                               |
|-----------|--------------------------------|---------|------------------------------------------------|-----------------------------------------------------------|
| 0..*      | ScheduleResource               | 0..1    | <a href="#">ScheduleResource</a>               | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | PowerElectronicsUnitController | 0..1    | <a href="#">PowerElectronicsUnitController</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | Circuit                        | 0..1    | <a href="#">Circuit</a>                        | (NC) inherited from: <a href="#">Equipment</a>            |
| 0..*      | AggregatedEquipment            | 0..1    | <a href="#">Equipment</a>                      | (NC) inherited from: <a href="#">Equipment</a>            |

### 3.5 (abstract) ConductingEquipment

Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

The parts of the AC power system that are designed to carry current or that are conductively connected through terminals.

Table 5 shows all attributes of ConductingEquipment.

**Table 5 – Attributes of EquipmentReliabilityProfile::ConductingEquipment**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 6 shows all association ends of ConductingEquipment with other classes.

**Table 6 – Association ends of EquipmentReliabilityProfile::ConductingEquipment with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.6 (abstract) Conductor

Inheritance path = [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Combination of conducting material with consistent electrical characteristics, building a single electrical system, used to carry current between points in the power system.

Table 7 shows all attributes of Conductor.

**Table 7 – Attributes of EquipmentReliabilityProfile::Conductor**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 8 shows all association ends of Conductor with other classes.

**Table 8 – Association ends of EquipmentReliabilityProfile::Conductor with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.7 ConnectivityNode

Inheritance path = [IdentifiedObject](#)

Connectivity nodes are points where terminals of AC conducting equipment are connected together with zero impedance.

Table 9 shows all attributes of ConnectivityNode.

**Table 9 – Attributes of EquipmentReliabilityProfile::ConnectivityNode**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

### 3.8 (abstract) ConnectivityNodeContainer

Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

A base class for all objects that may contain connectivity nodes or topological nodes.

Table 10 shows all attributes of ConnectivityNodeContainer.

**Table 10 – Attributes of EquipmentReliabilityProfile::ConnectivityNodeContainer**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

### 3.9 (abstract) CsConverter root class

DC side of the current source converter (CSC).

The firing angle controls the dc voltage at the converter, both for rectifier and inverter. The difference between the dc voltages of the rectifier and inverter determines the dc current. The extinction angle is used to limit the dc voltage at the inverter, if needed, and is not used in active power control. The firing angle, transformer tap position and number of connected filters are the primary means to control a current source dc line. Higher level controls are built on top, e.g. dc voltage, dc current and active power. From a steady state perspective it is sufficient to specify the wanted active power transfer (ACDCConverter.targetPpcc) and the control functions will set the dc voltage, dc current, firing angle, transformer tap position and number of connected filters to meet this. Therefore attributes targetAlpha and targetGamma are not applicable in this case.

The reactive power consumed by the converter is a function of the firing angle, transformer tap position and number of connected filter, which can be approximated with half of the active power. The losses is a function of the dc voltage and dc current.

The attributes minAlpha and maxAlpha define the range of firing angles for rectifier operation between which no discrete tap changer action takes place. The range is typically 10-18 degrees. The attributes minGamma and maxGamma define the range of extinction angles for inverter operation between which no discrete tap changer action takes place. The range is typically 17-20 degrees.

### 3.10 (abstract) Curve

Inheritance path = [IdentifiedObject](#)

A multi-purpose curve or functional relationship between an independent variable (X-axis) and dependent (Y-axis) variables.

Table 11 shows all attributes of Curve.

**Table 11 – Attributes of EquipmentReliabilityProfile::Curve**

| name               | mult | type                           | description                                                            |
|--------------------|------|--------------------------------|------------------------------------------------------------------------|
| curveStyle         | 1..1 | <a href="#">CurveStyle</a>     | The style or shape of the curve.                                       |
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a> | Multiplier for X-axis.                                                 |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>     | The X-axis units of measure.                                           |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | Multiplier for Y1-axis.                                                |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>     | The Y1-axis units of measure.                                          |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | Multiplier for Y2-axis.                                                |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>     | The Y2-axis units of measure.                                          |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |

### 3.11 CurveData root class

Multi-purpose data points for defining a curve. The use of this generic class is discouraged if a more specific class can be used to specify the X and Y axis values along with their specific data types.

Table 12 shows all attributes of CurveData.

**Table 12 – Attributes of EquipmentReliabilityProfile::CurveData**

| name   | mult | type                  | description                                                           |
|--------|------|-----------------------|-----------------------------------------------------------------------|
| xvalue | 1..1 | <a href="#">Float</a> | The data value of the X-axis variable, depending on the X-axis units. |

| name    | mult | type                  | description                                                                               |
|---------|------|-----------------------|-------------------------------------------------------------------------------------------|
| y1value | 1..1 | <a href="#">Float</a> | The data value of the first Y-axis variable, depending on the Y-axis units.               |
| y2value | 0..1 | <a href="#">Float</a> | The data value of the second Y-axis variable (if present), depending on the Y-axis units. |

Table 13 shows all association ends of CurveData with other classes.

**Table 13 – Association ends of EquipmentReliabilityProfile::CurveData with other classes**

| mult from | name  | mult to | type                  | description                         |
|-----------|-------|---------|-----------------------|-------------------------------------|
| 1..*      | Curve | 1..1    | <a href="#">Curve</a> | The curve of this curve data point. |

### 3.12 (abstract) DCBaseTerminal

Inheritance path = [ACDCTerminal](#)

An electrical connection point at a piece of DC conducting equipment. DC terminals are connected at one physical DC node that may have multiple DC terminals connected. A DC node is similar to an AC connectivity node. The model requires that DC connections are distinct from AC connections.

### 3.13 (abstract) DCConductingEquipment

Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

The parts of the DC power system that are designed to carry current or that are conductively connected through DC terminals.

Table 14 shows all attributes of DCConductingEquipment.

**Table 14 – Attributes of EquipmentReliabilityProfile::DCConductingEquipment**

| name               | mult | type                        | description                                                                                                                                                 |
|--------------------|------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) The maximum continuous current carrying capacity in amps governed by the device material and construction.<br>The attribute shall be a positive value. |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | Rated DC device voltage. The attribute shall be a positive value. It is configuration data used in power flow.                                              |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                      |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                            |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                            |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                            |

Table 15 shows all association ends of DCConductingEquipment with other classes.

**Table 15 – Association ends of EquipmentReliabilityProfile::DCConductingEquipment with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.14 (abstract) DCEquipmentContainer**

Inheritance path = [EquipmentContainer](#) : [ConnectivityNodeContainer](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A modelling construct to provide a root class for containment of DC as well as AC equipment. The class differ from the EquipmentContainer for AC in that it may also contain DCNode-s. Hence it can contain both AC and DC equipment.

Table 16 shows all attributes of DCEquipmentContainer.

**Table 16 – Attributes of EquipmentReliabilityProfile::DCEquipmentContainer**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

**3.15 DCNode**

Inheritance path = [IdentifiedObject](#)

DC nodes are points where terminals of DC conducting equipment are connected together with zero impedance.

Table 17 shows all attributes of DCNode.

**Table 17 – Attributes of EquipmentReliabilityProfile::DCNode**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

**3.16 DCTerminal**

Inheritance path = [DCBaseTerminal](#) : [ACDCTerminal](#)

An electrical connection point to generic DC conducting equipment.

Table 18 shows all attributes of DCTerminal.

**Table 18 – Attributes of EquipmentReliabilityProfile::DCTerminal**

| name     | mult | type                                   | description                                            |
|----------|------|----------------------------------------|--------------------------------------------------------|
| polarity | 0..1 | <a href="#">DCTerminalPolarityKind</a> | (NC) Represents the normal network polarity condition. |

Table 19 shows all association ends of DCTerminal with other classes.

**Table 19 – Association ends of EquipmentReliabilityProfile::DCTerminal with other classes**

| mult from | name           | mult to | type                           | description                                                |
|-----------|----------------|---------|--------------------------------|------------------------------------------------------------|
| 0..3      | ACDCCConverter | 0..1    | <a href="#">ACDCCConverter</a> | (NC) The ACDCCConverter that has this external DCTerminal. |

**3.17 (abstract) EnergyConnection**

Inheritance path = [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A connection of energy generation or consumption on the power system model.

Table 20 shows all attributes of EnergyConnection.

**Table 20 – Attributes of EquipmentReliabilityProfile::EnergyConnection**

| name              | mult | type                   | description                                                            |
|-------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdetCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description       | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID              | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name              | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 21 shows all association ends of EnergyConnection with other classes.

**Table 21 – Association ends of EquipmentReliabilityProfile::EnergyConnection with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.18 (abstract) EquipmentContainer**

Inheritance path = [ConnectivityNodeContainer](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A modelling construct to provide a root class for containing equipment.

Table 22 shows all attributes of EquipmentContainer.

**Table 22 – Attributes of EquipmentReliabilityProfile::EquipmentContainer**

| name              | mult | type                   | description                                                            |
|-------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdetCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description       | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID              | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name              | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

**3.19 (abstract) IdentifiedObject root class**

This is a root class to provide common identification for all classes needing identification and naming attributes.

Table 23 shows all attributes of IdentifiedObject.

**Table 23 – Attributes of EquipmentReliabilityProfile::IdentifiedObject**

| name              | mult | type                   | description                                                                                                                                                                                                                                 |
|-------------------|------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| energyIdetCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) The attribute is used for an exchange of the EIC code (Energy identification Code). The length of the string is 16 characters as defined by the EIC code. For details on EIC scheme please refer to ENTSO-E web site. |

| name        | mult | type                   | description                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------|------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| description | 0..1 | <a href="#">String</a> | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy.                                                                                                                                                                                                                                                              |
| mRID        | 1..1 | <a href="#">String</a> | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br><br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| name        | 0..1 | <a href="#">String</a> | The name is any free human readable and possibly non unique text naming the object.                                                                                                                                                                                                                                                                                                                           |

1587

1588 **3.20 (abstract) OperationalLimit**1589 Inheritance path = [IdentifiedObject](#)

1590 A value and normal value associated with a specific kind of limit.

1591 The sub class value and normalValue attributes vary inversely to the associated  
1592 OperationalLimitType.acceptableDuration (acceptableDuration for short).1593 If a particular piece of equipment has multiple operational limits of the same kind (apparent  
1594 power, current, etc.), the limit with the greatest acceptableDuration shall have the smallest limit  
1595 value and the limit with the smallest acceptableDuration shall have the largest limit value. Note:  
1596 A large current can only be allowed to flow through a piece of equipment for a short duration  
1597 without causing damage, but a lesser current can be allowed to flow for a longer duration.

1598 Table 24 shows all attributes of OperationalLimit.

1599 **Table 24 – Attributes of EquipmentReliabilityProfile::OperationalLimit**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

1600

1601 Table 25 shows all association ends of OperationalLimit with other classes.

1602 **Table 25 – Association ends of EquipmentReliabilityProfile::OperationalLimit with other**  
1603 **classes**

| mult from | name                 | mult to | type                                 | description                                     |
|-----------|----------------------|---------|--------------------------------------|-------------------------------------------------|
| 1..*      | OperationalLimitType | 1..1    | <a href="#">OperationalLimitType</a> | The limit type associated with this limit.      |
| 1..*      | OperationalLimitSet  | 1..1    | <a href="#">OperationalLimitSet</a>  | The limit set to which the limit values belong. |

1604

1605 **3.21 OperationalLimitType**1606 Inheritance path = [IdentifiedObject](#)

1607 The operational meaning of a category of limits.

1608 Table 26 shows all attributes of OperationalLimitType.

1609 **Table 26 – Attributes of EquipmentReliabilityProfile::OperationalLimitType**

| name               | mult | type                                          | description                                                                                                                                                                                                                                                       |
|--------------------|------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| direction          | 1..1 | <a href="#">OperationalLimitDirectionKind</a> | The direction of the limit.                                                                                                                                                                                                                                       |
| isMinimum          | 0..1 | <a href="#">Boolean</a>                       | (NC) Defines if the operational limit type is minimum. If true, the value is a minimum value of the same kind. This applies to stability and PATL. If false, the limit has the normal behaviour. OperationalLimitType.direction attribute shall be absoluteValue. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                        | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                            |
| description        | 0..1 | <a href="#">String</a>                        | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                  |
| mRID               | 1..1 | <a href="#">String</a>                        | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                  |
| name               | 0..1 | <a href="#">String</a>                        | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                  |

1610  
1611 Table 27 shows all association ends of OperationalLimitType with other classes.

1612 **Table 27 – Association ends of EquipmentReliabilityProfile::OperationalLimitType with**  
1613 **other classes**

| mult from | name                                       | mult to | type                                              | description                                                                              |
|-----------|--------------------------------------------|---------|---------------------------------------------------|------------------------------------------------------------------------------------------|
| 0..*      | PermanentSolarRadiationCurve               | 0..1    | <a href="#">SolarRadiationDependencyCurve</a>     | (NC) The permanent solar radiation curve for this operational limit type.                |
| 0..*      | TemporaryDurationOverloadLimitCurve        | 0..1    | <a href="#">DurationOverloadLimitCurve</a>        | (NC) The temporary duration overload limit curve for this operational limit type.        |
| 0..*      | TemporaryBaseOverloadLimitCurve            | 0..1    | <a href="#">BaseOverloadLimitCurve</a>            | (NC) The temporary base overload limit curve for this operational limit type.            |
| 0..*      | PermanentAmbientTemperatureDependencyCurve | 0..1    | <a href="#">AmbientTemperatureDependencyCurve</a> | (NC) The permanent ambient temperature dependency curve for this operational limit type. |
| 0..*      | RecoveryOverloadLimitCurve                 | 0..1    | <a href="#">RecoveryOverloadLimitCurve</a>        | (NC) This is the curve which provides the recovery time information for this limit type. |

### 1614 1615 3.22 Organisation

1616 Inheritance path = [IdentifiedObject](#)

1617 Organisation that might have roles as utility, contractor, supplier, manufacturer, customer, etc.

1618 Table 28 shows all attributes of Organisation.

1619 **Table 28 – Attributes of EquipmentReliabilityProfile::Organisation**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

### 1620 1621 3.23 (abstract) OrganisationRole

1622 Inheritance path = [IdentifiedObject](#)

1623 Identifies a way in which an organisation may participate in the utility enterprise (e.g., customer,  
1624 manufacturer, etc).

1625 Table 29 shows all attributes of OrganisationRole.

1626 **Table 29 – Attributes of EquipmentReliabilityProfile::OrganisationRole**

| name                 | mult | type                   | description                                                                                                                                                                                                                                                                                                                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) The Global Location Number (GLN) is part of the GS1 systems of standards. GLN is a 13-digit number structured that include GS1 Company Prefix, Location Reference (N1-N12) and Check Digit (N13).<br><br>GS1 is a neutral, not-for-profit, international organisation that develops and maintains standards for supply and demand chains across multiple sectors. |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                 |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                       |

1627  
1628 Table 30 shows all association ends of OrganisationRole with other classes.

1629 **Table 30 – Association ends of EquipmentReliabilityProfile::OrganisationRole with**  
1630 **other classes**

| mult from | name         | mult to | type                         | description                    |
|-----------|--------------|---------|------------------------------|--------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | Organisation having this role. |

### 1631 1632 3.24 (abstract) PowerSystemResource

1633 Inheritance path = [IdentifiedObject](#)

1634 A power system resource (PSR) can be an item of equipment such as a switch, an equipment  
1635 container containing many individual items of equipment such as a substation, or an  
1636 organisational entity such as sub-control area. Power system resources can have  
1637 measurements associated.

1638 Table 31 shows all attributes of PowerSystemResource.

1639 **Table 31 – Attributes of EquipmentReliabilityProfile::PowerSystemResource**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

### 1640 1641 3.25 (abstract) PowerTransformer root class

1642 An electrical device consisting of two or more coupled windings, with or without a magnetic  
1643 core, for introducing mutual coupling between electric circuits. Transformers can be used to  
1644 control voltage and phase shift (active power flow).

1645 A power transformer may be composed of separate transformer tanks that need not be identical.

A power transformer can be modelled with or without tanks and is intended for use in both balanced and unbalanced representations. A power transformer typically has two terminals, but may have one (grounding), three or more terminals.

The inherited association ConductingEquipment.BaseVoltage should not be used. The association from TransformerEnd to BaseVoltage should be used instead.

### 3.26 ReactiveCapabilityCurve

Inheritance path = [Curve](#) : [IdentifiedObject](#)

Reactive power rating envelope versus the synchronous machine's active power, in both the generating and motoring modes. For each active power value there is a corresponding high and low reactive power limit value. Typically there will be a separate curve for each coolant condition, such as hydrogen pressure. The Y1 axis values represent reactive minimum and the Y2 axis values represent reactive maximum.

Table 32 shows all attributes of ReactiveCapabilityCurve.

**Table 32 – Attributes of EquipmentReliabilityProfile::ReactiveCapabilityCurve**

| name               | mult | type                                            | description                                                                                                                                                                                                                                                 |
|--------------------|------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| referenceVoltage   | 1..1 | <a href="#">Voltage</a>                         | (NC) The reference voltage for which the capability curve is valid.                                                                                                                                                                                         |
| coolantTemperature | 0..1 | <a href="#">Temperature</a>                     | The machine's coolant temperature (e.g., ambient air or stator circulating water).                                                                                                                                                                          |
| hydrogenPressure   | 0..1 | <a href="#">Pressure</a>                        | The hydrogen coolant pressure.                                                                                                                                                                                                                              |
| operatingMode      | 0..1 | <a href="#">SynchronousMachineOperatingMode</a> | (NC) The operating mode of synchronous machine for which the reactive capability curve is valid for. In case the attribute is not provided it is assumed that the reactive capability curve covers all possible operating modes of the synchronous machine. |
| curveStyle         | 1..1 | <a href="#">CurveStyle</a>                      | inherited from: <a href="#">Curve</a>                                                                                                                                                                                                                       |
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a>                  | inherited from: <a href="#">Curve</a>                                                                                                                                                                                                                       |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>                      | inherited from: <a href="#">Curve</a>                                                                                                                                                                                                                       |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a>                  | inherited from: <a href="#">Curve</a>                                                                                                                                                                                                                       |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>                      | inherited from: <a href="#">Curve</a>                                                                                                                                                                                                                       |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a>                  | inherited from: <a href="#">Curve</a>                                                                                                                                                                                                                       |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>                      | inherited from: <a href="#">Curve</a>                                                                                                                                                                                                                       |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                          | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                      |
| description        | 0..1 | <a href="#">String</a>                          | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                            |
| mRID               | 1..1 | <a href="#">String</a>                          | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                            |
| name               | 0..1 | <a href="#">String</a>                          | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                            |

Table 33 shows all association ends of ReactiveCapabilityCurve with other classes.

**Table 33 – Association ends of EquipmentReliabilityProfile::ReactiveCapabilityCurve with other classes**

| mult from | name                 | mult to | type                                | description                                                         |
|-----------|----------------------|---------|-------------------------------------|---------------------------------------------------------------------|
| 0..*      | SynchronousMachine2  | 0..1    | <a href="#">SynchronousMachine</a>  | (NC) Synchronous machine using this curve.                          |
| 0..*      | EquivalentInjection2 | 0..1    | <a href="#">EquivalentInjection</a> | (NC) The equivalent injection using this reactive capability curve. |

**3.27 (abstract) RegulatingCondEq**

Inheritance path = [EnergyConnection](#) : [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A type of conducting equipment that can regulate a quantity (i.e. voltage or flow) at a specific point in the network.

Table 34 shows all attributes of RegulatingCondEq.

**Table 34 – Attributes of EquipmentReliabilityProfile::RegulatingCondEq**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 35 shows all association ends of RegulatingCondEq with other classes.

**Table 35 – Association ends of EquipmentReliabilityProfile::RegulatingCondEq with other classes**

| mult from | name                | mult to | type                                | description                                                             |
|-----------|---------------------|---------|-------------------------------------|-------------------------------------------------------------------------|
| 0..*      | EquipmentController | 0..1    | <a href="#">EquipmentController</a> | (NC) The equipment controller for this regulating conducting equipment. |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>             | (NC) inherited from: <a href="#">Equipment</a>                          |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>           | (NC) inherited from: <a href="#">Equipment</a>                          |

**3.28 Reservoir**

Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

A water storage facility within a hydro system, including: ponds, lakes, lagoons, and rivers. The storage is usually behind some type of dam.

Table 36 shows all attributes of Reservoir.

**Table 36 – Attributes of EquipmentReliabilityProfile::Reservoir**

| name                | mult | type                       | description                                                            |
|---------------------|------|----------------------------|------------------------------------------------------------------------|
| normalEnergyStorage | 0..1 | <a href="#">RealEnergy</a> | (NC) Normal amount of energy available in the storage.                 |
| energyIdentCodeEic  | 0..1 | <a href="#">String</a>     | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description         | 0..1 | <a href="#">String</a>     | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                | 1..1 | <a href="#">String</a>     | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                | 0..1 | <a href="#">String</a>     | inherited from: <a href="#">IdentifiedObject</a>                       |

**3.29 (abstract) SynchronousMachine root class**

An electromechanical device that operates with shaft rotating synchronously with the network. It is a single machine operating either as a generator or synchronous condenser or pump.

**3.30 (abstract) Terminal**

Inheritance path = [ACDCTerminal](#)

An AC electrical connection point to a piece of conducting equipment. Terminals are connected at physical connection points called connectivity nodes.

**3.31 ThermalGeneratingUnit**

Inheritance path = [GeneratingUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A generating unit whose prime mover could be a steam turbine, combustion turbine, or diesel engine.

Table 37 shows all attributes of ThermalGeneratingUnit.

**Table 37 – Attributes of EquipmentReliabilityProfile::ThermalGeneratingUnit**

| name                      | mult | type                                  | description                                                            |
|---------------------------|------|---------------------------------------|------------------------------------------------------------------------|
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| maxStartupLoad            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| shutdownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| lowerRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| raiseRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| minimumOffTime            | 0..1 | <a href="#">Seconds</a>               | inherited from: <a href="#">GeneratingUnit</a>                         |
| warmStartupTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| coolDownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| startupRampRate           | 0..1 | <a href="#">ActivePowerChangeRate</a> | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunP            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| runningLeadTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minimumUpTime             | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalStartupCost         | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalWarmStartupCost     | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunQ            | 0..1 | <a href="#">ReactivePower</a>         | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| maxRampDownCountPerDay    | 0..1 | <a href="#">Integer</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| rampLockTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| costCurrency              | 0..1 | <a href="#">Currency</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalShutdownCost        | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>                 | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>                | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                      | 1..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                      | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 38 shows all association ends of ThermalGeneratingUnit with other classes.

**Table 38 – Association ends of EquipmentReliabilityProfile::ThermalGeneratingUnit with other classes**

| mult from | name                            | mult to | type                                            | description                                                                                     |
|-----------|---------------------------------|---------|-------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 0..*      | CompressedAirEnergyStoragePlant | 0..1    | <a href="#">CompressedAirEnergyStoragePlant</a> | (NC) The compressed air energy storage plant of which this thermal generating unit is a member. |

| mult from | name                | mult to | type                              | description                                                                 |
|-----------|---------------------|---------|-----------------------------------|-----------------------------------------------------------------------------|
| 0..*      | ThermalPowerPlant   | 0..1    | <a href="#">ThermalPowerPlant</a> | (NC) The thermal power plant that coordinates this thermal generating unit. |
| 0..*      | ScheduleResource    | 0..1    | <a href="#">ScheduleResource</a>  | (NC) inherited from: <a href="#">GeneratingUnit</a>                         |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>           | (NC) inherited from: <a href="#">Equipment</a>                              |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>         | (NC) inherited from: <a href="#">Equipment</a>                              |

### 3.32 VsCapabilityCurve

Inheritance path = [Curve](#) : [IdentifiedObject](#)

The P-Q capability curve for a voltage source converter, with P on X-axis and Qmin and Qmax on Y1-axis and Y2-axis.

Table 39 shows all attributes of VsCapabilityCurve.

**Table 39 – Attributes of EquipmentReliabilityProfile::VsCapabilityCurve**

| name               | mult | type                           | description                                                            |
|--------------------|------|--------------------------------|------------------------------------------------------------------------|
| referenceVoltage   | 1..1 | <a href="#">Voltage</a>        | (NC) The reference voltage for which the capability curve is valid.    |
| curveStyle         | 1..1 | <a href="#">CurveStyle</a>     | inherited from: <a href="#">Curve</a>                                  |
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 40 shows all association ends of VsCapabilityCurve with other classes.

**Table 40 – Association ends of EquipmentReliabilityProfile::VsCapabilityCurve with other classes**

| mult from | name                    | mult to | type                                    | description                                                          |
|-----------|-------------------------|---------|-----------------------------------------|----------------------------------------------------------------------|
| 0..*      | VsConverter             | 1..1    | <a href="#">VsConverter</a>             | (NC) Converter with this capability curve.                           |
| 0..*      | EquivalentACDCConverter | 0..1    | <a href="#">EquivalentACDCConverter</a> | (NC) The equivalent AC and DC converter that has a capability curve. |

### 3.33 (abstract) VsConverter

Inheritance path = [ACDCConverter](#) : [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

DC side of the voltage source converter (VSC).

Table 41 shows all attributes of VsConverter.

1718

**Table 41 – Attributes of EquipmentReliabilityProfile::VsConverter**

| name               | mult | type                          | description                                                                                                                                                              |
|--------------------|------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| maxModulationIndex | 0..1 | <a href="#">Float</a>         | The maximum quotient between the AC converter voltage (Uc) and DC voltage (Ud). A factor typically less than 1. It is converter's configuration data used in power flow. |
| qShare             | 0..1 | <a href="#">PerCent</a>       | Reactive power sharing factor among parallel converters on Uac control. The attribute shall be a positive value or zero.                                                 |
| baseS              | 0..1 | <a href="#">ApparentPower</a> | inherited from: <a href="#">ACDCCConverter</a>                                                                                                                           |
| maxUdc             | 0..1 | <a href="#">Voltage</a>       | inherited from: <a href="#">ACDCCConverter</a>                                                                                                                           |
| minUdc             | 0..1 | <a href="#">Voltage</a>       | inherited from: <a href="#">ACDCCConverter</a>                                                                                                                           |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>       | inherited from: <a href="#">ACDCCConverter</a>                                                                                                                           |
| maxP               | 0..1 | <a href="#">ActivePower</a>   | inherited from: <a href="#">ACDCCConverter</a>                                                                                                                           |
| minP               | 0..1 | <a href="#">ActivePower</a>   | inherited from: <a href="#">ACDCCConverter</a>                                                                                                                           |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>        | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                   |
| description        | 0..1 | <a href="#">String</a>        | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                         |
| mRID               | 1..1 | <a href="#">String</a>        | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                         |
| name               | 0..1 | <a href="#">String</a>        | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                         |

1719

1720

Table 42 shows all association ends of VsConverter with other classes.

1721

1722

**Table 42 – Association ends of EquipmentReliabilityProfile::VsConverter with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

1723

1724

**3.34 (NC) ACDCCConverterControlStrategyKind enumeration**

1725

Kinds of converter control strategy.

1726

Table 43 shows all literals of ACDCCConverterControlStrategyKind.

1727

**Table 43 – Literals of EquipmentReliabilityProfile::ACDCCConverterControlStrategyKind**

| literal       | value | description                                                                                                                                                                                                    |
|---------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| gridForming   |       | Converter control strategy in which the converter establishes or contributes to the AC voltage magnitude and frequency reference, operating as a controllable AC voltage source.                               |
| gridFollowing |       | Converter control strategy in which the converter synchronizes to an externally established AC voltage and frequency reference, typically using phase-locked synchronization and controlled current injection. |

1728

1729

**3.35 (NC) ACDCCConverterKind enumeration**

1730

Kinds of AC and DC converter.

1731

Table 44 shows all literals of ACDCCConverterKind.

1732 **Table 44 – Literals of EquipmentReliabilityProfile::ACDCConverterKind**

| literal                    | value | description                         |
|----------------------------|-------|-------------------------------------|
| currentSourceConverter     |       | Current source converter (CSC).     |
| voltageSourceConverter     |       | Voltage source converter (VSC).     |
| modularMultilevelConverter |       | Modular Multilevel Converter (MMC). |

1733

1734 **3.36 (NC,new) ClimateZoneClassificationKind enumeration**

1735 The kind of classification scheme used to define a climate zone.

1736 Note: The classification kind identifies the methodology or controlled classification system  
 1737 according to which the climate zone is defined. It does not identify the climate category, code  
 1738 or identifier assigned to the zone within that classification. The category, code or identifier  
 1739 defined by the selected classification scheme is provided separately.

1740 Table 45 shows all literals of ClimateZoneClassificationKind.

1741 **Table 45 – Literals of EquipmentReliabilityProfile::ClimateZoneClassificationKind**

| literal      | value | description                                                                                                                                                                                                                                                                                                                                                                |
|--------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pecd         |       | The climate-zone classification defined by the Pan-European Climate Database (PECD) for climate and energy-system studies.<br><br>Note: PECD climate zones support the spatial aggregation of climate variables and renewable-energy data used in European power-system studies. The applicable PECD version should be identified separately when relevant.                |
| koppenGeiger |       | The Köppen-Geiger climate classification.<br><br>Note: The Köppen-Geiger classification categorises climates principally from long-term temperature and precipitation conditions and their seasonal distribution. Climate categories are represented by codes such as Cfb, Dfb or ET.                                                                                      |
| national     |       | A climate classification established or adopted by a national authority.<br><br>Note: National classifications may be established for building regulation, infrastructure design, agriculture, environmental assessment, energy planning or another nationally defined purpose. The responsible authority and classification version should be identifiable when relevant. |
| regional     |       | A climate classification established or adopted for a geographical region.<br><br>Note: A regional classification may be established by a sub-national, multi-national or other regional authority or organisation and may cover an area that does not correspond to national boundaries.                                                                                  |
| other        |       | A climate classification scheme other than those explicitly represented by ClimateZoneClassificationKind.<br><br>Note: The classification scheme should be identified using ClimateZone.otherClassification. The issuing organisation and applicable version should be identifiable when relevant.                                                                         |

1742

1743 **3.37 (NC) CombinedCycleConfigurationKind enumeration**

1744 The configuration of thermal generating units and shaft arrangements used by a combined cycle plant.

1745 Table 46 shows all literals of CombinedCycleConfigurationKind.

1747 **Table 46 – Literals of EquipmentReliabilityProfile::CombinedCycleConfigurationKind**

| literal     | value | description |
|-------------|-------|-------------|
| singleShaft |       |             |
| multiShaft  |       |             |
| multiBlock  |       |             |
| hybrid      |       |             |
| other       |       |             |

1748

1749 **3.38 Currency enumeration**

1750 Monetary currencies. ISO 4217 standard including 3-character currency code.

1751 Table 47 shows all literals of Currency.

1752 **Table 47 – Literals of EquipmentReliabilityProfile::Currency**

| literal | value | description                                             |
|---------|-------|---------------------------------------------------------|
| AED     |       | United Arab Emirates dirham.                            |
| AFN     |       | Afghan afghani.                                         |
| ALL     |       | Albanian lek.                                           |
| AMD     |       | Armenian dram.                                          |
| ANG     |       | Netherlands Antillean guilder.                          |
| AOA     |       | Angolan kwanza.                                         |
| ARS     |       | Argentine peso.                                         |
| AUD     |       | Australian dollar.                                      |
| AWG     |       | Aruban florin.                                          |
| AZN     |       | Azerbaijani manat.                                      |
| BAM     |       | Bosnia and Herzegovina convertible mark.                |
| BBD     |       | Barbados dollar.                                        |
| BDT     |       | Bangladeshi taka.                                       |
| BGN     |       | Bulgarian lev.                                          |
| BHD     |       | Bahraini dinar.                                         |
| BIF     |       | Burundian franc.                                        |
| BMD     |       | Bermudian dollar (customarily known as Bermuda dollar). |
| BND     |       | Brunei dollar.                                          |
| BOB     |       | Boliviano.                                              |
| BOV     |       | Bolivian Mvdol (funds code).                            |
| BRL     |       | Brazilian real.                                         |
| BSD     |       | Bahamian dollar.                                        |
| BTN     |       | Bhutanese ngultrum.                                     |
| BWP     |       | Botswana pula.                                          |

| literal | value | description                            |
|---------|-------|----------------------------------------|
| BYR     |       | Belarusian ruble.                      |
| BZD     |       | Belize dollar.                         |
| CAD     |       | Canadian dollar.                       |
| CDF     |       | Congolese franc.                       |
| CHF     |       | Swiss franc.                           |
| CLF     |       | Unidad de Fomento (funds code), Chile. |
| CLP     |       | Chilean peso.                          |
| CNY     |       | Chinese yuan.                          |
| COP     |       | Colombian peso.                        |
| COU     |       | Unidad de Valor Real.                  |
| CRC     |       | Costa Rican colon.                     |
| CUC     |       | Cuban convertible peso.                |
| CUP     |       | Cuban peso.                            |
| CVE     |       | Cape Verde escudo.                     |
| CZK     |       | Czech koruna.                          |
| DJF     |       | Djiboutian franc.                      |
| DKK     |       | Danish krone.                          |
| DOP     |       | Dominican peso.                        |
| DZD     |       | Algerian dinar.                        |
| EEK     |       | Estonian kroon.                        |
| EGP     |       | Egyptian pound.                        |
| ERN     |       | Eritrean nakfa.                        |
| ETB     |       | Ethiopian birr.                        |
| EUR     |       | Euro.                                  |
| FJD     |       | Fiji dollar.                           |
| FKP     |       | Falkland Islands pound.                |
| GBP     |       | Pound sterling.                        |
| GEL     |       | Georgian lari.                         |
| GHS     |       | Ghanaian cedi.                         |
| GIP     |       | Gibraltar pound.                       |
| GMD     |       | Gambian dalasi.                        |
| GNF     |       | Guinean franc.                         |
| GTQ     |       | Guatemalan quetzal.                    |
| GYD     |       | Guyanese dollar.                       |
| HKD     |       | Hong Kong dollar.                      |
| HNL     |       | Honduran lempira.                      |
| HRK     |       | Croatian kuna.                         |
| HTG     |       | Haitian gourde.                        |
| HUF     |       | Hungarian forint.                      |
| IDR     |       | Indonesian rupiah.                     |
| ILS     |       | Israeli new sheqel.                    |

| literal | value | description            |
|---------|-------|------------------------|
| INR     |       | Indian rupee.          |
| IQD     |       | Iraqi dinar.           |
| IRR     |       | Iranian rial.          |
| ISK     |       | Icelandic króna.       |
| JMD     |       | Jamaican dollar.       |
| JOD     |       | Jordanian dinar.       |
| JPY     |       | Japanese yen.          |
| KES     |       | Kenyan shilling.       |
| KGS     |       | Kyrgyzstani som.       |
| KHR     |       | Cambodian riel.        |
| KMF     |       | Comoro franc.          |
| KPW     |       | North Korean won.      |
| KRW     |       | South Korean won.      |
| KWD     |       | Kuwaiti dinar.         |
| KYD     |       | Cayman Islands dollar. |
| KZT     |       | Kazakhstani tenge.     |
| LAK     |       | Lao kip.               |
| LBP     |       | Lebanese pound.        |
| LKR     |       | Sri Lanka rupee.       |
| LRD     |       | Liberian dollar.       |
| LSL     |       | Lesotho loti.          |
| LTL     |       | Lithuanian litas.      |
| LVL     |       | Latvian lats.          |
| LYD     |       | Libyan dinar.          |
| MAD     |       | Moroccan dirham.       |
| MDL     |       | Moldovan leu.          |
| MGA     |       | Malagasy ariary.       |
| MKD     |       | Macedonian denar.      |
| MMK     |       | Myanma kyat.           |
| MNT     |       | Mongolian tugrik.      |
| MOP     |       | Macanese pataca.       |
| MRO     |       | Mauritanian ouguiya.   |
| MUR     |       | Mauritian rupee.       |
| MVR     |       | Maldivian rufiyaa.     |
| MWK     |       | Malawian kwacha.       |
| MXN     |       | Mexican peso.          |
| MYR     |       | Malaysian ringgit.     |
| MZN     |       | Mozambican metical.    |
| NAD     |       | Namibian dollar.       |
| NGN     |       | Nigerian naira.        |
| NIO     |       | Cordoba oro.           |

| literal | value | description                  |
|---------|-------|------------------------------|
| NOK     |       | Norwegian krone.             |
| NPR     |       | Nepalese rupee.              |
| NZD     |       | New Zealand dollar.          |
| OMR     |       | Omani rial.                  |
| PAB     |       | Panamanian balboa.           |
| PEN     |       | Peruvian nuevo sol.          |
| PGK     |       | Papua New Guinean kina.      |
| PHP     |       | Philippine peso.             |
| PKR     |       | Pakistani rupee.             |
| PLN     |       | Polish zloty.                |
| PYG     |       | Paraguayan guaraní.          |
| QAR     |       | Qatari rial.                 |
| RON     |       | Romanian new leu.            |
| RSD     |       | Serbian dinar.               |
| RUB     |       | Russian rouble.              |
| RWF     |       | Rwandan franc.               |
| SAR     |       | Saudi riyal.                 |
| SBD     |       | Solomon Islands dollar.      |
| SCR     |       | Seychelles rupee.            |
| SDG     |       | Sudanese pound.              |
| SEK     |       | Swedish krona/kronor.        |
| SGD     |       | Singapore dollar.            |
| SHP     |       | Saint Helena pound.          |
| SLL     |       | Sierra Leonean leone.        |
| SOS     |       | Somali shilling.             |
| SRD     |       | Surinamese dollar.           |
| STD     |       | São Tomé and Príncipe dobra. |
| SYR     |       | Syrian pound.                |
| SZL     |       | Lilangeni.                   |
| THB     |       | Thai baht.                   |
| TJS     |       | Tajikistani somoni.          |
| TMT     |       | Turkmenistani manat.         |
| TND     |       | Tunisian dinar.              |
| TOP     |       | Tongan pa'anga.              |
| TRY     |       | Turkish lira.                |
| TTD     |       | Trinidad and Tobago dollar.  |
| TWD     |       | New Taiwan dollar.           |
| TZS     |       | Tanzanian shilling.          |
| UAH     |       | Ukrainian hryvnia.           |
| UGX     |       | Ugandan shilling.            |
| USD     |       | United States dollar.        |

| literal | value | description                |
|---------|-------|----------------------------|
| UYU     |       | Uruguayan peso.            |
| UZS     |       | Uzbekistan som.            |
| VEF     |       | Venezuelan bolívar fuerte. |
| VND     |       | Vietnamese Dong.           |
| VUV     |       | Vanuatu vatu.              |
| WST     |       | Samoan tala.               |
| XAF     |       | CFA franc BEAC.            |
| XCD     |       | East Caribbean dollar.     |
| XOF     |       | CFA Franc BCEAO.           |
| XPF     |       | CFP franc.                 |
| YER     |       | Yemeni rial.               |
| ZAR     |       | South African rand.        |
| ZMK     |       | Zambian kwacha.            |
| ZWL     |       | Zimbabwe dollar.           |

1753

1754 **3.39 CurveStyle enumeration**

1755 Style or shape of curve.

1756 Table 48 shows all literals of CurveStyle.

1757

**Table 48 – Literals of EquipmentReliabilityProfile::CurveStyle**

| literal             | value | description                                                                                             |
|---------------------|-------|---------------------------------------------------------------------------------------------------------|
| constantYValue      |       | The Y-axis values are assumed constant until the next curve point and prior to the first curve point.   |
| straightLineYValues |       | The Y-axis values are assumed to be a straight line between values. Also known as linear interpolation. |

1758

1759 **3.40 (NC) DCSystemDirectionKind enumeration**

1760 Direction kinds of the DC system.

1761 Table 49 shows all literals of DCSystemDirectionKind.

1762

**Table 49 – Literals of EquipmentReliabilityProfile::DCSystemDirectionKind**

| literal        | value | description                                                                                                                                                                                                                                                                                              |
|----------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| unidirectional |       | Unidirectional DC system used for the transfer of energy in only one direction. According to IEC 60633, most DC systems are inherently bidirectional. However, some systems may be optimized to transmit power in only one preferred direction. Such systems may still be considered as "bidirectional". |
| bidirectional  |       | Bidirectional DC system used for the transfer of energy in either direction. According to IEC 60633 a multiterminal DC system is bidirectional if one or more substations are bidirectional.                                                                                                             |

1763

1764 **3.41 (NC) DCSystemTransmissionKind enumeration**

1765 DC system transmission kind.

1766 Table 50 shows all literals of DCSYSTEMTRANSMISSIONKIND.

1767 **Table 50 – Literals of EquipmentReliabilityProfile::DCSYSTEMTRANSMISSIONKIND**

| literal       | value | description                                                                                                                                          |
|---------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| twoTerminal   |       | Two-terminal DC transmission system (IEC 60633), consisting of two DC substations and the connecting DC transmission line(s).                        |
| multiTerminal |       | Multiterminal DC transmission system (IEC 60633) consisting of more than two separated DC substations and the interconnecting DC transmission lines. |
| backToBack    |       | DC back-to-back system (IEC 60633) is a DC system which transfers energy between AC buses at the same location.                                      |

1768

### 1769 3.42 (NC) DCTERMINALPOLARITYKIND enumeration

1770 Polarity for DC terminal.

1771 Table 51 shows all literals of DCTERMINALPOLARITYKIND.

1772 **Table 51 – Literals of EquipmentReliabilityProfile::DCTERMINALPOLARITYKIND**

| literal  | value | description        |
|----------|-------|--------------------|
| positive |       | Positive terminal. |
| negative |       | Negative terminal. |
| neutral  |       | Neutral terminal.  |

1773

### 1774 3.43 (NC) DEPENDENCYCONSTRAINTKIND enumeration

1775 The kind of dependency constraint defined between the dependee and dependent peer objects.

1776 Note: The dependee is the peer object upon which another peer object depends. The dependent

1777 is the peer object whose temporal or operational behaviour is constrained by the dependee.

1778 Although dependee is not a commonly used English term, it is used here to distinguish this

1779 relationship from a parent-child hierarchy, as both objects are peer instances of the same class.

1780 Table 52 shows all literals of DEPENDENCYCONSTRAINTKIND.

1781 **Table 52 – Literals of EquipmentReliabilityProfile::DEPENDENCYCONSTRAINTKIND**

| literal     | value | description                                                                                                                                                                                                                                                                  |
|-------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| exclusive   |       | The dependee and dependent shall not both be active or effective at the same time.                                                                                                                                                                                           |
| inclusive   |       | The dependent shall only be active or effective while the dependee is active or effective.                                                                                                                                                                                   |
| restrictive |       | The dependee constrains the dependent without requiring the dependent to become active or effective.<br><br>Note: A restrictive dependency defines temporal or operational constraints on the behaviour of the dependent while leaving its activation or operation optional. |

1782

### 1783 3.44 (NC) ENERGYKIND enumeration

1784 A broad classification of an energy resource according to its energy source, storage function,  
1785 or consumption behaviour.

1786 Note: EnergyKind provides a high-level grouping suitable for scenario modelling, forecasting,  
1787 capacity aggregation and reporting. It is intended to classify generation, storage and

consumption using a common set of categories without representing detailed fuel, energy-source or technology classifications. More detailed classifications may be provided separately, for example by an `EnergyResourceType` using externally defined energy-source or technology codes.

The classification may represent the origin of energy, such as hydro, solar or wind; an energy storage behaviour, such as battery or buffer; or the flexibility characteristics of consumption, such as time-shiftable or unconstrained consumption.

Table 53 shows all literals of EnergyKind.

**Table 53 – Literals of EquipmentReliabilityProfile::EnergyKind**

| literal                   | value | description                                                                                                                     |
|---------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------|
| hydroRunOfRiver           |       | Hydropower using natural river flow with little or no storage, where generation mainly follows river discharge.                 |
| hydroReservoir            |       | Hydropower based on reservoirs with significant storage, enabling dispatchable generation.                                      |
| hydroPump                 |       | Pumped-storage hydropower operation where electrical energy is used to pump water to an elevated reservoir.                     |
| biomass                   |       | Generation based mainly on biomass fuels of biogenic origin, including solid, liquid and gaseous forms.                         |
| fossil                    |       | Generation based mainly on fossil fuels such as coal, oil, gas or other non-renewable combustible fuels.                        |
| geothermal                |       | Generation based on geothermal heat from underground reservoirs.                                                                |
| marine                    |       | Generation based on marine energy sources such as tidal or wave power.                                                          |
| consumptionUncontrollable |       | Demand that is not directly controlled and is primarily driven by weather, behaviour or unmanaged processes.                    |
| nuclear                   |       | Generation based on nuclear fission reactors of any type.                                                                       |
| consumptionTimeShift      |       | Demand that can be shifted in time without significantly changing total energy over a defined period.                           |
| battery                   |       | Energy storage based on batteries, capable of charging from and discharging to the electrical system.                           |
| buffer                    |       | Consumption associated with storage-like buffers where energy can be shifted in time while broadly preserving total energy use. |
| solar                     |       | Generation or heat production based on solar energy, including photovoltaic and solar thermal technologies.                     |
| consumptionUnconstrained  |       | Modelled demand assuming no explicit network or market constraints, used as an unconstrained reference load.                    |
| waste                     |       | Generation based on energy recovery from renewable or non-renewable waste streams.                                              |
| chemicalElectrical        |       | Conversion from chemical energy carriers to electrical energy, such as fuel cells or combustion of hydrogen-rich fuels.         |

| literal            | value | description                                                                                            |
|--------------------|-------|--------------------------------------------------------------------------------------------------------|
| electricalChemical |       | Conversion from electrical energy into chemical energy carriers, such as electrolysis or power-to-gas. |
| wind               |       | Generation based on wind energy using wind turbines on land or offshore.                               |
| other              |       | Other.                                                                                                 |

1797

1798 **3.45 (NC) GeothermalUnitKind enumeration**

1799 Kind of geothermal.

1800 Table 54 shows all literals of GeothermalUnitKind.

1801 **Table 54 – Literals of EquipmentReliabilityProfile::GeothermalUnitKind**

| literal     | value | description                                                                                                         |
|-------------|-------|---------------------------------------------------------------------------------------------------------------------|
| binaryCycle |       | The moderately hot geothermal water is passed by a secondary fluid with a much lower boiling point than water.      |
| drySteam    |       | Uses geothermal steam of 150 degree Celsius or greater to turn turbines.                                            |
| flashSteam  |       | Pull deep, high-pressure hot water into lower-pressure tanks and use the resulting flashed steam to drive turbines. |
| other       |       | Other type of geothermal generating unit.                                                                           |

1802

1803 **3.46 (NC) LogicalOperatorsKind enumeration**

1804 Kinds of logical operators for comparison.

1805 Table 55 shows all literals of LogicalOperatorsKind.

1806 **Table 55 – Literals of EquipmentReliabilityProfile::LogicalOperatorsKind**

| literal             | value | description                                  |
|---------------------|-------|----------------------------------------------|
| notEqual            |       | Not equal (unlike) comparison operation.     |
| equals              |       | Equals (like) comparison operation.          |
| lessThanOrEquals    |       | Less than or equals comparison operation.    |
| lessThan            |       | Less than comparison operation.              |
| greaterThanOrEquals |       | Greater than or equals comparison operation. |
| greaterThan         |       | Greater than comparison operation.           |

1807

1808 **3.47 (NC) MarineUnitKind enumeration**

1809 Kind of marine energy capture.

1810 Table 56 shows all literals of MarineUnitKind.

1811 **Table 56 – Literals of EquipmentReliabilityProfile::MarineUnitKind**

| literal  | value | description                                                                                                  |
|----------|-------|--------------------------------------------------------------------------------------------------------------|
| currents |       | Capture energy from ocean current which are caused by forces like breaking waves, wind, coriolis effect etc. |
| pressure |       | Capture energy from pressure.                                                                                |

| literal | value | description                                                                                                                     |
|---------|-------|---------------------------------------------------------------------------------------------------------------------------------|
| tidal   |       | Capture energy from tidal power, which captures the energy of the current caused by the gravitational pull of the Sun and Moon. |
| wave    |       | Capture energy from wind waves.                                                                                                 |
| other   |       | Other way of capture energy from marine elements.                                                                               |

1812

1813 **3.48 (NC) ModularMultilevelConverterValveKind enumeration**

1814 Defines the possible MMC valve submodule configurations.

1815 Table 57 shows all literals of ModularMultilevelConverterValveKind.

1816 **Table 57 – Literals of EquipmentReliabilityProfile::ModularMultilevelConverterValveKind**

| literal    | value | description                                                                                                          |
|------------|-------|----------------------------------------------------------------------------------------------------------------------|
| fullBridge |       | MMC valve based on a full-bridge submodule topology capable of bipolar voltage generation and DC fault blocking.     |
| halfBridge |       | MMC valve based on a half-bridge submodule topology typically used for efficient voltage source converter operation. |

1817

1818 **3.49 (NC) NuclearReactorKind enumeration**

1819 Kind of nuclear reactor.

1820 Table 58 shows all literals of NuclearReactorKind.

1821 **Table 58 – Literals of EquipmentReliabilityProfile::NuclearReactorKind**

| literal     | value | description                                                                                                                                                                                                                          |
|-------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| breeder     |       | Reactor whose heat source is a nuclear reactor that generates more fissile material than it consumes.                                                                                                                                |
| graphite    |       | Reactor whose heat source is a graphite-moderated reactor that is a nuclear reactor that uses carbon as a neutron moderator, which allows natural uranium to be used as nuclear fuel.                                                |
| heavyWater  |       | Reactor whose heat source is a pressurized heavy-water reactor (PHWR) that uses heavy water (deuterium oxide D <sub>2</sub> O) as its coolant and neutron moderator.                                                                 |
| lightWater  |       | Reactor whose heat source is a light-water reactor (LWR) that is a type of thermal-neutron reactor that uses normal water, as both its coolant and neutron moderator – furthermore a solid form of fissile elements is used as fuel. |
| liquidMetal |       | Reactor whose liquid metal cooled nuclear reactor, liquid metal fast reactor or LMFR is an advanced type of nuclear reactor where the primary coolant is a liquid metal.                                                             |
| other       |       | Other type of nuclear reactors.                                                                                                                                                                                                      |

1822

1823 **3.50 OperationalLimitDirectionKind enumeration**

1824 The direction attribute describes the side of a limit that is a violation.

1825 Table 59 shows all literals of OperationalLimitDirectionKind.

1826 **Table 59 – Literals of EquipmentReliabilityProfile::OperationalLimitDirectionKind**

| literal       | value | description                                                                                                                                         |
|---------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| high          |       | High means that a monitored value above the limit value is a violation. If applied to a terminal flow, the positive direction is into the terminal. |
| low           |       | Low means a monitored value below the limit is a violation. If applied to a terminal flow, the positive direction is into the terminal.             |
| absoluteValue |       | An absoluteValue limit means that a monitored absolute value above the limit value is a violation.                                                  |

1827

1828 **3.51 (NC) PinDCTerminalKind enumeration**

1829 The kind of quantities that can serve as an input value for the DCTerminal pin.

1830 Table 60 shows all literals of PinDCTerminalKind.

1831 **Table 60 – Literals of EquipmentReliabilityProfile::PinDCTerminalKind**

| literal | value | description                               |
|---------|-------|-------------------------------------------|
| voltage |       | Direct current voltage in the DCTerminal. |
| current |       | Direct current in the DCTerminal.         |

1832

1833 **3.52 (NC) PinTerminalKind enumeration**

1834 The kind of quantities that can serve as an input value for the pin.

1835 Table 61 shows all literals of PinTerminalKind.

1836 **Table 61 – Literals of EquipmentReliabilityProfile::PinTerminalKind**

| literal          | value | description                        |
|------------------|-------|------------------------------------|
| activePower      |       | Active power on the Terminal.      |
| apparentPower    |       | Apparent power on the Terminal.    |
| voltageMagnitude |       | Voltage magnitude on the Terminal. |
| voltageAngle     |       | Voltage angle on the Terminal.     |
| current          |       | Current on the Terminal.           |
| reactivePower    |       | Reactive power on the Terminal.    |
| frequency        |       | Frequency on the Terminal.         |

1837

1838 **3.53 (NC) PowerBlockKind enumeration**

1839 Power block kind describes the increase and/or decrease of power.

1840 Table 62 shows all literals of PowerBlockKind.

1841 **Table 62 – Literals of EquipmentReliabilityProfile::PowerBlockKind**

| literal                  | value | description                                                                                        |
|--------------------------|-------|----------------------------------------------------------------------------------------------------|
| powerIncrease            |       | Increase in the power. The block represents action for increased power.                            |
| powerDecrease            |       | Decrease in the power. The block represents action for decreased power.                            |
| powerIncreaseAndDecrease |       | Increase and decrease in the power. The block represents action for increased and decreased power. |

1842

1843 **3.54 (NC) PowerElectricalChemicalUnitKind enumeration**

1844 Kind of power electrical chemical unit.

1845 Table 63 shows all literals of PowerElectricalChemicalUnitKind.

1846 **Table 63 – Literals of EquipmentReliabilityProfile::PowerElectricalChemicalUnitKind**

| literal          | value | description                                                                                                                                                                                                 |
|------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| electrolyticCell |       | An electrolytic cell is an electrochemical cell that drives a non-spontaneous redox reaction through the application of electrical energy. Example are the decomposition of water into hydrogen and oxygen. |
| fuelCell         |       | A fuel cell is an electrochemical cell that converts the chemical energy from a fuel into electricity through an electrochemical reaction of hydrogen fuel with oxygen or another oxidizing agent.          |
| other            |       | Other type of cell used in chemical reactions.                                                                                                                                                              |

1847

1848 **3.55 (NC) PowerFrequencyControlKind enumeration**

1849 Kinds of power frequency control modes.

1850 Table 64 shows all literals of PowerFrequencyControlKind.

1851 **Table 64 – Literals of EquipmentReliabilityProfile::PowerFrequencyControlKind**

| literal                 | value | description                              |
|-------------------------|-------|------------------------------------------|
| frequency               |       | Frequency control mode.                  |
| activePower             |       | Active power control mode.               |
| activePowerAndFrequency |       | Active power and frequency control mode. |

1852

1853 **3.56 (NC) PowerShiftKeyKind enumeration**

1854 Kind of generating and load shift keys strategy.

1855 Table 65 shows all literals of PowerShiftKeyKind.

1856 **Table 65 – Literals of EquipmentReliabilityProfile::PowerShiftKeyKind**

| literal              | value | description                                                                                                                                                                                                                                                                       |
|----------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| explicitInstruction  |       | The distribution is done according to the individual participation factor on the unit.                                                                                                                                                                                            |
| explicitDistribution |       | The distribution is explicitly done according to the power shift key distribution in the power bid Schedule.                                                                                                                                                                      |
| generatorsFlat       |       | Flat adjustment, equal amount of power, on all active generators. e.g. 100 MW increase adjustment on 4 generators, it means that each of them get increased 25 MW, as long as no other constraints are violated.                                                                  |
| consumptionsFlat     |       | Flat adjustment, equal amount of power, on all active consumption units (Energy Consumers and Power Electronics like FlexibleEnergyUnit). e.g. 100 MW decrease adjustment on 4 loads, it means that each of them get reduced 25 MW, as long as no other constraints are violated. |
| generatorsPmax       |       | The distribution is relative to the maximum p of the generator.                                                                                                                                                                                                                   |

| literal                     | value | description                                                                                                                                                                                                                                                      |
|-----------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| generatorsP                 |       | The distribution is based on the generators active power in the given case.                                                                                                                                                                                      |
| consumptionsP               |       | The distribution is based on the consumptions active power in the given case.                                                                                                                                                                                    |
| generatorsAndConsumptionsP  |       | The distribution is based on the generator and consumption active power in the given case.                                                                                                                                                                       |
| generatorsRemainingCapacity |       | The distribution is based on the remaining capacity for generators in the given case.                                                                                                                                                                            |
| nonConformLoadP             |       | The distribution is based on the non conform load active power in the given case.                                                                                                                                                                                |
| storageP                    |       | The distribution is based on the batteries and any operating hydro pumps active power in the given case.                                                                                                                                                         |
| storageFlat                 |       | Flat adjustment, equal amount of power, on all the batteries and any operating hydro pumps. e.g. 100 MW increase or decrease adjustment on 4 batteries, it means that each of them get increased or reduced 25 MW, as long as no other constraints are violated. |
| generatorsPmin              |       | The distribution is relative to the minimum p of the generator.                                                                                                                                                                                                  |
| generatorsUsedCapacity      |       | The distribution is based on the used capacity, the difference between the minimum operation and operating p (GeneratingUnit.minOperatingP)                                                                                                                      |

1857

1858 **3.57 (NC) RampingPrincipleKind enumeration**

1859 Kind of ramping principle.

1860 Table 66 shows all literals of RampingPrincipleKind.

1861 **Table 66 – Literals of EquipmentReliabilityProfile::RampingPrincipleKind**

| literal        | value | description                                                                                                                                                                                                                                                                                                         |
|----------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fiveMinutes    |       | Five minutes ramping principle. Ramping starts five minutes before the schedule time point and ends five minutes after. For instance, if the schedule time point is 19:30h it starts at 19:25h and ends at 19:35h.                                                                                                  |
| fifteenMinutes |       | Fifteen minutes ramping principle. Ramping starts 15 minutes before the schedule time point and ends 15 minutes after. For instance, if the schedule time point is 19:30h it starts at 19:15h and ends at 19:45h.                                                                                                   |
| continuous     |       | Continuous ramping principle is applied between two scheduled time point. For instance, from 10 MW to 70 MW over one hour the change is 1 MW/min.                                                                                                                                                                   |
| tenMinutes     |       | Ten minutes ramping principle. Ramping starts 10 minutes before the schedule time point and ends 10 minutes after. For instance, if the schedule time point is 19:30h it starts at 19:20h and ends at 19:40h.                                                                                                       |
| maxContinuous  |       | Maximum continuous ramping principle. The schedule is kept as long as possible and the maximum ramping rate is used to get from one point to another, symmetrically around the schedule time points. For example, there is 40 MW change in the schedule the maximum ramp rate is 20 MW/min the ramping starts 1 min |

| literal | value | description                                                  |
|---------|-------|--------------------------------------------------------------|
|         |       | before (e.g. 19:29h) and finishes 1 min after (e.g. 19:31h). |

1862

1863 **3.58 (NC) ReferenceValueKind enumeration**

1864 Kind of reference value.

1865 Table 67 shows all literals of ReferenceValueKind.

1866 **Table 67 – Literals of EquipmentReliabilityProfile::ReferenceValueKind**

| literal | value | description                                      |
|---------|-------|--------------------------------------------------|
| exact   |       | The referenced value is to be met exactly.       |
| minimum |       | The referenced value establishes a lower bound.  |
| maximum |       | The referenced value establishes an upper bound. |

1867

1868 **3.59 (NC) ShiftMethodKind enumeration**

1869 Kind of shift method. Describes the way a power schedule should be distributed amongst production and consumption. e.g. Type of generating and load shift key.

1870 Table 68 shows all literals of ShiftMethodKind.

1872 **Table 68 – Literals of EquipmentReliabilityProfile::ShiftMethodKind**

| literal  | value | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| shared   |       | Power schedule shift (distribution) is done by a shared fraction e.g. A two unit with the participation factor 60 and 40 will distribute a 10 MW schedule by 6 and 4 MW.                                                                                                                                                                                                                                                                                                                                                                                                                |
| priority |       | Power schedule shift (distribution) is done by a shared fraction prioritizing the unit e.g. A two unit with the participation factor 60 and 40 will distribute a 10 MW increased schedule by first filling the highest participation factor (priority) until max economy power or maximum power allowed by the unit before it starts filling the next on the list. e.g. The unit with 60 will be getting its maximum shared first. The same logic applies with reducing the schedule. e.g. The 60 participation factor unit will be reduced to its min economy factor or minimum power. |

1873

1874 **3.60 SynchronousMachineOperatingMode enumeration**

1875 Synchronous machine operating mode.

1876 Table 69 shows all literals of SynchronousMachineOperatingMode.

1877 **Table 69 – Literals of EquipmentReliabilityProfile::SynchronousMachineOperatingMode**

| literal   | value | description             |
|-----------|-------|-------------------------|
| generator |       | Operating as generator. |
| condenser |       | Operating as condenser. |
| motor     |       | Operating as motor.     |

1878

1879 **3.61 UnitMultiplier enumeration**

1880 The unit multipliers defined for the CIM. When applied to unit symbols, the unit symbol is treated as a derived unit. Regardless of the contents of the unit symbol text, the unit symbol

1881

shall be treated as if it were a single-character unit symbol. Unit symbols should not contain multipliers, and it should be left to the multiplier to define the multiple for an entire data type.

For example, if a unit symbol is "m2Pers" and the multiplier is "k", then the value is  $k(m^{**2}/s)$ , and the multiplier applies to the entire final value, not to any individual part of the value. This can be conceptualized by substituting a derived unit symbol for the unit type. If one imagines that the symbol "P" represents the derived unit "m2Pers", then applying the multiplier "k" can be conceptualized simply as "kP".

For example, the SI unit for mass is "kg" and not "g". If the unit symbol is defined as "kg", then the multiplier is applied to "kg" as a whole and does not replace the "k" in front of the "g". In this case, the multiplier of "m" would be used with the unit symbol of "kg" to represent one gram. As a text string, this violates the instructions in IEC 80000-1. However, because the unit symbol in CIM is treated as a derived unit instead of as an SI unit, it makes more sense to conceptualize the "kg" as if it were replaced by one of the proposed replacements for the SI mass symbol. If one imagines that the "kg" were replaced by a symbol "P", then it is easier to conceptualize the multiplier "m" as creating the proper unit "mP", and not the forbidden unit "mkg".

Table 70 shows all literals of UnitMultiplier.

**Table 70 – Literals of EquipmentReliabilityProfile::UnitMultiplier**

| literal | value | description                                  |
|---------|-------|----------------------------------------------|
| none    |       | No multiplier or equivalently multiply by 1. |
| k       |       | Kilo $10^{**3}$ .                            |
| M       |       | Mega $10^{**6}$ .                            |

### 3.62 UnitSymbol enumeration

The derived units defined for usage in the CIM. In some cases, the derived unit is equal to an SI unit. Whenever possible, the standard derived symbol is used instead of the formula for the derived unit. For example, the unit symbol Farad is defined as "F" instead of "CPerV". In cases where a standard symbol does not exist for a derived unit, the formula for the unit is used as the unit symbol. For example, density does not have a standard symbol and so it is represented as "kgPerm3". With the exception of the "kg", which is an SI unit, the unit symbols do not contain multipliers and therefore represent the base derived unit to which a multiplier can be applied as a whole.

Every unit symbol is treated as an unparseable text as if it were a single-letter symbol. The meaning of each unit symbol is defined by the accompanying descriptive text and not by the text contents of the unit symbol.

To allow the widest possible range of serializations without requiring special character handling, several substitutions are made which deviate from the format described in IEC 80000-1. The division symbol "/" is replaced by the letters "Per". Exponents are written in plain text after the unit as "m3" instead of being formatted as "m" with a superscript of 3 or introducing a symbol as in "m^3". The degree symbol "°" is replaced with the letters "deg". Any clarification of the meaning for a substitution is included in the description for the unit symbol.

Non-SI units are included in list of unit symbols to allow sources of data to be correctly labelled with their non-SI units (for example, a GPS sensor that is reporting numbers that represent feet instead of meters). This allows software to use the unit symbol information correctly convert and scale the raw data of those sources into SI-based units.

The integer values are used for harmonization with IEC 61850.

Table 71 shows all literals of UnitSymbol.

**Table 71 – Literals of EquipmentReliabilityProfile::UnitSymbol**

| literal | value | description                                         |
|---------|-------|-----------------------------------------------------|
| none    |       | Dimension less quantity, e.g. count, per unit, etc. |
| s       |       | Time in seconds.                                    |
| A       |       | Current in amperes.                                 |

| literal | value | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| deg     |       | Plane angle in degrees.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| degC    |       | Relative temperature in degrees Celsius.<br>In the SI unit system the symbol is °C. Electric charge is measured in coulomb that has the unit symbol C. To distinguish degree Celsius from coulomb the symbol used in the UML is degC. The reason for not using °C is that the special character ° is difficult to manage in software.                                                                                                                                                      |
| H       |       | Electric inductance in henrys (Wb/A).                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| V       |       | Electric potential in volts (W/A).                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| ohm     |       | Electric resistance in ohms (V/A).                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Hz      |       | Frequency in hertz (1/s).                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| W       |       | Real power in watts (J/s). Electrical power may have real and reactive components. The real portion of electrical power ( $I^2R$ or $VI\cos(\phi)$ ), is expressed in Watts. See also apparent power and reactive power.                                                                                                                                                                                                                                                                   |
| Pa      |       | Pressure in pascals (N/m <sup>2</sup> ). Note: the absolute or relative measurement of pressure is implied with this entry. See below for more explicit forms.                                                                                                                                                                                                                                                                                                                             |
| WPerm2  |       | Heat flux density, irradiance, watts per square metre.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| VA      |       | Apparent power in volt amperes. See also real power and reactive power.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| VAr     |       | Reactive power in volt amperes reactive. The "reactive" or "imaginary" component of electrical power ( $VI\sin(\phi)$ ). (See also real power and apparent power).<br><br>Note: Different meter designs use different methods to arrive at their results. Some meters may compute reactive power as an arithmetic value, while others compute the value vectorially. The data consumer should determine the method in use and the suitability of the measurement for the intended purpose. |
| Wh      |       | Real energy in watt hours.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| WPers   |       | Ramp rate in watts per second.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| VPerVAr |       | Power factor, PF, the ratio of the active power to the apparent power. Note: The sign convention used for power factor will differ between IEC meters and EEI (ANSI) meters. It is assumed that the data consumers understand the type of meter being used and agree on the sign convention in use at any given utility.                                                                                                                                                                   |
| kgPerJ  |       | Weight per energy in kilograms per joule (kg/J). Note: multiplier "k" is included in this unit symbol for compatibility with IEC 61850-7-3.                                                                                                                                                                                                                                                                                                                                                |

1925

1926 **3.63 ActivePower datatype**1927 Product of RMS value of the voltage and the RMS value of the in-phase component of the  
1928 current.

1929 Table 72 shows all attributes of ActivePower.

1930 **Table 72 – Attributes of EquipmentReliabilityProfile::ActivePower**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

1931

1932 **3.64 ActivePowerChangeRate datatype**

1933 Rate of change of active power per time.

1934 Table 73 shows all attributes of ActivePowerChangeRate.

1935 **Table 73 – Attributes of EquipmentReliabilityProfile::ActivePowerChangeRate**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

1936

1937 **3.65 AngleDegrees datatype**

1938 Measurement of angle in degrees.

1939 Table 74 shows all attributes of AngleDegrees.

1940 **Table 74 – Attributes of EquipmentReliabilityProfile::AngleDegrees**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| value      | 0..1 | <a href="#">Float</a>          |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

1941

1942 **3.66 ApparentPower datatype**

1943 Product of the RMS value of the voltage and the RMS value of the current.

1944 Table 75 shows all attributes of ApparentPower.

1945 **Table 75 – Attributes of EquipmentReliabilityProfile::ApparentPower**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

1946

1947 **3.67 CurrentFlow datatype**

1948 Electrical current with sign convention: positive flow is out of the conducting equipment into the connectivity node. Can be both AC and DC.

1950 Table 76 shows all attributes of CurrentFlow.

1951 **Table 76 – Attributes of EquipmentReliabilityProfile::CurrentFlow**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |

| name  | mult | type                  | description |
|-------|------|-----------------------|-------------|
| value | 0..1 | <a href="#">Float</a> |             |

1952

1953 **3.68 Emission datatype**

1954 Quantity of emission per fuel heat content.

1955 Table 77 shows all attributes of Emission.

1956

**Table 77 – Attributes of EquipmentReliabilityProfile::Emission**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

1957

1958 **3.69 Frequency datatype**

1959 Cycles per second.

1960 Table 78 shows all attributes of Frequency.

1961

**Table 78 – Attributes of EquipmentReliabilityProfile::Frequency**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| value      | 0..1 | <a href="#">Float</a>          |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

1962

1963 **3.70 Hours datatype**

1964 Time specified in hours.

1965 Table 79 shows all attributes of Hours.

1966

**Table 79 – Attributes of EquipmentReliabilityProfile::Hours**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| value      | 0..1 | <a href="#">Float</a>          |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

1967

1968 **3.71 Impedance datatype**

1969 Ratio of voltage to current.

1970 Table 80 shows all attributes of Impedance.

1971

**Table 80 – Attributes of EquipmentReliabilityProfile::Impedance**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| value      | 0..1 | <a href="#">Float</a>          |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

1972

1973 **3.72 Inductance datatype**

1974 Inductive part of reactance (imaginary part of impedance), at rated frequency.

1975 Table 81 shows all attributes of Inductance.

1976 **Table 81 – Attributes of EquipmentReliabilityProfile::Inductance**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| value      | 0..1 | <a href="#">Float</a>          |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

1977

### 1978 3.73 Length datatype

1979 Unit of length. It shall be a positive value or zero.

1980 Table 82 shows all attributes of Length.

1981 **Table 82 – Attributes of EquipmentReliabilityProfile::Length**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

1982

### 1983 3.74 PerCent datatype

1984 Percentage on a defined base. For example, specify as 100 to indicate at the defined base.

1985 Table 83 shows all attributes of PerCent.

1986 **Table 83 – Attributes of EquipmentReliabilityProfile::PerCent**

| name       | mult | type                           | description                          |
|------------|------|--------------------------------|--------------------------------------|
| value      | 0..1 | <a href="#">Float</a>          | Normally 0 to 100 on a defined base. |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |                                      |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |                                      |

1987

### 1988 3.75 Pressure datatype

1989 Pressure in pascals.

1990 Table 84 shows all attributes of Pressure.

1991 **Table 84 – Attributes of EquipmentReliabilityProfile::Pressure**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| value      | 0..1 | <a href="#">Float</a>          |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

1992

### 1993 3.76 PU datatype

1994 Per Unit - a positive or negative value referred to a defined base. Values typically range from -10 to +10.

1996 Table 85 shows all attributes of PU.

1997 **Table 85 – Attributes of EquipmentReliabilityProfile::PU**

| name  | mult | type                  | description |
|-------|------|-----------------------|-------------|
| value | 0..1 | <a href="#">Float</a> |             |

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

1998

1999 **3.77 Reactance datatype**

2000 Reactance (imaginary part of impedance), at rated frequency.

2001 Table 86 shows all attributes of Reactance.

2002 **Table 86 – Attributes of EquipmentReliabilityProfile::Reactance**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| value      | 0..1 | <a href="#">Float</a>          |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

2003

2004 **3.78 ReactivePower datatype**

2005 Product of RMS value of the voltage and the RMS value of the quadrature component of the current.

2007 Table 87 shows all attributes of ReactivePower.

2008 **Table 87 – Attributes of EquipmentReliabilityProfile::ReactivePower**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| value      | 0..1 | <a href="#">Float</a>          |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

2009

2010 **3.79 RealEnergy datatype**

2011 Real electrical energy.

2012 Table 88 shows all attributes of RealEnergy.

2013 **Table 88 – Attributes of EquipmentReliabilityProfile::RealEnergy**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

2014

2015 **3.80 Resistance datatype**

2016 Resistance (real part of impedance).

2017 Table 89 shows all attributes of Resistance.

2018 **Table 89 – Attributes of EquipmentReliabilityProfile::Resistance**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| value      | 0..1 | <a href="#">Float</a>          |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |

2019

2020 **3.81 Seconds datatype**

2021 Time, in seconds.

2022 Table 90 shows all attributes of Seconds.

2023 **Table 90 – Attributes of EquipmentReliabilityProfile::Seconds**

| name       | mult | type                           | description      |
|------------|------|--------------------------------|------------------|
| value      | 0..1 | <a href="#">Float</a>          | Time, in seconds |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |                  |
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |                  |

2024

2025 **3.82 Speed datatype**

2026 Distance per unit of time.

2027 Table 91 shows all attributes of Speed.

2028 **Table 91 – Attributes of EquipmentReliabilityProfile::Speed**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

2029

2030 **3.83 Temperature datatype**

2031 Value of temperature in degrees Celsius.

2032 Table 92 shows all attributes of Temperature.

2033 **Table 92 – Attributes of EquipmentReliabilityProfile::Temperature**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

2034

2035 **3.84 Voltage datatype**

2036 Electrical voltage, can be both AC and DC.

2037 Table 93 shows all attributes of Voltage.

2038 **Table 93 – Attributes of EquipmentReliabilityProfile::Voltage**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

2039

2040 **3.85 VoltagePerReactivePower datatype**

2041 Voltage variation with reactive power.

2042 Table 94 shows all attributes of VoltagePerReactivePower.

2043 **Table 94 – Attributes of EquipmentReliabilityProfile::VoltagePerReactivePower**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

2044

2045 **3.86 Boolean primitive**

2046 A type with the value space "true" and "false".

2047 **3.87 Decimal primitive**

2048 Decimal is the base-10 notational system for representing real numbers.

2049 **3.88 Duration primitive**

2050 Duration as "PnYnMnDTnHnMnS" which conforms to ISO 8601, where nY expresses a number  
 2051 of years, nM a number of months, nD a number of days. The letter T separates the date  
 2052 expression from the time expression and, after it, nH identifies a number of hours, nM a number  
 2053 of minutes and nS a number of seconds. The number of seconds could be expressed as a  
 2054 decimal number, but all other numbers are integers.

2055 **3.89 Float primitive**

2056 A floating point number. The range is unspecified and not limited.

2057 **3.90 Integer primitive**

2058 An integer number. The range is unspecified and not limited.

2059 **3.91 String primitive**

2060 A string consisting of a sequence of characters. The character encoding is UTF-8. The string  
 2061 length is unspecified and unlimited.

2062 **3.92 (European) URI primitive**

2063 URI is a string following the rules defined by the W3C/IETF URI Planning Interest Group in a  
 2064 set of RFCs of which one is RFC 3305.

2065 **3.93 (NC) ACDCCConverterController**

2066 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :  
 2067 [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2068 ACDCC converter unit control. According to IEC 60633, it is the control system used for the  
 2069 controlling, monitoring and protection of a single converter unit.

2070 Table 95 shows all attributes of ACDCCConverterController.

2071 **Table 95 – Attributes of EquipmentReliabilityProfile::ACDCCConverterController**

| name               | mult | type                                               | description                                                                                                       |
|--------------------|------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| controlStrategy    | 0..1 | <a href="#">ACDCCConverterControlsStrategyKind</a> | (NC) High-level control strategy defining how the converter interacts with and regulates the connected AC system. |
| type               | 0..1 | <a href="#">String</a>                             | (NC) inherited from: <a href="#">AutomationFunction</a>                                                           |
| normalEnabled      | 0..1 | <a href="#">Boolean</a>                            | (NC) inherited from: <a href="#">AutomationFunction</a>                                                           |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                             | (deprecated, European) inherited from: <a href="#">IdentifiedObject</a>                                           |
| description        | 0..1 | <a href="#">String</a>                             | inherited from: <a href="#">IdentifiedObject</a>                                                                  |
| mRID               | 1..1 | <a href="#">String</a>                             | inherited from: <a href="#">IdentifiedObject</a>                                                                  |
| name               | 0..1 | <a href="#">String</a>                             | inherited from: <a href="#">IdentifiedObject</a>                                                                  |

Table 96 shows all association ends of ACDCCConverterController with other classes.

**Table 96 – Association ends of EquipmentReliabilityProfile::ACDCCConverterController with other classes**

| mult from | name                        | mult to | type                                        | description                                                      |
|-----------|-----------------------------|---------|---------------------------------------------|------------------------------------------------------------------|
| 0..1      | ACDCCConverter              | 1..1    | <a href="#">ACDCCConverter</a>              | (NC) ACDC converter controlled by the direct current controller. |
| 2..2      | DirectCurrentPoleController | 0..1    | <a href="#">DirectCurrentPoleController</a> | (NC) DC pole controller that controls this ACDC controller.      |
| 0..*      | PartOf                      | 0..1    | <a href="#">AutomationFunction</a>          | (NC) inherited from: <a href="#">AutomationFunction</a>          |

### 3.94 (NC) ACEmulationControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

The AC emulation control function is used when AC emulation model is activated for a DC system. It consists in computing the active power set point of the DC system as a function of the voltage angle difference between both points of common coupling with the AC network in order to mimic the behavior of an AC transmission line. This control mode enables the automatic adjustment of the active power reference following variations of the AC system operational point.

The setpoint of the DC system is calculated by  $P_{setpoint} = P_{ref} + K_{dc} * (angle1 - angle2)$ , where

-  $P_{ref}$  is the existing active power setpoint;

-  $K_{dc}$  is the control system gain and

-  $angle1$  and  $angle2$  are the phase angle measurement (measured at points of common coupling with the AC network) respectively at the side 1 and 2 of the DC system.

Table 97 shows all attributes of ACEmulationControlFunction.

**Table 97 – Attributes of EquipmentReliabilityProfile::ACEmulationControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 98 shows all association ends of ACEmulationControlFunction with other classes.

**Table 98 – Association ends of EquipmentReliabilityProfile::ACEmulationControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

2097 **3.95 (NC) ACTieCorridor**2098 Inheritance path = [TieCorridor](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2099 A collection of one or more AC tie lines that connect two different control areas.

2100 Table 99 shows all attributes of ACTieCorridor.

2101 **Table 99 – Attributes of EquipmentReliabilityProfile::ACTieCorridor**

| name                       | mult | type                        | description                                                            |
|----------------------------|------|-----------------------------|------------------------------------------------------------------------|
| delayRegulatingReserve     | 0..1 | <a href="#">Seconds</a>     | (NC) inherited from: <a href="#">TieCorridor</a>                       |
| maxRegulatingReserveRamp   | 0..1 | <a href="#">Float</a>       | (NC) inherited from: <a href="#">TieCorridor</a>                       |
| thresholdRegulatingReserve | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">TieCorridor</a>                       |
| energyIdentCodeEic         | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description                | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                       | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                       | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2102

2103 Table 100 shows all association ends of ACTieCorridor with other classes.

2104 **Table 100 – Association ends of EquipmentReliabilityProfile::ACTieCorridor with other classes**

| mult from | name                     | mult to | type                                     | description                                      |
|-----------|--------------------------|---------|------------------------------------------|--------------------------------------------------|
| 0..*      | LoadFrequencyControlArea | 0..1    | <a href="#">LoadFrequencyControlArea</a> | (NC) inherited from: <a href="#">TieCorridor</a> |

2106

2107 **3.96 (NC) ActivePowerControlFunction**2108 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

2109 Active power control function is a function block that calculates operating point of the controlled equipment to achieve the target active power.

2110 Table 101 shows all attributes of ActivePowerControlFunction.

2112 **Table 101 – Attributes of EquipmentReliabilityProfile::ActivePowerControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

2113

2114 Table 102 shows all association ends of ActivePowerControlFunction with other classes.

**Table 102 – Association ends of  
EquipmentReliabilityProfile::ActivePowerControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 3.97 (NC) AmbientTemperatureDependencyCurve

Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

A curve or functional relationship between the ambient temperature independent variable (X-axis) and relative temperature dependent (Y-axis) variables.

Table 103 shows all attributes of AmbientTemperatureDependencyCurve.

**Table 103 – Attributes of  
EquipmentReliabilityProfile::AmbientTemperatureDependencyCurve**

| name               | mult | type                           | description                                                            |
|--------------------|------|--------------------------------|------------------------------------------------------------------------|
| curveStyle         | 1..1 | <a href="#">CurveStyle</a>     | inherited from: <a href="#">Curve</a>                                  |
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |

### 3.98 (NC) AreaInterchangeController

Inheritance path = [SystemControl](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Area interchange control is set to control active power of an area.

Table 104 shows all attributes of AreaInterchangeController.

**Table 104 – Attributes of EquipmentReliabilityProfile::AreaInterchangeController**

| name               | mult | type                        | description                                                                                   |
|--------------------|------|-----------------------------|-----------------------------------------------------------------------------------------------|
| pTolerance         | 1..1 | <a href="#">ActivePower</a> | (NC) Active power net interchange tolerance. The attribute shall be a positive value or zero. |
| type               | 0..1 | <a href="#">String</a>      | (NC) inherited from: <a href="#">AutomationFunction</a>                                       |
| normalEnabled      | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">AutomationFunction</a>                                       |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                        |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                              |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                              |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                              |

Table 105 shows all association ends of AreaInterchangeController with other classes.

**Table 105 – Association ends of EquipmentReliabilityProfile::AreaInterchangeController with other classes**

| mult from | name                | mult to | type                                | description                                                       |
|-----------|---------------------|---------|-------------------------------------|-------------------------------------------------------------------|
| 0..1      | BiddingZone         | 0..1    | <a href="#">BiddingZone</a>         | (NC) Bidding zone which has an area interchange controller.       |
| 0..1      | BiddingZoneBorder   | 0..1    | <a href="#">BiddingZoneBorder</a>   | (NC) Bidding zone border that has an area interchange controller. |
| 0..1      | ControlArea         | 0..1    | <a href="#">ControlArea</a>         | (NC) Control area that has a area interchange controller.         |
| 0..1      | EquipmentController | 1..*    | <a href="#">EquipmentController</a> | (NC) inherited from: <a href="#">SystemControl</a>                |
| 0..*      | PartOf              | 0..1    | <a href="#">AutomationFunction</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>           |

### 3.99 (NC) AreaReserveResource

Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

A resource representation for a specific balancing reserve product, associated with either a scheduling area or a tie corridor, and used to represent reserve capability made available to a control area for market and operational purposes.

Note: An AreaReserveResource shall be associated with either a SchedulingArea or a TieCorridor, but not both.

When associated with a SchedulingArea, the resource represents reserve capability made available within that area context.

When associated with a TieCorridor, the resource represents reserve capability provided across an inter-area connection to support a control area other than the one in which the underlying resource is located.

A single physical or logical resource (for example a GeneratingUnit, HydroPump, PowerElectronicsUnit, or equivalent) may be represented by multiple AreaReserveResource instances, each corresponding to a different balancing reserve product (e.g. FCR, aFRR, mFRR).

Table 106 shows all attributes of AreaReserveResource.

**Table 106 – Attributes of EquipmentReliabilityProfile::AreaReserveResource**

| name               | mult | type                    | description                                                                                                                                                                                                                                      |
|--------------------|------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) Identifies if the unit is normally enabled to accept a dispatch instruction. If true, the unit is enabled to accept a dispatch instruction. If false, the unit has the capability, but it is not enabled to receive a dispatch instruction. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                           |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                 |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                 |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                 |

Table 107 shows all association ends of AreaReserveResource with other classes.

**Table 107 – Association ends of EquipmentReliabilityProfile::AreaReserveResource with other classes**

| mult from | name                 | mult to | type                                 | description                                                                                                                                                      |
|-----------|----------------------|---------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0..1      | PowerElectronicsUnit | 0..1    | <a href="#">PowerElectronicsUnit</a> | (NC) Power electronics unit that provides the reserve capability represented by the area reserve resource.                                                       |
| 0..1      | ScheduleResource     | 0..1    | <a href="#">ScheduleResource</a>     | (NC) Schedule resource representing an aggregation or grouping of resources that provides the reserve capability represented by the area reserve resource.       |
| 0..*      | SchedulingArea       | 0..1    | <a href="#">SchedulingArea</a>       | (NC) Scheduling area within which the reserve resource is made available when the reserve support is provided in the area context of the underlying resource.    |
| 0..1      | GeneratingUnit       | 0..1    | <a href="#">GeneratingUnit</a>       | (NC) Generating unit that provides the reserve capability represented by the area reserve resource.                                                              |
| 0..1      | HydroPump            | 0..1    | <a href="#">HydroPump</a>            | (NC) Hydro pump that provides the reserve capability represented by the area reserve resource.                                                                   |
| 0..*      | TieCorridor          | 0..1    | <a href="#">TieCorridor</a>          | (NC) Tie corridor through which the reserve resource is made available to support a control area other than the one in which the underlying resource is located. |

**3.100 (NC) AutomationBlockGroup root class**

Grouping of function block that are operated with the same priority as settings.

Table 108 shows all attributes of AutomationBlockGroup.

**Table 108 – Attributes of EquipmentReliabilityProfile::AutomationBlockGroup**

| name     | mult | type                    | description                                                                                         |
|----------|------|-------------------------|-----------------------------------------------------------------------------------------------------|
| priority | 0..1 | <a href="#">Integer</a> | (NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority. |

Table 109 shows all association ends of AutomationBlockGroup with other classes.

**Table 109 – Association ends of EquipmentReliabilityProfile::AutomationBlockGroup with other classes**

| mult from | name               | mult to | type                               | description                                                |
|-----------|--------------------|---------|------------------------------------|------------------------------------------------------------|
| 0..*      | AutomationFunction | 1..1    | <a href="#">AutomationFunction</a> | (NC) Automation function which has automation block group. |

**3.101 (abstract,NC) AutomationFunction**

Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

Automation function is a collection of functional block or other automation function that can be executed as a work cycle program as part of an automated system.

Table 110 shows all attributes of AutomationFunction.

2174 **Table 110 – Attributes of EquipmentReliabilityProfile::AutomationFunction**

| name               | mult | type                    | description                                                                 |
|--------------------|------|-------------------------|-----------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) Type of automation function.                                           |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) True, if the automation function is enabled (active). Otherwise false. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>      |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                            |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                            |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                            |

2175 Table 111 shows all association ends of AutomationFunction with other classes.

2176 **Table 111 – Association ends of EquipmentReliabilityProfile::AutomationFunction with**  
2177 **other classes**

| mult from | name   | mult to | type                               | description                                                   |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) Automation function is part of this automation function. |

### 2180 3.102 (NC) BaseOverloadLimitCurve

2181 Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

2182 A curve or functional relationship between

2183 - the relative loading - current loading over permanent loading (PATL) independent variable (X-axis), and

2184 - temporary overloading (TATL) limiting dependent (Y-axis) variables.

2185 Table 112 shows all attributes of BaseOverloadLimitCurve.

2187 **Table 112 – Attributes of EquipmentReliabilityProfile::BaseOverloadLimitCurve**

| name               | mult | type                           | description                                                            |
|--------------------|------|--------------------------------|------------------------------------------------------------------------|
| curveStyle         | 1..1 | <a href="#">CurveStyle</a>     | inherited from: <a href="#">Curve</a>                                  |
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |

### 2189 3.103 (NC) BiddingZone

2190 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

2191 A bidding zone is a market-based method for handling power transmission congestion. It  
 2192 consists of scheduling areas that include the relevant production (supply) and consumption  
 2193 (demand) to form an electrical area with the same market price without capacity allocation.  
 2194 Table 113 shows all attributes of BiddingZone.

2195 **Table 113 – Attributes of EquipmentReliabilityProfile::BiddingZone**

| name               | mult | type                    | description                                                                                                                                                                                                                                                                                                       |
|--------------------|------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| isTradeEnabled     | 1..1 | <a href="#">Boolean</a> | (NC) Identifies the mechanism for determining the energy price for a given bidding zone. If true, the bid and the offer is expected to be provided for the bidding zone to create the market price. If false, other mechanism determines the price of energy for a given bidding zone, e.g. virtual bidding zone. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                            |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                  |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                  |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                  |

2196  
 2197 Table 114 shows all association ends of BiddingZone with other classes.

2198 **Table 114 – Association ends of EquipmentReliabilityProfile::BiddingZone with other**  
 2199 **classes**

| mult from | name                      | mult to | type                                      | description                                                        |
|-----------|---------------------------|---------|-------------------------------------------|--------------------------------------------------------------------|
| 0..*      | CapacityCalculationRegion | 0..1    | <a href="#">CapacityCalculationRegion</a> | (NC) The capacity calculation region related to this bidding zone. |
| 0..1      | GridPowerCapacity         | 0..1    | <a href="#">GridPowerCapacity</a>         | (NC) Grid Power capacity which is associated to the bidding zone.  |

### 2200 2201 3.104 (NC) BiddingZoneBorder

2202 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)  
 2203 A unidirectional interface between two adjacent Bidding Zones, representing the available  
 2204 transmission capacity from the Bidding Zone defined by the association FromBiddingZone  
 2205 (source) to the Bidding Zone defined by the association ToBiddingZone (sink). It defines the  
 2206 capacity constraints and market-based allocation mechanisms for cross-zonal electricity  
 2207 exchange in the specified direction, considering potential transmission congestion and market  
 2208 price differences.  
 2209 Table 115 shows all attributes of BiddingZoneBorder.

2210 **Table 115 – Attributes of EquipmentReliabilityProfile::BiddingZoneBorder**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

2211  
 2212 Table 116 shows all association ends of BiddingZoneBorder with other classes.

2213 **Table 116 – Association ends of EquipmentReliabilityProfile::BiddingZoneBorder with**  
2214 **other classes**

| mult from | name                      | mult to | type                                      | description                                                                  |
|-----------|---------------------------|---------|-------------------------------------------|------------------------------------------------------------------------------|
| 0..*      | ToBiddingZone             | 1..1    | <a href="#">BiddingZone</a>               | (NC) The bidding zone for the to side.                                       |
| 0..*      | FromBiddingZone           | 1..1    | <a href="#">BiddingZone</a>               | (NC) The bidding zone for the from side.                                     |
| 0..*      | TieCorridor               | 0..1    | <a href="#">TieCorridor</a>               | (NC) Tie corridor for a given bidding zone border.                           |
| 0..*      | CapacityCalculationRegion | 0..1    | <a href="#">CapacityCalculationRegion</a> | (NC) The capacity calculation region for which the capacity is derived from. |

2215

### 2216 3.105 (NC) BipolarDCSystem

2217 Inheritance path = [DCSystem](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2218 Bipolar DC system (IEC 60633) consists of two poles of opposite polarity with respect to earth.

2219 The overhead lines, if any, of the two poles may be carried on common or separate towers.

2220 Table 117 shows all attributes of BipolarDCSystem.

2221 **Table 117 – Attributes of EquipmentReliabilityProfile::BipolarDCSystem**

| name               | mult | type                                     | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| isRigid            | 1..1 | <a href="#">Boolean</a>                  | (NC) If true, the bipolar DC system is a rigid DC current bipolar system (IEC 60633). It is a bipolar DC system without neutral connection between both converter stations. Since only two (pole) conductors exist, no unbalance current between both poles is possible. In case of interruption of power transfer of one converter pole, the current of the other pole has to be interrupted as well (at least for a limited time to allow reconfiguration of the DC circuit). |
| directionKind      | 0..1 | <a href="#">DCSystemDirectionKind</a>    | (NC) inherited from: <a href="#">DCSystem</a>                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| transmissionKind   | 0..1 | <a href="#">DCSystemTransmissionKind</a> | (NC) inherited from: <a href="#">DCSystem</a>                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                   | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                          |
| description        | 0..1 | <a href="#">String</a>                   | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                |
| mRID               | 1..1 | <a href="#">String</a>                   | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                |
| name               | 0..1 | <a href="#">String</a>                   | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                |

2222

### 2223 3.106 (NC) BoundaryPoint

2224 Inheritance path = [CommonResponsibilityPoint](#) : [IdentifiedObject](#)

2225 <<EU>> Designates a connection point at which one or more model authority sets shall connect to. The location of the connection point as well as other properties are agreed between  
2226 organisations responsible for the interconnection, hence all attributes of the class represent  
2227 this agreement. It is primarily used in a boundary model authority set which can contain one or  
2228 many BoundaryPoint-s among other Equipment-s and their connections.

2229 New:

2230 A BoundaryPoint is a CommonResponsibilityPoint that identifies a location in the power system  
2231 model where two or more parties establish a common agreement on modelling responsibility. It  
2232 defines the point at which the representation of adjacent model responsibilities connect and  
2233 where the agreed boundary between modelling domains is established.

2235 Note: A BoundaryPoint represents the agreed location where modelling responsibility changes  
2236 between organisations such as transmission system operators, distribution system operators,  
2237 or other authorised model authorities.

2238 The BoundaryPoint may be located on an interconnection between networks or at an internal  
2239 location within a substation or facility where modelling responsibility is divided between parties.  
2240 Table 118 shows all attributes of BoundaryPoint.

2241 **Table 118 – Attributes of EquipmentReliabilityProfile::BoundaryPoint**

| name                 | mult | type                    | description                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------|------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| partyOneResourceName | 0..1 | <a href="#">String</a>  | (NC) Name used by the first party to refer to the shared or connected resource associated with the BoundaryPoint.<br><br>Note: This attribute records the name used in the model maintained by the first party for the resource or connection associated with the BoundaryPoint.<br><br>It shall only be used when exactly two parties share modelling responsibility at the BoundaryPoint.   |
| partyTwoResourceName | 0..1 | <a href="#">String</a>  | (NC) Name used by the second party to refer to the shared or connected resource associated with the BoundaryPoint.<br><br>Note: This attribute records the name used in the model maintained by the second party for the resource or connection associated with the BoundaryPoint.<br><br>It shall only be used when exactly two parties share modelling responsibility at the BoundaryPoint. |
| isDirectCurrent      | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a>                                                                                                                                                                                                                                                                                                                                |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                        |
| description          | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                              |
| mRID                 | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                              |
| name                 | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                              |

2242  
2243 Table 119 shows all association ends of BoundaryPoint with other classes.

2244 **Table 119 – Association ends of EquipmentReliabilityProfile::BoundaryPoint with other**  
2245 **classes**

| mult from | name                | mult to | type                                | description                                                                                                                                |
|-----------|---------------------|---------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 0..*      | BoundaryPointBorder | 0..1    | <a href="#">BoundaryPointBorder</a> | (NC) The BoundaryPointBorder that identifies the bilateral border relationship between the two parties responsible for this BoundaryPoint. |
| 0..*      | ConnectivityNode    | 0..1    | <a href="#">ConnectivityNode</a>    | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a>                                                                             |
| 0..*      | DCNode              | 0..1    | <a href="#">DCNode</a>              | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a>                                                                             |

2246  
2247 **3.107 (NC) BoundaryPointBorder**

2248 Inheritance path = [IdentifiedObject](#)

2249 A BoundaryPointBorder identifies a specific border relationship between exactly two parties for  
2250 one or more BoundaryPoints. It provides a bilateral context used to describe and reference the

2251 two parties that share responsibility for coordinating and exchanging boundary information  
 2252 across that border.  
 2253 Note:  
 2254 A BoundaryPointBorder always represents exactly two parties, even when one or more  
 2255 associated BoundaryPoints are shared among more than two parties (for example in multi-party  
 2256 interconnections). In such cases, separate BoundaryPointBorder instances are used to  
 2257 represent each bilateral border relationship.  
 2258 partyOne\* and partyTwo\* attributes are role-neutral and do not imply direction, hierarchy, or  
 2259 electrical flow.  
 2260 Table 120 shows all attributes of BoundaryPointBorder.

**Table 120 – Attributes of EquipmentReliabilityProfile::BoundaryPointBorder**

| name                  | mult | type                   | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------|------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| partyOneDesignatorRef | 1..1 | <a href="#">URI</a>    | (NC) Globally unique reference to the designator associated with the first party, expressed as a URI.<br><br>Note: The reference may be a web URL identifying the designator or another persistent identifier expressed in URI form. When resolvable, the URI may provide additional linked data describing the designator.<br><br>The designator typically represents a jurisdictional or organisational designation that has empowered the party with the authority to provide the normative power system reference model.<br><br>This may refer to a country or to a specific regulatory or governing organisation.<br><br>Example:<br>"https://vocabulary.uncefact.org/unlocode-countries#NO",<br>"https://www.nve.no/reguleringssmyndigheten/" |
| partyOneName          | 1..1 | <a href="#">String</a> | (NC) Human-readable name of the first party participating in the border relationship.<br><br>Note: This name shall be suitable for unambiguous identification of the party within the exchange context.<br><br>If partyOneRef is provided, partyOneName shall be aligned with the party identified by partyOneRef.<br><br>Example: "Statnett"                                                                                                                                                                                                                                                                                                                                                                                                       |
| partyOneRef           | 1..1 | <a href="#">URI</a>    | (NC) Globally unique reference to the first party participating in the border relationship, expressed as a URI.<br><br>Note: The reference may be a web URL identifying the party or another persistent identifier expressed in URI form. When resolvable, the URI may provide additional linked data describing the party.<br><br>Example:<br>"https://energy.referencedata.eu/party/statnett",<br>"urn:uuid:6f3e3a4e-3d4e-4b1a-a1e4-2b2c3f1a9a8d",<br>"https://virksomhet.brreg.no/nb/oppslag/enheter/962986633"                                                                                                                                                                                                                                  |
| partyTwoDesignatorRef | 1..1 | <a href="#">URI</a>    | (NC) Globally unique reference to the designator associated with the second party, expressed as a URI.<br><br>Note: The reference may be a web URL identifying the designator or another persistent identifier expressed in URI form. When                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| name               | mult | type                   | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |      |                        | resolvable, the URI may provide additional linked data describing the designator.<br>The designator typically represents a jurisdictional or organisational designation that has empowered the party with the authority to provide the normative power system reference model.<br>This may refer to a country or to a specific regulatory or governing organisation.<br>Example:<br>"https://vocabulary.uncefact.org/unlocode-countries#SE", "https://ei.se/"                                                                                           |
| partyTwoName       | 1..1 | <a href="#">String</a> | (NC) Human-readable name of the second party participating in the border relationship.<br>Note: This name shall be suitable for unambiguous identification of the party within the exchange context.<br>If partyTwoRef is provided, partyTwoName shall be aligned with the party identified by partyTwoRef.<br>Example: "SvenskaKraftnet"                                                                                                                                                                                                               |
| partyTwoRef        | 1..1 | <a href="#">URI</a>    | (NC) Globally unique reference to the second party participating in the border relationship, expressed as a URI.<br>Note: The reference may be a web URL identifying the party or another persistent identifier expressed in URI form. When resolvable, the URI may provide additional linked data describing the party.<br>Example:<br>"https://energy.referencedata.eu/party/svk",<br>"urn:uuid:0d4c7c30-cc7e-4f8f-bb6c-6d6b8c6f7f62",<br>"https://www.allabolag.se/foretag/svenska-kraftn%C3%A4t/sundbyberg/energif%C3%B6rs%C3%B6rning/XF94VWI5YE1K" |
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated, European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

2262

2263 **3.108 (NC) BoundaryPointBorderLink root class**

2264 A BoundaryPointBorderLink identifies the relationship between a specific BoundaryPoint and a  
 2265 specific BoundaryPointBorder. It is used when a BoundaryPoint is shared by more than two  
 2266 parties and therefore needs to be related to multiple bilateral BoundaryPointBorder instances

2267 Note: When exactly two parties share a BoundaryPoint, the BoundaryPoint shall be directly  
 2268 associated with a single BoundaryPointBorder and BoundaryPointBorderLink shall not be used.  
 2269 BoundaryPointBorderLink does not imply direction or hierarchy between the two parties; it only  
 2270 establishes that the BoundaryPoint participates in the bilateral border context.

2271 Table 121 shows all attributes of BoundaryPointBorderLink.

2272 **Table 121 – Attributes of EquipmentReliabilityProfile::BoundaryPointBorderLink**

| name | mult | type                   | description                                                                                                                        |
|------|------|------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily |

| name | mult | type | description                                                                                                                                                                                                                                                                |
|------|------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |      |      | achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br><br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |

2273  
2274 Table 122 shows all association ends of BoundaryPointBorderLink with other classes.

2275 **Table 122 – Association ends of EquipmentReliabilityProfile::BoundaryPointBorderLink**  
2276 **with other classes**

| mult from | name                | mult to | type                                | description                                                                                            |
|-----------|---------------------|---------|-------------------------------------|--------------------------------------------------------------------------------------------------------|
| 0..*      | BoundaryPoint       | 1..1    | <a href="#">BoundaryPoint</a>       | (NC) BoundaryPoint that is linked to multiple BoundaryPointBorder through the BoundaryPointBorderLink. |
| 0..*      | BoundaryPointBorder | 1..1    | <a href="#">BoundaryPointBorder</a> | (NC) The BoundaryPointBorder that is given by the BoundaryPointBorderLink.                             |

2277  
2278 **3.109 (NC) CapacityCalculationRegion**

2279 Inheritance path = [Region](#) : [PowerSystemResource](#) : [IdentifiedObject](#)  
2280 Capacity calculation region is a coherent part of the interconnected system that is used for  
2281 calculating the transmission capacity for a bidding zone or between bidding zones.  
2282 Table 123 shows all attributes of CapacityCalculationRegion.

2283 **Table 123 – Attributes of EquipmentReliabilityProfile::CapacityCalculationRegion**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

2284  
2285 Table 124 shows all association ends of CapacityCalculationRegion with other classes.

2286 **Table 124 – Association ends of**  
2287 **EquipmentReliabilityProfile::CapacityCalculationRegion with other classes**

| mult from | name                          | mult to | type                                          | description                                                                                  |
|-----------|-------------------------------|---------|-----------------------------------------------|----------------------------------------------------------------------------------------------|
| 0..*      | SecurityCoordinator           | 0..1    | <a href="#">SecurityCoordinator</a>           | (NC) The security coordinator responsible for the capacity calculation region.               |
| 0..*      | CoordinatedCapacityCalculator | 0..1    | <a href="#">CoordinatedCapacityCalculator</a> | (NC) Coordinated capacity calculator responsible for the capacity calculation of the region. |
| 0..*      | OverlappingZone               | 0..1    | <a href="#">OverlappingZone</a>               | (NC) inherited from: <a href="#">Region</a>                                                  |

2288  
2289 **3.110 (abstract,NC) Circuit**

2290 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)  
2291 A circuit is a collection of equipment in a network graph that provide common stability limits.  
2292 The relevant equipment is in general given by the identifying terminal. A software application

2293 that can do topology processing shall calculate the equipment belonging to the circuit, if there  
2294 are no stability limits associated to it. In case of stability limits, the containment reflects the  
2295 equipments that were used in the calculation/analysis.  
2296 Table 125 shows all attributes of Circuit.

2297 **Table 125 – Attributes of EquipmentReliabilityProfile::Circuit**

| name               | mult | type                    | description                                                                                                                                                                           |
|--------------------|------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| positiveFlowIn     | 1..1 | <a href="#">Boolean</a> | (NC) True, if the positive value on the terminal shall be considered flow into the circuit. False, if the positive value on the terminal shall be considered flow out of the circuit. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                      |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                      |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                      |

2298  
2299 Table 126 shows all association ends of Circuit with other classes.

2300 **Table 126 – Association ends of EquipmentReliabilityProfile::Circuit with other classes**

| mult from | name                | mult to | type                     | description                                |
|-----------|---------------------|---------|--------------------------|--------------------------------------------|
| 0..1      | IdentifyingTerminal | 0..1    | <a href="#">Terminal</a> | (NC) Terminal that identifies the circuit. |

2301  
2302 **3.111 (NC) CircuitShare**

2303 Inheritance path = [IdentifiedObject](#)  
2304 Defines the share of the circuit which is part of an associated power transfer corridor.  
2305 Table 127 shows all attributes of CircuitShare.

2306 **Table 127 – Attributes of EquipmentReliabilityProfile::CircuitShare**

| name                     | mult | type                    | description                                                                                                                     |
|--------------------------|------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| normalContributionFactor | 0..1 | <a href="#">PerCent</a> | (NC) Normal contribution factor for the circuit which is part of a power transfer corridor. The allowed value range is [0,100]. |
| energyIdentCodeEic       | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                          |
| description              | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                |
| mRID                     | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                |
| name                     | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                |

2307  
2308 Table 128 shows all association ends of CircuitShare with other classes.

2309 **Table 128 – Association ends of EquipmentReliabilityProfile::CircuitShare with other classes**

| mult from | name                  | mult to | type                                  | description                                                     |
|-----------|-----------------------|---------|---------------------------------------|-----------------------------------------------------------------|
| 0..*      | Circuit               | 1..1    | <a href="#">Circuit</a>               | (NC) The circuit that has a share of the power system corridor. |
| 0..*      | PowerTransferCorridor | 1..1    | <a href="#">PowerTransferCorridor</a> | (NC) The power transfer corridor that has this circuit share.   |

2312 **3.112 (NC) ClimateZone**2313 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)2314 A geographically defined area characterised according to a climate classification and used as  
2315 a spatial reference for representative meteorological, hydrological and marine conditions  
2316 relevant to energy production, consumption and resource availability.2317 Note: ClimateZone provides selected climatological normal values as structured information  
2318 and may reference time series for detailed climate, weather, hydrological and marine data. A  
2319 normal value represents a climatological reference condition for the area. Time series may  
2320 represent observed, historical, modelled, forecast, scenario or climatological data. Reference  
2321 period, scenario, source, calculation method and other provenance information are represented  
2322 separately.2323 ClimateZone may be used to associate energy resources and energy-system studies with  
2324 climate-dependent conditions such as temperature, wind, solar irradiance, precipitation, snow,  
2325 hydro inflow, extreme weather, waves, sea ice and sea currents.2326 Example: Climate study zones defined in the Pan-European Climate Database (PECD) for  
2327 European energy-system modelling.

2328 Table 129 shows all attributes of ClimateZone.

2329 **Table 129 – Attributes of EquipmentReliabilityProfile::ClimateZone**

| name                                | mult | type                                          | description                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------|------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| classificationKind                  | 0..1 | <a href="#">ClimateZoneClassificationKind</a> | (NC) The kind of climate classification scheme according to which the ClimateZone is defined.<br><br>Note: The attribute identifies the classification scheme and not the code or identifier of the ClimateZone within that scheme. When the classification scheme is not explicitly represented by ClimateZoneClassificationKind, classificationKind shall be set to other and otherClassification shall identify the scheme.      |
| code                                | 0..1 | <a href="#">String</a>                        | (NC) The code or identifier assigned to the ClimateZone by the selected climate classification scheme.<br><br>Note: The interpretation of the code depends on ClimateZone.classificationKind. The code should conform to the identification or naming convention defined by the corresponding classification scheme.<br><br>Example: "Dfb" or "Cfb" for Köppen-Geiger, or a zone code defined by PECD or a national classification. |
| normalAnnualDiffuseSolarIrradiation | 0..1 | <a href="#">Irradiation</a>                   | (NC) The climatological normal total diffuse solar energy received per unit area during an annual period.<br><br>Note: The orientation of the applicable reference surface is defined by the data specification or provenance information.                                                                                                                                                                                          |
| normalAnnualDirectSolarIrradiation  | 0..1 | <a href="#">Irradiation</a>                   | (NC) The climatological normal total direct solar energy received per unit area during an annual period.<br><br>Note: The orientation of the applicable reference surface is defined by the data specification or provenance information.                                                                                                                                                                                           |
| normalAnnualEvaporation             | 0..1 | <a href="#">Length</a>                        | (NC) The climatological normal amount of water returned to the atmosphere through evaporation and evapotranspiration during an annual period, expressed as an equivalent depth of water.                                                                                                                                                                                                                                            |
| normalAnnualExtremeFireDangerDays   | 0..1 | <a href="#">Decimal</a>                       | (NC) The climatological normal number of days during an annual period classified as having extreme fire danger.                                                                                                                                                                                                                                                                                                                     |

| name                                  | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------|------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       |      |                             | <p>Note: The criterion for extreme fire danger is determined by the applicable wildfire index and classification identified through the data provenance. The CIM model does not prescribe a specific threshold.</p> <p>Example: When the European Forest Fire Information System (EFFIS) classification is applied, extreme fire danger corresponds to an Canadian Fire Weather Index (FWI) of 50 or greater. A value of "18.5" therefore indicates a climatological normal of 18.5 days per year with FWI greater than or equal to 50.</p> |
| normalAnnualFreezingPrecipitationDays | 0..1 | <a href="#">Decimal</a>     | (NC) The climatological normal number of days during an annual period with freezing precipitation.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| normalAnnualFrostDays                 | 0..1 | <a href="#">Decimal</a>     | <p>(NC) The climatological normal number of frost days during an annual period.</p> <p>Note: The threshold used to define a frost day is determined by the applicable meteorological specification, normally using minimum air temperature.</p>                                                                                                                                                                                                                                                                                             |
| normalAnnualGlobalSolarIrradiation    | 0..1 | <a href="#">Irradiation</a> | <p>(NC) The climatological normal total global solar energy received per unit area during an annual period.</p> <p>Note: Global solar irradiation includes direct and diffuse solar radiation incident on the applicable reference surface. For a horizontal reference surface it corresponds to global horizontal irradiation.</p> <p>Example: A value may be expressed as annual solar energy per square metre, such as MJ/m<sup>2</sup> or an equivalent unit.</p>                                                                       |
| normalAnnualHailDays                  | 0..1 | <a href="#">Decimal</a>     | (NC) The climatological normal number of days during an annual period on which hail occurs.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| normalAnnualHeatwaveDays              | 0..1 | <a href="#">Decimal</a>     | <p>(NC) The climatological normal number of days during an annual period occurring as part of a heatwave.</p> <p>Note: A heatwave represents unusually high temperature persisting for a defined minimum duration. The temperature criteria and minimum duration are specified by the applicable climate dataset or scenario.</p>                                                                                                                                                                                                           |
| normalAnnualHighAvalancheDangerDays   | 0..1 | <a href="#">Decimal</a>     | <p>(NC) The climatological normal number of days during an annual period classified as having high avalanche danger.</p> <p>Note: The criterion for high avalanche danger is determined by the applicable avalanche methodology and classification identified through data provenance. The CIM model does not prescribe a particular threshold.</p> <p>Example: "8.5" when high avalanche danger is defined as EAWS danger level 4 or 5.</p>                                                                                                |
| normalAnnualHotDays                   | 0..1 | <a href="#">Decimal</a>     | <p>(NC) The climatological normal number of hot days during an annual period.</p> <p>Note: A hot day is defined using the threshold specified by the applicable climate dataset or scenario. The threshold may be an absolute temperature or a percentile relative to the local climatology.</p>                                                                                                                                                                                                                                            |
| normalAnnualHydroInflow               | 0..1 | <a href="#">RealEnergy</a>  | (NC) The climatological normal energy equivalent of natural hydro inflow associated                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| name                                 | mult | type                         | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------|------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      |      |                              | <p>with hydro resources in the ClimateZone during an annual period.</p> <p>Note: The value represents the potential energy associated with natural inflow and not generated electrical energy. This representation is intended for aggregated power-system and adequacy studies where hydro inflow is expressed as an energy quantity.</p> <p>Example: The value may represent the annual energy equivalent of natural inflow to reservoir hydropower resources within the ClimateZone.</p> |
| normalAnnualIcingDays                | 0..1 | <a href="#">Decimal</a>      | <p>(NC) The climatological normal number of days during an annual period with meteorological conditions producing significant icing.</p> <p>Note: The criteria defining an icing day are provided by the applicable data specification or provenance information. The attribute may be used to characterise climate-related availability risk for overhead lines, wind turbines and other exposed equipment.</p>                                                                            |
| normalAnnualLightningDensity         | 0..1 | <a href="#">CountPerArea</a> | <p>(NC) The climatological normal number of lightning events per unit area during an annual period.</p> <p>Note: The definition of a lightning event, for example a flash or ground strike, is determined by the applicable data specification.</p> <p>Example: 1.5 flashes/km2 indicates that an average of 1.5 lightning flashes per square kilometre occurs during a normal year.</p>                                                                                                    |
| normalAnnualMaxDailyPrecipitation    | 0..1 | <a href="#">Length</a>       | <p>(NC) The climatological normal of the maximum precipitation accumulated during a single day within an annual period.</p> <p>Note: This value provides an indication of exposure to extreme precipitation that is not represented by normalAnnualPrecipitation alone.</p> <p>Example: A value of 85 mm indicates that the normal annual maximum one-day precipitation is approximately 85 mm.</p>                                                                                         |
| normalAnnualMaxSignificantWaveHeight | 0..1 | <a href="#">Length</a>       | <p>(NC) The climatological normal of the maximum significant wave height occurring during an annual period.</p> <p>Note: This value characterises exposure to severe sea states relevant to accessibility, equipment loading and availability of offshore resources.</p>                                                                                                                                                                                                                    |
| normalAnnualMaxTempAt2m              | 0..1 | <a href="#">Temperature</a>  | <p>(NC) The climatological normal of the maximum air temperature at 2 metres above ground level occurring during an annual period.</p> <p>Note: This represents an annual extreme maximum rather than the normal mean of daily maximum temperatures.</p>                                                                                                                                                                                                                                    |
| normalAnnualMaxWindGustAt10m         | 0..1 | <a href="#">Speed</a>        | <p>(NC) The climatological normal of the maximum wind gust at 10 metres above ground level occurring during an annual period.</p> <p>Note: This value characterises exposure to strong short-duration wind events rather than the normal wind resource.</p> <p>Example: A value of 31 m/s indicates that the climatological normal annual maximum gust is approximately 31 m/s.</p>                                                                                                         |

| name                             | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------|------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalAnnualMinTempAt2m          | 0..1 | <a href="#">Temperature</a> | (NC) The climatological normal of the minimum air temperature at 2 metres above ground level occurring during an annual period.<br>Note: This represents an annual extreme minimum rather than the normal mean of daily minimum temperatures.                                                                                                                                    |
| normalAnnualPotentialEvaporation | 0..1 | <a href="#">Length</a>      | (NC) The climatological normal potential amount of water that could be returned to the atmosphere by evaporation during an annual period, expressed as an equivalent depth of water.<br>Note: Potential evaporation represents atmospheric evaporative demand and is not limited by actual water availability.                                                                   |
| normalAnnualPrecipitation        | 0..1 | <a href="#">Length</a>      | (NC) The climatological normal total precipitation received during an annual period.<br>Note: Precipitation includes liquid and solid precipitation and is expressed as an equivalent depth of water over the area.<br>Example: 1100 mm represents an annual precipitation volume equivalent to 1100 litres of water per square metre.                                           |
| normalAnnualRainfall             | 0..1 | <a href="#">Length</a>      | (NC) The climatological normal amount of liquid precipitation received during an annual period.                                                                                                                                                                                                                                                                                  |
| normalAnnualRunoff               | 0..1 | <a href="#">Length</a>      | (NC) The climatological normal runoff during an annual period, expressed as an equivalent depth of water over the area.<br>Note: Runoff represents water leaving the land surface and subsurface drainage system after precipitation, snowmelt, evaporation, infiltration and storage effects.                                                                                   |
| normalAnnualSeaIceDays           | 0..1 | <a href="#">Decimal</a>     | (NC) The climatological normal number of days during an annual period for which sea ice is present within the ClimateZone.<br>Note: The minimum ice concentration or other criterion used to determine sea-ice presence is defined by the applicable data specification.                                                                                                         |
| normalAnnualSnowfall             | 0..1 | <a href="#">Length</a>      | (NC) The climatological normal amount of solid precipitation received during an annual period, expressed as its equivalent amount of liquid water.<br>Note: The value represents water input from snowfall rather than physical snow depth.<br>Example: 500 mm means that the annual snowfall normally contains an amount of water equivalent to a 500 mm layer of liquid water. |
| normalAnnualSnowmelt             | 0..1 | <a href="#">Length</a>      | (NC) The climatological normal amount of water released by melting snow during an annual period.<br>Note: Snowmelt is expressed as the equivalent depth of liquid water produced from the snowpack.                                                                                                                                                                              |
| normalAnnualSunshineDuration     | 0..1 | <a href="#">Hours</a>       | (NC) The climatological normal total duration of sunshine during an annual period.<br>Example: 1650 h represents approximately 1650 hours of sunshine during a normal year.                                                                                                                                                                                                      |
| normalAnnualThunderDays          | 0..1 | <a href="#">Decimal</a>     | (NC) The climatological normal number of days during an annual period on which thunder is observed.                                                                                                                                                                                                                                                                              |

| name                             | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------|------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalAnnualTropicalNights       | 0..1 | <a href="#">Decimal</a>     | (NC) The climatological normal number of tropical nights during an annual period.<br>Note: A tropical night is a night for which the minimum air temperature remains above the applicable threshold. A threshold of 20 degC is commonly used in European climate indicators, but the applicable threshold is defined by the dataset or scenario.                                                                                                                                                                  |
| normalCloudCover                 | 0..1 | <a href="#">PerCent</a>     | (NC) The climatological normal proportion of the sky covered by cloud.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| normalDewPointTempAt2m           | 0..1 | <a href="#">Temperature</a> | (NC) The climatological normal dew-point temperature at 2 metres above ground level.<br>Note: Dew-point temperature indicates atmospheric moisture content and may be used together with air temperature to derive relative humidity and icing conditions.                                                                                                                                                                                                                                                        |
| normalMaxSeaCurrentSpeed         | 0..1 | <a href="#">Speed</a>       | (NC) The climatological normal maximum sea-current speed within the ClimateZone.<br>Note: The value characterises strong current conditions relevant to marine-energy resource potential and equipment loading. The applicable depth and method for determining the maximum are defined by the source dataset or provenance information.                                                                                                                                                                          |
| normalMaxSeaIceThickness         | 0..1 | <a href="#">Length</a>      | (NC) The climatological normal maximum sea-ice thickness during the seasonal cycle within a marine ClimateZone.<br>Note: This attribute is primarily relevant for high-latitude offshore areas and may be used when assessing accessibility and availability of offshore resources.<br>Example: 0.8 m indicates that the normal seasonal maximum sea-ice thickness is approximately 0.8 metres.                                                                                                                   |
| normalMaxSnowWater               | 0..1 | <a href="#">Length</a>      | (NC) The climatological normal of the maximum amount of water stored in the snowpack during the seasonal cycle.<br>Note: Snow water represents the water content of the snowpack expressed as an equivalent depth of liquid water. The value characterises seasonal snow storage and is more hydrologically meaningful than physical snow depth.<br>Example: 450 mm indicates that the normal seasonal maximum snowpack contains an amount of water equivalent to a 450 mm layer of liquid water.                 |
| normalPopulationWeightedTempAt2m | 0..1 | <a href="#">Temperature</a> | (NC) The climatological normal population-weighted air temperature at 2 metres above ground level.<br>Note: Population-weighted temperature is a spatially aggregated temperature in which locations with a higher population are given greater weight. It provides a representative temperature for the conditions experienced by the population and is particularly relevant for energy-demand modelling. The population dataset, weighting method and other provenance information are represented separately. |
| normalRelativeHumidityAt2m       | 0..1 | <a href="#">PerCent</a>     | (NC) The climatological normal relative humidity at 2 metres above ground level.                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| name                        | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------|------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalSeaCurrentSpeed       | 0..1 | <a href="#">Speed</a>       | (NC) The climatological normal speed of the sea-water current within the ClimateZone.<br>Note: Sea-current speed depends on depth. The applicable depth or vertical reference is defined by the source dataset or provenance information.                                                                                                                                                                                                                                                                                                            |
| normalSeaSurfaceTemp        | 0..1 | <a href="#">Temperature</a> | (NC) The climatological normal sea-surface temperature within a marine ClimateZone.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| normalSignificantWaveHeight | 0..1 | <a href="#">Length</a>      | (NC) The climatological normal significant wave height within a marine ClimateZone.<br>Note: Significant wave height is a statistical representation of sea state commonly approximated as the mean height of the highest one-third of waves.<br>Example: A value of 2.1 m represents a climate where the normal significant wave height is approximately 2.1 metres.                                                                                                                                                                                |
| normalSurfacePressure       | 0..1 | <a href="#">Pressure</a>    | (NC) The climatological normal atmospheric pressure at the surface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| normalTempAt2m              | 0..1 | <a href="#">Temperature</a> | (NC) The climatological normal air temperature at 2 metres above ground level.<br>Note: Two metres above ground is the standard reference height for near-surface air temperature.                                                                                                                                                                                                                                                                                                                                                                   |
| normalWavePeriod            | 0..1 | <a href="#">Seconds</a>     | (NC) The climatological normal representative wave period within a marine ClimateZone.<br>Note: The precise wave-period statistic, such as mean or peak period, is determined by the applicable data specification.                                                                                                                                                                                                                                                                                                                                  |
| normalWindSpeedAt100m       | 0..1 | <a href="#">Speed</a>       | (NC) The climatological normal wind speed at 100 metres above ground level.<br>Note: Wind speed at 100 metres is commonly available in meteorological and energy datasets and provides a useful indication of the wind resource for electricity generation.                                                                                                                                                                                                                                                                                          |
| normalWindSpeedAt10m        | 0..1 | <a href="#">Speed</a>       | (NC) The climatological normal wind speed at 10 metres above ground level.<br>Note: Ten metres above ground is the conventional reference height for near-surface meteorological wind observations.                                                                                                                                                                                                                                                                                                                                                  |
| otherClassification         | 0..1 | <a href="#">String</a>      | (NC) The name or identifier of the climate classification scheme when ClimateZone.classificationKind equals other.<br>Note: This attribute shall only be used when ClimateZone.classificationKind is set to other. It identifies the classification scheme that is not explicitly represented by ClimateZoneClassificationKind. The value should be sufficiently descriptive to identify the scheme.<br>Example: "Trewartha Climate Classification", "Holdridge Life Zones", "Thorntwaite Climate Classification", "Company Internal Climate Zones". |
| ref                         | 0..1 | <a href="#">URI</a>         | (NC) A URI identifying the ClimateZone within the applicable climate classification scheme.<br>Note: The URI identifies the classified zone or concept rather than the classification scheme itself. It may be used as an alternative to code when the classification is published as linked data or another URI-based controlled                                                                                                                                                                                                                    |

| name               | mult | type                   | description                                                                                                                                                                                                                                   |
|--------------------|------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |      |                        | vocabulary. Both code and ref may be provided when the classification defines both representations.<br>Example:<br>"https://example.org/climate/pecd/zone-12" as an illustrative URI identifying a climate zone within a PECD classification. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                        |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                              |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                              |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                              |

2330

2331 **3.113 (NC) ClosedDistributionSystemOperator**

2332 Inheritance path = [SystemOperator](#) : [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

2333 A system operator which distributes electricity (or gas) within a geographically confined industrial, commercial or shared services and does not supply household customers.

2336 Table 130 shows all attributes of ClosedDistributionSystemOperator.

2337

2338 **Table 130 – Attributes of  
EquipmentReliabilityProfile::ClosedDistributionSystemOperator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

2339

2340 Table 131 shows all association ends of ClosedDistributionSystemOperator with other classes.

2341 **Table 131 – Association ends of**

2342 **EquipmentReliabilityProfile::ClosedDistributionSystemOperator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

2343

2344 **3.114 (NC) CogenerationPlant**

2345 Inheritance path = [ThermalPowerPlant](#) : [PowerPlant](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2346 A set of thermal generating units for the production of electrical energy and process steam (usually from the output of the steam turbines). The steam sendout is typically used for industrial purposes or for municipal heating and cooling.

2349 Update:

2350 Table 132 shows all attributes of CogenerationPlant.

2351 **Table 132 – Attributes of EquipmentReliabilityProfile::CogenerationPlant**

| name     | mult | type                        | description                                     |
|----------|------|-----------------------------|-------------------------------------------------|
| nominalP | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a> |

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| maxOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| minOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| deadbandMinP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| deadbandMaxP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2352

2353 **3.115 (NC) CombinedCyclePlant**2354 Inheritance path = [ThermalPowerPlant](#) : [PowerPlant](#) : [PowerSystemResource](#) : [IdentifiedObject](#)2355 A thermal power plant in which two or more thermal generating units are operated in  
2356 combination so that heat from one thermodynamic cycle is used as an energy input to another  
2357 thermodynamic cycle.2358 Note: A combined cycle plant normally includes at least one combustion-turbine generating unit  
2359 and one steam-turbine generating unit. Dependencies between the thermal generating units  
2360 may define their relative activation, deactivation and operation.

2361 Table 133 shows all attributes of CombinedCyclePlant.

2362 **Table 133 – Attributes of EquipmentReliabilityProfile::CombinedCyclePlant**

| name               | mult | type                                           | description                                                                                                     |
|--------------------|------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| kind               | 0..1 | <a href="#">CombinedCycleConfigurationKind</a> | (NC) The configuration used to arrange and coordinate the thermal generating units of the combined cycle plant. |
| nominalP           | 0..1 | <a href="#">ActivePower</a>                    | (NC) inherited from: <a href="#">PowerPlant</a>                                                                 |
| maxOperatingP      | 0..1 | <a href="#">ActivePower</a>                    | (NC) inherited from: <a href="#">PowerPlant</a>                                                                 |
| minOperatingP      | 0..1 | <a href="#">ActivePower</a>                    | (NC) inherited from: <a href="#">PowerPlant</a>                                                                 |
| deadbandMinP       | 0..1 | <a href="#">ActivePower</a>                    | (NC) inherited from: <a href="#">PowerPlant</a>                                                                 |
| deadbandMaxP       | 0..1 | <a href="#">ActivePower</a>                    | (NC) inherited from: <a href="#">PowerPlant</a>                                                                 |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                          |
| description        | 0..1 | <a href="#">String</a>                         | inherited from: <a href="#">IdentifiedObject</a>                                                                |
| mRID               | 1..1 | <a href="#">String</a>                         | inherited from: <a href="#">IdentifiedObject</a>                                                                |
| name               | 0..1 | <a href="#">String</a>                         | inherited from: <a href="#">IdentifiedObject</a>                                                                |

2363

2364 **3.116 (abstract,NC) CommonResponsibilityPoint**2365 Inheritance path = [IdentifiedObject](#)2366 A Common Responsibility Point represents a named and persistent point in a power system  
2367 model where two or more parties share a formally agreed responsibility related to the power  
2368 system. It provides a stable reference for expressing agreements, constraints, and conditions  
2369 that apply at a specific location in the power system model and that are defined jointly by the  
2370 involved parties.

2371 Note:

2372 A CommonResponsibilityPoint is anchored to the connectivity model by association to either a  
2373 ConnectivityNode (AC grid) or a DCNode (DC grid). This separation allows the same  
2374 responsibility-point concept to be used consistently for AC and DC networks without duplicating  
2375 classes.

2376 Table 134 shows all attributes of CommonResponsibilityPoint.

2377 **Table 134 – Attributes of EquipmentReliabilityProfile::CommonResponsibilityPoint**

| name               | mult | type                    | description                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| isDirectCurrent    | 1..1 | <a href="#">Boolean</a> | (NC) Indicates whether the CommonResponsibilityPoint is anchored to a DC grid node.<br>If isDirectCurrent is true, the CommonResponsibilityPoint shall be associated to a DCNode and shall not be associated to a ConnectivityNode.<br>If isDirectCurrent is false, the CommonResponsibilityPoint shall be associated to a ConnectivityNode and shall not be associated to a DCNode. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                               |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                     |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                     |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                     |

2378

2379 Table 135 shows all association ends of CommonResponsibilityPoint with other classes.

2380 **Table 135 – Association ends of**  
2381 **EquipmentReliabilityProfile::CommonResponsibilityPoint with other classes**

| mult from | name             | mult to | type                             | description                                                                                 |
|-----------|------------------|---------|----------------------------------|---------------------------------------------------------------------------------------------|
| 0..*      | ConnectivityNode | 0..1    | <a href="#">ConnectivityNode</a> | (NC) The ConnectivityNode that anchors this CommonResponsibilityPoint in the AC grid model. |
| 0..*      | DCNode           | 0..1    | <a href="#">DCNode</a>           | (NC) The DCNode that anchors this CommonResponsibilityPoint in the DC grid model.           |

2382

### 2383 3.117 (NC) CompensatorController

2384 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
2385 [IdentifiedObject](#)

2386 Compensator controller is controlling the equipment to optimize the use of the compensators.

2387 Table 136 shows all attributes of CompensatorController.

2388 **Table 136 – Attributes of EquipmentReliabilityProfile::CompensatorController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

2389

2390 Table 137 shows all association ends of CompensatorController with other classes.

**Table 137 – Association ends of EquipmentReliabilityProfile::CompensatorController with other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

**3.118 (NC) CompressedAirEnergyStoragePlant**

Inheritance path = [EnergyStoragePlant](#) : [PowerPlant](#) : [PowerSystemResource](#) : [IdentifiedObject](#)  
 An energy storage plant in which energy is stored by compressing air and is subsequently recovered by expanding the compressed air to support electrical generation. The plant may use stored thermal energy, external heat or fuel combustion during the energy recovery process.  
 Table 138 shows all attributes of CompressedAirEnergyStoragePlant.

**Table 138 – Attributes of EquipmentReliabilityProfile::CompressedAirEnergyStoragePlant**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| nominalCapacity    | 0..1 | <a href="#">RealEnergy</a>  | (NC) inherited from: <a href="#">EnergyStoragePlant</a>                |
| minCapacity        | 0..1 | <a href="#">RealEnergy</a>  | (NC) inherited from: <a href="#">EnergyStoragePlant</a>                |
| maxCapacity        | 0..1 | <a href="#">RealEnergy</a>  | (NC) inherited from: <a href="#">EnergyStoragePlant</a>                |
| nominalP           | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| maxOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| minOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| deadbandMinP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| deadbandMaxP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

**3.119 (Description) ControlArea**

Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)  
 A control area is a grouping of generating units and/or loads and a cutset of tie lines (as terminals) which may be used for a variety of purposes including automatic generation control, power flow solution area interchange control specification, and input to load forecasting. All generation and load within the area defined by the terminals on the border are considered in the area interchange control. Note that any number of overlapping control area specifications can be superimposed on the physical model. The following general principles apply to ControlArea:

1. The control area orientation for net interchange is positive for an import, negative for an export.
2. The control area net interchange is determined by summing flows in Terminals. The Terminals are identified by creating a set of TieFlow objects associated with a ControlArea object. Each TieFlow object identifies one Terminal.
3. In a single network model, a tie between two control areas must be modelled in both control area specifications, such that the two representations of the tie flow sum to zero.
4. The normal orientation of Terminal flow is positive for flow into the conducting equipment that owns the Terminal. (i.e. flow from a bus into a device is positive.) However, the orientation of each flow in the control area specification must align with the control area convention, i.e.

2422 import is positive. If the orientation of the Terminal flow referenced by a TieFlow is positive into  
2423 the control area, then this is confirmed by setting TieFlow.positiveFlowIn flag TRUE. If not, the  
2424 orientation must be reversed by setting the TieFlow.positiveFlowIn flag FALSE.  
2425 Table 139 shows all attributes of ControlArea.

2426 **Table 139 – Attributes of EquipmentReliabilityProfile::ControlArea**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| areaType           | 0..1 | <a href="#">String</a> | (NC) Type of control area.                                             |
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

2427

2428 Table 140 shows all association ends of ControlArea with other classes.

2429 **Table 140 – Association ends of EquipmentReliabilityProfile::ControlArea with other**  
2430 **classes**

| mult from | name                     | mult to | type                                     | description                                                     |
|-----------|--------------------------|---------|------------------------------------------|-----------------------------------------------------------------|
| 0..*      | SystemOperator           | 0..1    | <a href="#">SystemOperator</a>           | (NC) The system operator that operates this control area.       |
| 0..*      | OutageCoordinationRegion | 0..1    | <a href="#">OutageCoordinationRegion</a> | (NC) The outage coordination region that has this control area. |
| 0..*      | PartOf                   | 0..1    | <a href="#">ControlArea</a>              | (NC) The control area that is part of this control area.        |

2431

### 2432 3.120 (abstract,NC) ControlFunctionBlock

2433 Inheritance path = [FunctionBlock](#) : [IdentifiedObject](#)

2434 Control function block is a function block that contains an algorithm for controlling the  
2435 equipment.

2436 Table 141 shows all attributes of ControlFunctionBlock.

2437 **Table 141 – Attributes of EquipmentReliabilityProfile::ControlFunctionBlock**

| name                  | mult | type                    | description                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) True, if the control function is discrete. This applies to equipment with discrete controls, e.g. tap changers and shunt compensators.                                                                                                                                                                                                                                                                                                                          |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) The deadband related to the targetValue of the control function. It is used with discrete control to avoid excessive update of controls like tap changers and shunt compensator banks while regulating. The attribute shall be a positive value or zero. If isDiscrete is set to "false", the targetDeadband is to be ignored.<br>Note that for instance, if the targetValue is 100 kV and the targetValueDeadband is 2 percent the range is from 99 to 101 kV. |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) Maximum allowed target value given by the percent of target value.<br>The allowed value range is [0,100].                                                                                                                                                                                                                                                                                                                                                       |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) Minimum allowed target value given by the percent of target value.                                                                                                                                                                                                                                                                                                                                                                                              |

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
|                    |      |                         | The allowed value range is [0,100].                                    |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 142 shows all association ends of ControlFunctionBlock with other classes.

**Table 142 – Association ends of EquipmentReliabilityProfile::ControlFunctionBlock with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 3.121 (NC) CoordinatedCapacityCalculator

Inheritance path = [SystemOperationCoordinator](#) : [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

A post that coordinates and executes the task of calculating transmission capacity.

Table 143 shows all attributes of CoordinatedCapacityCalculator.

**Table 143 – Attributes of EquipmentReliabilityProfile::CoordinatedCapacityCalculator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 144 shows all association ends of CoordinatedCapacityCalculator with other classes.

**Table 144 – Association ends of EquipmentReliabilityProfile::CoordinatedCapacityCalculator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

### 3.122 (NC,new) CountPerArea datatype

Number of discrete occurrences or events per unit area.

Note: Intended for spatial event densities such as lightning density. A new UnitSymbol countPerm2 is required if this quantity is represented as a CIMDatatype with an explicit unit.

Table 145 shows all attributes of CountPerArea.

2459 **Table 145 – Attributes of EquipmentReliabilityProfile::CountPerArea**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

2460

2461 **3.123 (NC) CrossZonalDCPole**2462 Inheritance path = [CrossZonalNetworkElement](#)2463 A CrossZonalNetworkElement represented by an HVDC pole participating in the transfer of  
2464 electrical power between two bidding zones.

2465 Table 146 shows all attributes of CrossZonalDCPole.

2466 **Table 146 – Attributes of EquipmentReliabilityProfile::CrossZonalDCPole**

| name | mult | type                   | description                                              |
|------|------|------------------------|----------------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | inherited from: <a href="#">CrossZonalNetworkElement</a> |

2467

2468 Table 147 shows all association ends of CrossZonalDCPole with other classes.

2469 **Table 147 – Association ends of EquipmentReliabilityProfile::CrossZonalDCPole with  
2470 other classes**

| mult from | name              | mult to | type                              | description                                                   |
|-----------|-------------------|---------|-----------------------------------|---------------------------------------------------------------|
| 0..*      | DCPole            | 1..1    | <a href="#">DCPole</a>            | (NC) Direct current pole represented by the CrossZonalDCPole. |
| 0..*      | BiddingZoneBorder | 2..?    | <a href="#">BiddingZoneBorder</a> | (NC) inherited from: <a href="#">CrossZonalNetworkElement</a> |

2471

2472 **3.124 (NC) CrossZonalLine**2473 Inheritance path = [CrossZonalNetworkElement](#)2474 A CrossZonalNetworkElement represented by an AC line participating in the transfer of  
2475 electrical power between two bidding zones.

2476 Table 148 shows all attributes of CrossZonalLine.

2477 **Table 148 – Attributes of EquipmentReliabilityProfile::CrossZonalLine**

| name | mult | type                   | description                                              |
|------|------|------------------------|----------------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | inherited from: <a href="#">CrossZonalNetworkElement</a> |

2478

2479 Table 149 shows all association ends of CrossZonalLine with other classes.

2480 **Table 149 – Association ends of EquipmentReliabilityProfile::CrossZonalLine with other  
2481 classes**

| mult from | name              | mult to | type                              | description                                                   |
|-----------|-------------------|---------|-----------------------------------|---------------------------------------------------------------|
| 0..1      | Line              | 1..1    | <a href="#">Line</a>              | (NC) The AC line represented by the CrossZonalLine.           |
| 0..*      | BiddingZoneBorder | 2..?    | <a href="#">BiddingZoneBorder</a> | (NC) inherited from: <a href="#">CrossZonalNetworkElement</a> |

2482

2483 **3.125 (abstract,NC) CrossZonalNetworkElement root class**

2484 A network element participating in the transfer of electrical power between two bidding zones  
2485 and associated with the two opposite directional BiddingZoneBorder instances representing  
2486 that bidding zone pair.

2487 Table 150 shows all attributes of CrossZonalNetworkElement.

2488 **Table 150 – Attributes of EquipmentReliabilityProfile::CrossZonalNetworkElement**

| name | mult | type                   | description                                                                                                                                                                                                                                                                                                                                                                                                   |
|------|------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br><br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |

2489  
2490 Table 151 shows all association ends of CrossZonalNetworkElement with other classes.

2491 **Table 151 – Association ends of**  
2492 **EquipmentReliabilityProfile::CrossZonalNetworkElement with other classes**

| mult from | name              | mult to | type                              | description                                                                                                                                                                                         |
|-----------|-------------------|---------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0..*      | BiddingZoneBorder | 2..?    | <a href="#">BiddingZoneBorder</a> | (NC) The directional bidding zone borders associated with the cross-zonal network element. Exactly two borders shall be referenced, representing the same bidding zone pair in opposite directions. |

2493  
2494 **3.126 (NC) CrossZonalPowerTransformer**

2495 Inheritance path = [CrossZonalNetworkElement](#)

2496 A CrossZonalNetworkElement represented by a power transformer participating in the transfer  
2497 of electrical power between two bidding zones.

2498 Table 152 shows all attributes of CrossZonalPowerTransformer.

2499 **Table 152 – Attributes of EquipmentReliabilityProfile::CrossZonalPowerTransformer**

| name | mult | type                   | description                                              |
|------|------|------------------------|----------------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | inherited from: <a href="#">CrossZonalNetworkElement</a> |

2500  
2501 Table 153 shows all association ends of CrossZonalPowerTransformer with other classes.

2502 **Table 153 – Association ends of**  
2503 **EquipmentReliabilityProfile::CrossZonalPowerTransformer with other classes**

| mult from | name              | mult to | type                              | description                                                           |
|-----------|-------------------|---------|-----------------------------------|-----------------------------------------------------------------------|
| 0..*      | PowerTransformer  | 1..1    | <a href="#">PowerTransformer</a>  | (NC) Power transformer represented by the CrossZonalPowerTransformer. |
| 0..*      | BiddingZoneBorder | 2..?    | <a href="#">BiddingZoneBorder</a> | (NC) inherited from: <a href="#">CrossZonalNetworkElement</a>         |

2504

2505 **3.127 (NC) CurrentControlFunction**2506 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)2507 Current control function is a function block that calculates the operating point of the controlled  
2508 equipment to achieve the target current.

2509 Table 154 shows all attributes of CurrentControlFunction.

2510 **Table 154 – Attributes of EquipmentReliabilityProfile::CurrentControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

2511

2512 Table 155 shows all association ends of CurrentControlFunction with other classes.

2513 **Table 155 – Association ends of EquipmentReliabilityProfile::CurrentControlFunction**  
2514 **with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

2515

2516 **3.128 (NC) CurrentDroopControlFunction**2517 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)2518 Current droop control function is a function block that calculates the operating point of the  
2519 controlled equipment to achieve the target current.

2520 Table 156 shows all attributes of CurrentDroopControlFunction.

2521 **Table 156 – Attributes of EquipmentReliabilityProfile::CurrentDroopControlFunction**

| name                  | mult | type                        | description                                                            |
|-----------------------|------|-----------------------------|------------------------------------------------------------------------|
| offsetInductive       | 1..1 | <a href="#">CurrentFlow</a> | (NC) Offset in capacitive region.                                      |
| droopInductive        | 1..1 | <a href="#">Float</a>       | (NC) Droop in inductive region. The unit is V/A.                       |
| offsetCapacitive      | 1..1 | <a href="#">CurrentFlow</a> | (NC) Offset in capacitive region.                                      |
| droopCapacitive       | 1..1 | <a href="#">Float</a>       | (NC) Droop in capacitive region. The unit is V/A.                      |
| isDiscrete            | 1..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a>     | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a>     | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a>     | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |

| name        | mult | type                   | description                                      |
|-------------|------|------------------------|--------------------------------------------------|
| description | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| mRID        | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| name        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 157 shows all association ends of CurrentDroopControlFunction with other classes.

**Table 157 – Association ends of  
EquipmentReliabilityProfile::CurrentDroopControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 3.129 (NC) CurrentDroopOverride root class

Current droop override uses the following logic:

- When the current exceeds a threshold the device executes the following transitions: 1) When injecting an inductive voltage or in monitoring mode the device tends to inject a voltage proportional to the difference between the line current and the aforementioned threshold. 2) When injecting a capacitive voltage the device transitions to monitoring mode.

- If the aforementioned proportional voltage is lower than the initial one, the voltage injection remains unchanged.

Current droop override is not applied when the device operates in currentDroop mode.

Table 158 shows all attributes of CurrentDroopOverride.

**Table 158 – Attributes of EquipmentReliabilityProfile::CurrentDroopOverride**

| name              | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| droopCapacitive   | 1..1 | <a href="#">Float</a>       | (NC) Droop in capacitive region. The unit is V/A.                                                                                                                                                                                                                                                                                                                                                                  |
| droopInductive    | 1..1 | <a href="#">Float</a>       | (NC) Droop in inductive region. The unit is V/A.                                                                                                                                                                                                                                                                                                                                                                   |
| offsetCapacitiveI | 1..1 | <a href="#">CurrentFlow</a> | (NC) Offset in capacitive region.                                                                                                                                                                                                                                                                                                                                                                                  |
| offsetInductiveI  | 1..1 | <a href="#">CurrentFlow</a> | (NC) Offset in capacitive region.                                                                                                                                                                                                                                                                                                                                                                                  |
| mRID              | 1..1 | <a href="#">String</a>      | (NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br><br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |

Table 159 shows all association ends of CurrentDroopOverride with other classes.

**Table 159 – Association ends of EquipmentReliabilityProfile::CurrentDroopOverride with other classes**

| mult from | name           | mult to | type                           | description                                                             |
|-----------|----------------|---------|--------------------------------|-------------------------------------------------------------------------|
| 0..1      | SSSCController | 1..1    | <a href="#">SSSCController</a> | (NC) The SSSC controller to which this CurrentDroopOverride applies to. |

2543 **3.130 (NC) DCActivePowerControlFunction**2544 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

2545 Direct current active power control function is a function block that calculates operating point of the controlled equipment to achieve the target active power.

2547 Table 160 shows all attributes of DCActivePowerControlFunction.

2548 **Table 160 – Attributes of EquipmentReliabilityProfile::DCActivePowerControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

2549  
2550 Table 161 shows all association ends of DCActivePowerControlFunction with other classes.2551 **Table 161 – Association ends of**2552 **EquipmentReliabilityProfile::DCActivePowerControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

2553

2554 **3.131 (NC) DCBiPole**2555 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

2556 DC system bipole (IEC 60633), which is part of an DC system consisting of two independently operable DC system poles, which during normal operation, exhibit opposite direct voltage polarities with respect to earth.

2559 Table 162 shows all attributes of DCBiPole.

2560 **Table 162 – Attributes of EquipmentReliabilityProfile::DCBiPole**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

2561

2562 Table 163 shows all association ends of DCBiPole with other classes.

**Table 163 – Association ends of EquipmentReliabilityProfile::DCBiPole with other classes**

| mult from | name            | mult to | type                            | description                                     |
|-----------|-----------------|---------|---------------------------------|-------------------------------------------------|
| 0..1      | BipolarDCSystem | 0..1    | <a href="#">BipolarDCSystem</a> | (NC) Bipolar DC system that has this DC bipole. |

**3.132 (Description) DCBreaker**

Inheritance path = [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A breaker within a DC system.

Table 164 shows all attributes of DCBreaker.

**Table 164 – Attributes of EquipmentReliabilityProfile::DCBreaker**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 165 shows all association ends of DCBreaker with other classes.

**Table 165 – Association ends of EquipmentReliabilityProfile::DCBreaker with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.133 (Description) DCBusbar**

Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A busbar within a DC system.

Table 166 shows all attributes of DCBusbar.

**Table 166 – Attributes of EquipmentReliabilityProfile::DCBusbar**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 167 shows all association ends of DCBusbar with other classes.

**Table 167 – Association ends of EquipmentReliabilityProfile::DCBusbar with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.134 (NC) DCBypassSwitch

Inheritance path = [DCHighSpeedSwitch](#) : [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

By-pass switch (IEC 60633) is a high-speed DC switch connected across each converter valve group in DC schemes using more than one independent converter per pole, designed to close rapidly to bypass a converter group that is being taken out of service and commutate the current back into a valve group that is being taken back in service. A by-pass switch may also be used for prolonged shunting of the bridge(s).

Table 168 shows all attributes of DCBypassSwitch.

**Table 168 – Attributes of EquipmentReliabilityProfile::DCBypassSwitch**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 169 shows all association ends of DCBypassSwitch with other classes.

**Table 169 – Association ends of EquipmentReliabilityProfile::DCBypassSwitch with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.135 (Description) DCChopper

Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Low resistance equipment used in the internal DC circuit to balance voltages. It has typically positive and negative pole terminals and a ground.

Table 170 shows all attributes of DCChopper.

2609

**Table 170 – Attributes of EquipmentReliabilityProfile::DCChopper**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2610

2611 Table 171 shows all association ends of DCChopper with other classes.

2612 **Table 171 – Association ends of EquipmentReliabilityProfile::DCChopper with other**  
2613 **classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

2614

2615 **3.136 (abstract,NC) DCCommutationSwitch**2616 Inheritance path = [DCHighSpeedSwitch](#) : [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) :  
2617 [PowerSystemResource](#) : [IdentifiedObject](#)2618 DC commutation switch (IEC 60633) is a type of high-speed DC switch specifically designed to  
2619 commute load current into an alternative parallel current path.

2620 Table 172 shows all attributes of DCCommutationSwitch.

2621 **Table 172 – Attributes of EquipmentReliabilityProfile::DCCommutationSwitch**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2622

2623 Table 173 shows all association ends of DCCommutationSwitch with other classes.

2624 **Table 173 – Association ends of EquipmentReliabilityProfile::DCCommutationSwitch**  
2625 **with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

2626

**3.137 (NC) DCConverterParallelingSwitch**

Inheritance path = [DCHighSpeedSwitch](#) : [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Converter paralleling switch (IEC 60633) is a high-speed DC switch connected in series with each converter at the DC terminal in DC schemes where two or more converters are connected in parallel onto a common pole conductor, designed to allow additional converter(s) to be connected in parallel or disconnected without affecting the load current in the other converter. Table 174 shows all attributes of DCConverterParallelingSwitch.

**Table 174 – Attributes of EquipmentReliabilityProfile::DCConverterParallelingSwitch**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 175 shows all association ends of DCConverterParallelingSwitch with other classes.

**Table 175 – Association ends of EquipmentReliabilityProfile::DCConverterParallelingSwitch with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.138 (Description) DCConverterUnit**

Inheritance path = [DCEquipmentContainer](#) : [EquipmentContainer](#) : [ConnectivityNodeContainer](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Indivisible operative unit comprising all equipment between the point of common coupling on the AC side and the point of common coupling – DC side, essentially one or more converters, together with one or more converter transformers, converter control equipment, essential protective and switching devices and auxiliaries, if any, used for conversion.

Table 176 shows all attributes of DCConverterUnit.

**Table 176 – Attributes of EquipmentReliabilityProfile::DCConverterUnit**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 177 shows all association ends of DCConverterUnit with other classes.

**Table 177 – Association ends of EquipmentReliabilityProfile::DCConverterUnit with other classes**

| mult from | name                  | mult to | type                                  | description                                                                                                                                             |
|-----------|-----------------------|---------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0..2      | DCPole                | 0..1    | <a href="#">DCPole</a>                | (NC) The DC pole that has this DC converter unit.                                                                                                       |
| 0..*      | Substation            | 0..1    | <a href="#">Substation</a>            | The containing substation of the DC converter unit.                                                                                                     |
| 0..1      | PointOfCommonCoupling | 0..1    | <a href="#">PointOfCommonCoupling</a> | (NC) The PointOfCommonCoupling that represents the electrical reference location where this DCConverterUnit interacts with the connected AC or DC grid. |
| 0..*      | DCSubstation          | 0..1    | <a href="#">DCSubstation</a>          | (NC) DC substation that has one or more DC converter units.                                                                                             |

**3.139 (NC) DCCurrentControlFunction**

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

DC current control function is a function block that calculates the operating point of the controlled equipment to achieve the target current.

Table 178 shows all attributes of DCCurrentControlFunction.

**Table 178 – Attributes of EquipmentReliabilityProfile::DCCurrentControlFunction**

| name                  | mult | type                       | description                                                                                                                                         |
|-----------------------|------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| droop                 | 0..1 | <a href="#">PU</a>         | (NC) Droop constant. The pu value is obtained as $D [kV/MW] \times S_b / U_{bdc}$ . The attribute shall be a positive value.                        |
| droopCompensation     | 0..1 | <a href="#">Resistance</a> | (NC) Compensation constant. Used to compensate for voltage drop when controlling voltage at a distant bus. The attribute shall be a positive value. |
| isDiscrete            | 1..1 | <a href="#">Boolean</a>    | (NC) inherited from: <a href="#">ControlFunctionBlock</a>                                                                                           |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a>    | (NC) inherited from: <a href="#">ControlFunctionBlock</a>                                                                                           |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a>    | (NC) inherited from: <a href="#">ControlFunctionBlock</a>                                                                                           |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a>    | (NC) inherited from: <a href="#">ControlFunctionBlock</a>                                                                                           |
| normalEnabled         | 0..1 | <a href="#">Boolean</a>    | (NC) inherited from: <a href="#">FunctionBlock</a>                                                                                                  |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>     | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                              |
| description           | 0..1 | <a href="#">String</a>     | inherited from: <a href="#">IdentifiedObject</a>                                                                                                    |
| mRID                  | 1..1 | <a href="#">String</a>     | inherited from: <a href="#">IdentifiedObject</a>                                                                                                    |
| name                  | 0..1 | <a href="#">String</a>     | inherited from: <a href="#">IdentifiedObject</a>                                                                                                    |

Table 179 shows all association ends of DCCurrentControlFunction with other classes.

**Table 179 – Association ends of EquipmentReliabilityProfile::DCCurrentControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

2666 **3.140 (Description) DCDisconnector**

2667 Inheritance path = [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2668 A disconnector within a DC system.

2670 Table 180 shows all attributes of DCDisconnector.

2671 **Table 180 – Attributes of EquipmentReliabilityProfile::DCDisconnector**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2672

2673 Table 181 shows all association ends of DCDisconnector with other classes.

2674 **Table 181 – Association ends of EquipmentReliabilityProfile::DCDisconnector with other classes**

2675

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

2676

2677 **3.141 (NC) DCEarthReturnTransferSwitch**

2678 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2680 Earth return transfer switch (IEC 60633) DC commutation switch used to transfer DC current from a metallic return path to an earth return path. In some applications, this function is performed by a by-pass switch. Although the term "earth return transfer breaker" has been widely used in the industry for many years, it is misleading since such switches have no ability to interrupt fault current.

2685 Table 182 shows all attributes of DCEarthReturnTransferSwitch.

2686 **Table 182 – Attributes of EquipmentReliabilityProfile::DCEarthReturnTransferSwitch**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2687

2688 Table 183 shows all association ends of DCEarthReturnTransferSwitch with other classes.

**Table 183 – Association ends of EquipmentReliabilityProfile::DCEarthReturnTransferSwitch with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.142 (NC) DCEquivalentInjection

Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

This class represents direct current equivalent injections (generation or load).

Table 184 shows all attributes of DCEquivalentInjection.

**Table 184 – Attributes of EquipmentReliabilityProfile::DCEquivalentInjection**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| maxP               | 0..1 | <a href="#">ActivePower</a> | (NC) Maximum active power limit.                                       |
| minP               | 0..1 | <a href="#">ActivePower</a> | (NC) Minimum active power limit.                                       |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 185 shows all association ends of DCEquivalentInjection with other classes.

**Table 185 – Association ends of EquipmentReliabilityProfile::DCEquivalentInjection with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.143 (NC) DCExtinctionAngleControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

Direct current extinction angle control function is a function block that calculates operating point of the controlled equipment to achieve the target extinction angle.

Table 186 shows all attributes of DCExtinctionAngleControlFunction.

**Table 186 – Attributes of EquipmentReliabilityProfile::DCExtinctionAngleControlFunction**

| name                  | mult | type                    | description                                               |
|-----------------------|------|-------------------------|-----------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a> |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a> |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a> |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a> |

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 187 shows all association ends of DCExtinctionAngleControlFunction with other classes.

**Table 187 – Association ends of  
EquipmentReliabilityProfile::DCExtinctionAngleControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 3.144 (NC) DCFiringAngleControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

Direct current firing angle control function is a function block that calculates operating point of the controlled equipment to achieve the target firing angle.

Table 188 shows all attributes of DCFiringAngleControlFunction.

**Table 188 – Attributes of EquipmentReliabilityProfile::DCFiringAngleControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 189 shows all association ends of DCFiringAngleControlFunction with other classes.

**Table 189 – Association ends of  
EquipmentReliabilityProfile::DCFiringAngleControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

2726 **3.145 (Description) DCGround**

2727 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2728 A ground within a DC system.

2730 Table 190 shows all attributes of DCGround.

2731 **Table 190 – Attributes of EquipmentReliabilityProfile::DCGround**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2732 Table 191 shows all association ends of DCGround with other classes.

2733 **Table 191 – Association ends of EquipmentReliabilityProfile::DCGround with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

2736

2737 **3.146 (NC) DCHarmonicFilter**

2738 Inheritance path = [DCSeriesDevice](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2739 DC harmonic filter (IEC 60633) is a filter which, in conjunction with the DC reactor(s) and with the DC surge capacitor(s), if any, serves the primary function of reducing (current or voltage) ripple on the DC transmission line and/or earth electrode line.

2743 Table 192 shows all attributes of DCHarmonicFilter.

2744 **Table 192 – Attributes of EquipmentReliabilityProfile::DCHarmonicFilter**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2745

2746 Table 193 shows all association ends of DCHarmonicFilter with other classes.

**Table 193 – Association ends of EquipmentReliabilityProfile::DCHarmonicFilter with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.147 (abstract,NC) DCHighSpeedSwitch**

Inheritance path = [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

High-speed DC switch (IEC 60633) is a type of switchgear used on a DC scheme, required to open or close rapidly (< 1 s), including in some cases the need to commutate load current into a parallel conducting path, but with no requirement to interrupt fault or load current. DC switchgear is usually based on a single-phase unit of an AC circuit-breaker, appropriately modified for their DC applications. Their capabilities to perform faster opening and closing than disconnect switches are used but the function of breaking short-circuit currents is not required. Table 194 shows all attributes of DCHighSpeedSwitch.

**Table 194 – Attributes of EquipmentReliabilityProfile::DCHighSpeedSwitch**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 195 shows all association ends of DCHighSpeedSwitch with other classes.

**Table 195 – Association ends of EquipmentReliabilityProfile::DCHighSpeedSwitch with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.148 (Description) DCLine root class**

Overhead lines and/or cables connecting two or more HVDC substations.

Table 196 shows all association ends of DCLine with other classes.

**Table 196 – Association ends of EquipmentReliabilityProfile::DCLine with other classes**

| mult from | name   | mult to | type                   | description                             |
|-----------|--------|---------|------------------------|-----------------------------------------|
| 0..1      | DCPole | 0..1    | <a href="#">DCPole</a> | (NC) The DC pole that has this DC line. |

2771 **3.149 (NC) DCLineParallelingSwitch**

2772 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) :  
2773 [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2774 Line paralleling switch (IEC 60633) DC commutation switch placed in series with one or more  
2775 high-voltage pole conductors, allowing two or more lines to be connected in parallel or to revert  
2776 to single-line operation while conducting load current.

2777 Table 197 shows all attributes of DCLineParallelingSwitch.

2778 **Table 197 – Attributes of EquipmentReliabilityProfile::DCLineParallelingSwitch**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2779  
2780 Table 198 shows all association ends of DCLineParallelingSwitch with other classes.

2781 **Table 198 – Association ends of EquipmentReliabilityProfile::DCLineParallelingSwitch**  
2782 **with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

2783

2784 **3.150 (Description) DCLineSegment**

2785 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2786 [IdentifiedObject](#)

2787 A wire or combination of wires not insulated from one another, with consistent electrical  
2788 characteristics, used to carry direct current between points in the DC region of the power  
2789 system.

2790 Table 199 shows all attributes of DCLineSegment.

2791 **Table 199 – Attributes of EquipmentReliabilityProfile::DCLineSegment**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2792

2793 Table 200 shows all association ends of DCLineSegment with other classes.

**Table 200 – Association ends of EquipmentReliabilityProfile::DCLineSegment with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.151 (NC) DCMetalicReturnSwitch**

Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Metallic return transfer switch (IEC 60633) is a DC commutation switch used to transfer DC current from an earth return path to a metallic return path. Although the term "metallic return transfer breaker" has been widely used in the industry for many years, it is misleading since such switches have no ability to interrupt fault current.

Table 201 shows all attributes of DCMetalicReturnSwitch.

**Table 201 – Attributes of EquipmentReliabilityProfile::DCMetalicReturnSwitch**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 202 shows all association ends of DCMetalicReturnSwitch with other classes.

**Table 202 – Association ends of EquipmentReliabilityProfile::DCMetalicReturnSwitch with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.152 (NC) DCNeutralBusGroundingSwitch**

Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Neutral bus grounding switch (IEC 60633) or a neutral bus earthing switch is a DC commutation switch connected from the neutral bus to the station earth mat on a bipolar DC scheme, designed to provide a temporary earth connection in the event of an open circuit fault on the electrode line until the imbalance of current between the two poles can be reduced to a safe minimum level or the electrode line connection can be restored.

Table 203 shows all attributes of DCNeutralBusGroundingSwitch.

2820 **Table 203 – Attributes of EquipmentReliabilityProfile::DCNeutralBusGroundingSwitch**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2821  
2822 Table 204 shows all association ends of DCNeutralBusGroundingSwitch with other classes.

2823 **Table 204 – Association ends of**  
2824 **EquipmentReliabilityProfile::DCNeutralBusGroundingSwitch with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

2825  
2826 **3.153 (NC) DCNeutralBusSwitch**  
2827 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) :  
2828 [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)  
2829 Neutral bus switch (IEC 60633) is a DC commutation switch connected in series with the neutral  
2830 bus on a bipolar DC scheme, designed to commutate current out of the pole conductor or neutral  
2831 bus and into the electrode line or dedicated metallic return conductor or earth in response to a  
2832 fault in a converter or neutral bus.  
2833 Table 205 shows all attributes of DCNeutralBusSwitch.

2834 **Table 205 – Attributes of EquipmentReliabilityProfile::DCNeutralBusSwitch**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">DCSwitch</a>                          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

2835  
2836 Table 206 shows all association ends of DCNeutralBusSwitch with other classes.

2837 **Table 206 – Association ends of EquipmentReliabilityProfile::DCNeutralBusSwitch with**  
2838 **other classes**

| mult from | name    | mult to | type                    | description                                    |
|-----------|---------|---------|-------------------------|------------------------------------------------|
| 0..*      | Circuit | 0..1    | <a href="#">Circuit</a> | (NC) inherited from: <a href="#">Equipment</a> |

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

2839

2840

**3.154 (NC) DCPole**2841 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)2842 The direct current (DC) system pole (IEC 60633) is part of a DC system consisting of all the  
2843 equipment in the DC substations and the interconnecting transmission lines, if any, which during  
2844 normal operation exhibit a common direct voltage polarity with respect to earth.2845 It includes active power, reactive power and participation factor to be able to schedule top down  
2846 (using DCTieCorridor and participation factor to provide schedule on the DCPole) and bottom  
2847 up (aggregation of DCPole to DCTieCorridor). Only one approach can be used at a time.

2848 Table 207 shows all attributes of DCPole.

2849

**Table 207 – Attributes of EquipmentReliabilityProfile::DCPole**

| name                      | mult | type                   | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------|------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a>  | (NC) Normal participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.<br>In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$ .<br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a> | (deprecated, European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| description               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| mRID                      | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| name                      | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

2850

2851 Table 208 shows all association ends of DCPole with other classes.

2852

**Table 208 – Association ends of EquipmentReliabilityProfile::DCPole with other classes**

| mult from | name                        | mult to | type                              | description                                                                  |
|-----------|-----------------------------|---------|-----------------------------------|------------------------------------------------------------------------------|
| 0..*      | DCTieCorridor               | 0..1    | <a href="#">DCTieCorridor</a>     | (NC) The DCTieCorridor that has this DC pole.                                |
| 1..2      | DCBiPole                    | 0..1    | <a href="#">DCBiPole</a>          | (NC) DC system bipole that has two independently operatable DC system poles. |
| 0..1      | AsymmetricMonopolarDCSystem | 0..1    | <a href="#">MonopolarDCSystem</a> | (NC) Asymmetric monopolar DC system that has this DC pole.                   |

2853

**3.155 (NC) DCPulseWidthModulationControlFunction**2855 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)2856 Direct current pulse width modulation control function is a function block that calculates  
2857 operating point of the controlled equipment to achieve the target pulse width modulation.

2858 Table 209 shows all attributes of DCPulseWidthModulationControlFunction.

**Table 209 – Attributes of  
EquipmentReliabilityProfile::DCPulseWidthModulationControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 210 shows all association ends of DCPulseWidthModulationControlFunction with other classes.

**Table 210 – Association ends of  
EquipmentReliabilityProfile::DCPulseWidthModulationControlFunction with other  
classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 3.156 (Description) DCSeriesDevice

Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A series device within the DC system, typically a reactor used for filtering or smoothing. Needed for transient and short circuit studies.

Table 211 shows all attributes of DCSeriesDevice.

**Table 211 – Attributes of EquipmentReliabilityProfile::DCSeriesDevice**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 212 shows all association ends of DCSeriesDevice with other classes.

**Table 212 – Association ends of EquipmentReliabilityProfile::DCSeriesDevice with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.157 (Description) DCShunt**

Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A shunt device within the DC system, typically used for filtering. Needed for transient and short circuit studies.

Table 213 shows all attributes of DCShunt.

**Table 213 – Attributes of EquipmentReliabilityProfile::DCShunt**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 214 shows all association ends of DCShunt with other classes.

**Table 214 – Association ends of EquipmentReliabilityProfile::DCShunt with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.158 (NC) DCsmoothingReactor**

Inheritance path = [DCSeriesDevice](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Reactor (IEC 60633) connected in series with a converter unit or converter units on the DC side for the primary purpose of smoothing the direct current and reducing current transients.

Table 215 shows all attributes of DCsmoothingReactor.

**Table 215 – Attributes of EquipmentReliabilityProfile::DCsmoothingReactor**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 216 shows all association ends of DCSmoothingReactor with other classes.

**Table 216 – Association ends of EquipmentReliabilityProfile::DCSmoothingReactor with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.159 (NC) DCSmoothingReactorArrester

Inheritance path = [DCSeriesDevice](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Arrester (IEC 60633) connected between the terminals of a smoothing reactor.

Table 217 shows all attributes of DCSmoothingReactorArrester.

**Table 217 – Attributes of EquipmentReliabilityProfile::DCSmoothingReactorArrester**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 218 shows all association ends of DCSmoothingReactorArrester with other classes.

**Table 218 – Association ends of EquipmentReliabilityProfile::DCSmoothingReactorArrester with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.160 (NC) DCSubstation

Inheritance path = [DCEquipmentContainer](#) : [EquipmentContainer](#) : [ConnectivityNodeContainer](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

DC substation or DC converter station (IEC 60633) is part of an DC system which consists of one or more converter units installed in a single location together with buildings, reactors, filters, reactive power supply, control, monitoring, protective, measuring and auxiliary equipment. A DC substation forming part of an DC transmission system may be referred to as an DC transmission substation.

Table 219 shows all attributes of DCSubstation.

2924 **Table 219 – Attributes of EquipmentReliabilityProfile::DCSubstation**

| name               | mult | type                    | description                                                                                                                                                              |
|--------------------|------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| isTapping          | 1..1 | <a href="#">Boolean</a> | (NC) DC tapping substation (IEC 60633) is a DC substation, mainly used for inversion, with a rating which is a small fraction of that of the rectifier(s) in the system. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                   |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                         |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                         |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                         |

2925  
2926 Table 220 shows all association ends of DCSubstation with other classes.

2927 **Table 220 – Association ends of EquipmentReliabilityProfile::DCSubstation with other**  
2928 **classes**

| mult from | name       | mult to | type                       | description                                       |
|-----------|------------|---------|----------------------------|---------------------------------------------------|
| 0..*      | Substation | 0..1    | <a href="#">Substation</a> | (NC) Substation that contains this DC substation. |

2929  
2930 **3.161 (NC) DCSubstationBipole**  
2931 Inheritance path = [DCEquipmentContainer](#) : [EquipmentContainer](#) : [ConnectivityNodeContainer](#) :  
2932 [PowerSystemResource](#) : [IdentifiedObject](#)  
2933 Part of a bipolar DC system (IEC 60633) contained within a DC substation.  
2934 Table 221 shows all attributes of DCSubstationBipole.

2935 **Table 221 – Attributes of EquipmentReliabilityProfile::DCSubstationBipole**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

2936  
2937 Table 222 shows all association ends of DCSubstationBipole with other classes.

2938 **Table 222 – Association ends of EquipmentReliabilityProfile::DCSubstationBipole with**  
2939 **other classes**

| mult from | name         | mult to | type                         | description                                                      |
|-----------|--------------|---------|------------------------------|------------------------------------------------------------------|
| 0..*      | DCSubstation | 0..1    | <a href="#">DCSubstation</a> | (NC) DC substation that contains this DC substation bipole part. |

2940  
2941 **3.162 (NC) DCSubstationPole**  
2942 Inheritance path = [DCEquipmentContainer](#) : [EquipmentContainer](#) : [ConnectivityNodeContainer](#) :  
2943 [PowerSystemResource](#) : [IdentifiedObject](#)  
2944 Part of an DC system pole (IEC 60633) which is contained within a DC substation.  
2945 Table 223 shows all attributes of DCSubstationPole.

2946 **Table 223 – Attributes of EquipmentReliabilityProfile::DCSubstationPole**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

2947  
2948 Table 224 shows all association ends of DCSubstationPole with other classes.

2949 **Table 224 – Association ends of EquipmentReliabilityProfile::DCSubstationPole with**  
2950 **other classes**

| mult from | name         | mult to | type                         | description                                                    |
|-----------|--------------|---------|------------------------------|----------------------------------------------------------------|
| 0..*      | DCSubstation | 0..1    | <a href="#">DCSubstation</a> | (NC) DC substation that contains this DC substation pole part. |

2951  
2952 **3.163 (Description) DCSwitch**

2953 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2954 [IdentifiedObject](#)

2955 A switch within the DC system.

2956 Table 225 shows all attributes of DCSwitch.

2957 **Table 225 – Attributes of EquipmentReliabilityProfile::DCSwitch**

| name               | mult | type                        | description                                                                                                                                                                                                   |
|--------------------|------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalOpen         | 0..1 | <a href="#">Boolean</a>     | (NC) The attribute is used in cases when no Measurement for the status value is present. If the DCSwitch has a status measurement the Discrete.normalValue is expected to match with the DCSwitch.normalOpen. |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>                                                                                                                                                    |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                                                                                                                                                         |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                        |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                              |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                              |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                              |

2958  
2959 Table 226 shows all association ends of DCSwitch with other classes.

2960 **Table 226 – Association ends of EquipmentReliabilityProfile::DCSwitch with other**  
2961 **classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

2962  
2963 **3.164 (abstract,NC) DCSystem**

2964 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

2965 Electrical power system which transfers energy in the form of direct current between two or  
 2966 more AC buses (defined in IEC 60633).  
 2967 Table 227 shows all attributes of DCSysstem.

2968 **Table 227 – Attributes of EquipmentReliabilityProfile::DCSystem**

| name               | mult | type                                     | description                                                            |
|--------------------|------|------------------------------------------|------------------------------------------------------------------------|
| directionKind      | 0..1 | <a href="#">DCSystemDirectionKind</a>    | (NC) Direction kind of the DC system.                                  |
| transmissionKind   | 0..1 | <a href="#">DCSystemTransmissionKind</a> | (NC) Transmission kind of the DC system.                               |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                   | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>                   | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>                   | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>                   | inherited from: <a href="#">IdentifiedObject</a>                       |

2969

### 2970 3.165 (NC) DCTieCorridor

2971 Inheritance path = [TieCorridor](#) : [PowerSystemResource](#) : [IdentifiedObject](#)  
 2972 A collection of one or more direct current poles that connect two different control areas.  
 2973 DCTieCorridor is linked to its own SchedulingArea. The active and reactive power is given by  
 2974 the SchedulingArea. The flow direction is provided by the link with the directional bidding zone.  
 2975 Table 228 shows all attributes of DCTieCorridor.

2976 **Table 228 – Attributes of EquipmentReliabilityProfile::DCTieCorridor**

| name                       | mult | type                                 | description                                                                                 |
|----------------------------|------|--------------------------------------|---------------------------------------------------------------------------------------------|
| maxRegulatingReserve       | 0..1 | <a href="#">ActivePower</a>          | (NC) Maximum regulating reserve.                                                            |
| minRegulatingReserve       | 0..1 | <a href="#">ActivePower</a>          | (NC) Minimum regulating reserve.                                                            |
| rampingKind                | 0..1 | <a href="#">RampingPrincipleKind</a> | (NC) Ramping principle is used to define a transition from one scheduled value to next one. |
| delayRegulatingReserve     | 0..1 | <a href="#">Seconds</a>              | (NC) inherited from: <a href="#">TieCorridor</a>                                            |
| maxRegulatingReserveRamp   | 0..1 | <a href="#">Float</a>                | (NC) inherited from: <a href="#">TieCorridor</a>                                            |
| thresholdRegulatingReserve | 0..1 | <a href="#">ActivePower</a>          | (NC) inherited from: <a href="#">TieCorridor</a>                                            |
| energyIdentCodeEic         | 0..1 | <a href="#">String</a>               | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                      |
| description                | 0..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                                            |
| mRID                       | 1..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                                            |
| name                       | 0..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                                            |

2977

2978 Table 229 shows all association ends of DCTieCorridor with other classes.

2979 **Table 229 – Association ends of EquipmentReliabilityProfile::DCTieCorridor with other**  
 2980 **classes**

| mult from | name                     | mult to | type                                     | description                                             |
|-----------|--------------------------|---------|------------------------------------------|---------------------------------------------------------|
| 0..1      | SchedulingArea           | 1..1    | <a href="#">SchedulingArea</a>           | (NC) The scheduling area that has this DC tie corridor. |
| 0..*      | LoadFrequencyControlArea | 0..1    | <a href="#">LoadFrequencyControlArea</a> | (NC) inherited from: <a href="#">TieCorridor</a>        |

2981

2982 **3.166 (abstract,NC) DCValve**

2983 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2984 [IdentifiedObject](#)

2985 A DC Valve is a solid-state switching module designed to control the flow of electrical power  
2986 between two main terminals. The internal semiconductor device determines the valve's behavior  
2987 and level of control.

2988 Table 230 shows all attributes of DCValve.

2989 **Table 230 – Attributes of EquipmentReliabilityProfile::DCValve**

| name               | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| valveU0            | 0..1 | <a href="#">Voltage</a>     | (NC) Represents the threshold or on-state voltage across the valve during conduction. The value is used in conduction loss calculations for converter valves. Approximate valve conduction losses may be calculated using: $P_{loss} \sim U0 \times I$ where:<br>U0 = valve forward voltage (valveU0)<br>I = valve current<br>Converter-level losses may be approximated from the combined contribution of associated valves, for example:<br>$P_{converter\_loss} \sim N \times U0 \times I$ where:<br>N = number of conducting valves<br>U0 = valve forward voltage<br>I = valve current. |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

2990

2991 Table 231 shows all association ends of DCValve with other classes.

2992 **Table 231 – Association ends of EquipmentReliabilityProfile::DCValve with other**  
2993 **classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

2994

2995 **3.167 (NC) DCVoltageControlFunction**

2996 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

2997 DC voltage control function is a function block that calculate the operating point of the controlled  
2998 equipment to achieve the target voltage.

2999 Table 232 shows all attributes of DCVoltageControlFunction.

3000 **Table 232 – Attributes of EquipmentReliabilityProfile::DCVoltageControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

3001 Table 233 shows all association ends of DCVoltageControlFunction with other classes.

3002 **Table 233 – Association ends of EquipmentReliabilityProfile::DCVoltageControlFunction**  
3003 **with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 3005 3.168 (NC) DCVoltageSource

3006 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3007 DC conducting equipment capable of establishing, maintaining, or controlling a DC voltage  
3008 difference between connected DC terminals.

3009 Table 234 shows all attributes of DCVoltageSource.

3010 **Table 234 – Attributes of EquipmentReliabilityProfile::DCVoltageSource**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| internalResistance | 0..1 | <a href="#">Resistance</a>  | (NC) Equivalent internal resistance of the DC voltage source.          |
| internalInductance | 0..1 | <a href="#">Inductance</a>  | (NC) Equivalent internal inductance of the DC voltage source.          |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

3012 Table 235 shows all association ends of DCVoltageSource with other classes.

**Table 235 – Association ends of EquipmentReliabilityProfile::DCVoltageSource with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.169 (NC) DiodeValve**

Inheritance path = [DCValve](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

The diode is uncontrolled valve. It is always in a "ready" state and conducts automatically when the voltage at the anode is higher than the cathode. It cannot be turned off or on by an external signal.

Table 236 shows all attributes of DiodeValve.

**Table 236 – Attributes of EquipmentReliabilityProfile::DiodeValve**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| valveU0            | 0..1 | <a href="#">Voltage</a>     | (NC) inherited from: <a href="#">DCValve</a>                           |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 237 shows all association ends of DiodeValve with other classes.

**Table 237 – Association ends of EquipmentReliabilityProfile::DiodeValve with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

**3.170 (NC) DirectCurrentBipoleController**

Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

DC system bipole control that is the control system of a bipole in accordance with IEC 60633.

Table 238 shows all attributes of DirectCurrentBipoleController.

**Table 238 – Attributes of EquipmentReliabilityProfile::DirectCurrentBipoleController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 239 shows all association ends of `DirectCurrentBipoleController` with other classes.

**Table 239 – Association ends of  
EquipmentReliabilityProfile::DirectCurrentBipoleController with other classes**

| mult from | name                          | mult to | type                                          | description                                                                        |
|-----------|-------------------------------|---------|-----------------------------------------------|------------------------------------------------------------------------------------|
| 0..*      | DirectCurrentMasterController | 0..1    | <a href="#">DirectCurrentMasterController</a> | (NC) Direct current master controller which has direct current bipole controllers. |
| 0..*      | PartOf                        | 0..1    | <a href="#">AutomationFunction</a>            | (NC) inherited from: <a href="#">AutomationFunction</a>                            |

### 3.171 (NC) DirectCurrentCircuit

Inheritance path = [Circuit](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A direct current circuit is a circuit consists of direct current equipment.

Table 240 shows all attributes of `DirectCurrentCircuit`.

**Table 240 – Attributes of EquipmentReliabilityProfile::DirectCurrentCircuit**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| positiveFlowIn     | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">Circuit</a>                           |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 241 shows all association ends of `DirectCurrentCircuit` with other classes.

**Table 241 – Association ends of EquipmentReliabilityProfile::DirectCurrentCircuit with other classes**

| mult from | name                | mult to | type                     | description                                  |
|-----------|---------------------|---------|--------------------------|----------------------------------------------|
| 0..1      | IdentifyingTerminal | 0..1    | <a href="#">Terminal</a> | (NC) inherited from: <a href="#">Circuit</a> |

### 3.172 (abstract,NC) DirectCurrentEquipmentController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Direct current equipment controller used to control different parts of the hierarchical structure of the DC control system defined by IEC 60633.

Table 242 shows all attributes of `DirectCurrentEquipmentController`.

**Table 242 – Attributes of  
EquipmentReliabilityProfile::DirectCurrentEquipmentController**

| name          | mult | type                    | description                                             |
|---------------|------|-------------------------|---------------------------------------------------------|
| type          | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a> |
| normalEnabled | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 243 shows all association ends of DirectCurrentEquipmentController with other classes.

**Table 243 – Association ends of  
EquipmentReliabilityProfile::DirectCurrentEquipmentController with other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

### 3.173 (NC) DirectCurrentMasterController

Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Direct current system control is a control system which governs the operation of an entire DC system consisting of more than one DC substation and performs those functions of controlling, monitoring and protection which require information from more than one substation. This can also be a multiterminal control which is a DC system control for more than two DC substations or a DC master control, which is a general concept for control coordination of a DC system. The DC master control may be implemented at the bipole and/or pole level as defined in IEC 60633. The DC system control/multiterminal control/master control is part of the hierarchical structure of an HVDC control system that has an integrated AC/DC system control as the highest level of control which governs the integrated operation of AC and DC systems of a power system. This control system is under the responsibility of the system operator.

Table 244 shows all attributes of DirectCurrentMasterController.

**Table 244 – Attributes of EquipmentReliabilityProfile::DirectCurrentMasterController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 245 shows all association ends of DirectCurrentMasterController with other classes.

**Table 245 – Association ends of  
EquipmentReliabilityProfile::DirectCurrentMasterController with other classes**

| mult from | name          | mult to | type                               | description                                                             |
|-----------|---------------|---------|------------------------------------|-------------------------------------------------------------------------|
| 0..1      | DCTieCorridor | 0..1    | <a href="#">DCTieCorridor</a>      | (NC) DCTieCorridor controlled by this direct current master controller. |
| 0..*      | PartOf        | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                 |

3085 **3.174 (NC) DirectCurrentPoleController**

3086 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :  
 3087 [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3088 DC system pole control, which is the control system of a pole in accordance with IEC 60633.

3089 Table 246 shows all attributes of DirectCurrentPoleController.

3090 **Table 246 – Attributes of EquipmentReliabilityProfile::DirectCurrentPoleController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

3091  
 3092 Table 247 shows all association ends of DirectCurrentPoleController with other classes.

3093 **Table 247 – Association ends of**  
 3094 **EquipmentReliabilityProfile::DirectCurrentPoleController with other classes**

| mult from | name                          | mult to | type                                          | description                                                      |
|-----------|-------------------------------|---------|-----------------------------------------------|------------------------------------------------------------------|
| 0..1      | DCPole                        | 1..1    | <a href="#">DCPole</a>                        | (NC) DC pole that is controlled by a DC pole controller.         |
| 2..2      | DirectCurrentBipoleController | 0..1    | <a href="#">DirectCurrentBipoleController</a> | (NC) DC bipole controller that controls this DC pole controller. |
| 0..*      | DirectCurrentMasterController | 0..1    | <a href="#">DirectCurrentMasterController</a> | (NC) DC master controller that has a DC pole controller.         |
| 0..*      | PartOf                        | 0..1    | <a href="#">AutomationFunction</a>            | (NC) inherited from: <a href="#">AutomationFunction</a>          |

3095  
 3096 **3.175 (NC) DirectCurrentSubstationBipoleController**

3097 Inheritance path = [DirectCurrentSubstationController](#) : [DirectCurrentEquipmentController](#) :  
 3098 [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3099 Control system of a substation bipole (IEC 60633).

3100 Table 248 shows all attributes of DirectCurrentSubstationBipoleController.

3101 **Table 248 – Attributes of**  
 3102 **EquipmentReliabilityProfile::DirectCurrentSubstationBipoleController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

3103  
 3104 Table 249 shows all association ends of DirectCurrentSubstationBipoleController with other  
 3105 classes.

**Table 249 – Association ends of  
EquipmentReliabilityProfile::DirectCurrentSubstationBipoleController with other  
classes**

| mult<br>from | name                 | mult<br>to | type                                          | description                                                                        |
|--------------|----------------------|------------|-----------------------------------------------|------------------------------------------------------------------------------------|
| 0..1         | DCSubstationBipole   | 1..1       | <a href="#">DCSubstationBipole</a>            | (NC) DC substation bipole that is controlled by a DC substation bipole controller. |
| 2..*         | MultiterminalControl | 0..1       | <a href="#">DirectCurrentMasterController</a> | (NC) inherited from: <a href="#">DirectCurrentSubstationController</a>             |
| 0..*         | PartOf               | 0..1       | <a href="#">AutomationFunction</a>            | (NC) inherited from: <a href="#">AutomationFunction</a>                            |

### 3.176 (abstract,NC) DirectCurrentSubstationController

Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Control system used for the controlling, monitoring and protection within a DC substation (IEC 60633). A DC substation control may be implemented at the bipole and/or pole level and may be referred to as local control.

Table 250 shows all attributes of DirectCurrentSubstationController.

**Table 250 – Attributes of  
EquipmentReliabilityProfile::DirectCurrentSubstationController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 251 shows all association ends of DirectCurrentSubstationController with other classes.

**Table 251 – Association ends of  
EquipmentReliabilityProfile::DirectCurrentSubstationController with other classes**

| mult<br>from | name                 | mult<br>to | type                                          | description                                                                       |
|--------------|----------------------|------------|-----------------------------------------------|-----------------------------------------------------------------------------------|
| 2..*         | MultiterminalControl | 0..1       | <a href="#">DirectCurrentMasterController</a> | (NC) Multiterminal control that controls more than two DC substation controllers. |
| 0..*         | PartOf               | 0..1       | <a href="#">AutomationFunction</a>            | (NC) inherited from: <a href="#">AutomationFunction</a>                           |

### 3.177 (NC) DirectCurrentSubstationPoleController

Inheritance path = [DirectCurrentSubstationController](#) : [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Control system of a substation pole (IEC 60633).

Table 252 shows all attributes of DirectCurrentSubstationPoleController.

3129  
3130**Table 252 – Attributes of  
EquipmentReliabilityProfile::DirectCurrentSubstationPoleController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

3131  
3132  
3133

Table 253 shows all association ends of DirectCurrentSubstationPoleController with other classes.

3134  
3135**Table 253 – Association ends of  
EquipmentReliabilityProfile::DirectCurrentSubstationPoleController with other classes**

| mult from | name                 | mult to | type                                          | description                                                                    |
|-----------|----------------------|---------|-----------------------------------------------|--------------------------------------------------------------------------------|
| 0..1      | DCSubstationPole     | 1..1    | <a href="#">DCSubstationPole</a>              | (NC) DC substation pole that is controlled by a DC substation pole controller. |
| 2..*      | MultiterminalControl | 0..1    | <a href="#">DirectCurrentMasterController</a> | (NC) inherited from: <a href="#">DirectCurrentSubstationController</a>         |
| 0..*      | PartOf               | 0..1    | <a href="#">AutomationFunction</a>            | (NC) inherited from: <a href="#">AutomationFunction</a>                        |

3136

**3.178 (NC) DirectCurrentSystemOperator**

Inheritance path = [SystemOperator](#) : [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

System operator of the direct current pole. There are typically one or two system operators that are operating either the control area at one side or the control areas at both sides of the direct current pole. In some cases it is operated by an operator from the connected control areas.

Table 254 shows all attributes of DirectCurrentSystemOperator.

**Table 254 – Attributes of EquipmentReliabilityProfile::DirectCurrentSystemOperator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3145

Table 255 shows all association ends of DirectCurrentSystemOperator with other classes.

**Table 255 – Association ends of  
EquipmentReliabilityProfile::DirectCurrentSystemOperator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

3147  
3148

3149

3150 **3.179 (NC) DistributionSystemOperator**

3151 Inheritance path = [SystemOperator](#) : [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

3153 A system operator that is responsible for operating of energy distribution network from transmission level down to low voltage levels including the connection to household.

3155 Table 256 shows all attributes of DistributionSystemOperator.

3156 **Table 256 – Attributes of EquipmentReliabilityProfile::DistributionSystemOperator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3157

3158 Table 257 shows all association ends of DistributionSystemOperator with other classes.

3159 **Table 257 – Association ends of**  
3160 **EquipmentReliabilityProfile::DistributionSystemOperator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

3161

3162 **3.180 (NC) DurationOverloadLimitCurve**

3163 Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

3164 A curve or functional relationship between

3165 - the overload duration independent variable (X-axis), and

3166 - temporary overloading (TATL) limiting dependent (Y-axis) variables.

3167 Table 258 shows all attributes of DurationOverloadLimitCurve.

3168 **Table 258 – Attributes of EquipmentReliabilityProfile::DurationOverloadLimitCurve**

| name               | mult | type                           | description                                                            |
|--------------------|------|--------------------------------|------------------------------------------------------------------------|
| curveStyle         | 1..1 | <a href="#">CurveStyle</a>     | inherited from: <a href="#">Curve</a>                                  |
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |

3169

3170 **3.181 (NC) EdgeControlArea**3171 Inheritance path = [SubControlArea](#) : [ControlArea](#) : [PowerSystemResource](#) : [IdentifiedObject](#)3172 An EdgeControlArea representing the local, site-level (edge) operational domain that  
3173 coordinates one or more Installations and their connections. It is typically operated by an edge  
3174 operator (e.g., a person/company operating a campus, mall, microgrid, or prosumer cluster)  
3175 and supports local monitoring, control, scheduling, and limits—both islanded and grid-  
3176 connected.

3177 Table 259 shows all attributes of EdgeControlArea.

3178 **Table 259 – Attributes of EquipmentReliabilityProfile::EdgeControlArea**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| areaType           | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">ControlArea</a>                       |
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3179  
3180 Table 260 shows all association ends of EdgeControlArea with other classes.3181 **Table 260 – Association ends of EquipmentReliabilityProfile::EdgeControlArea with**  
3182 **other classes**

| mult from | name                     | mult to | type                                     | description                                      |
|-----------|--------------------------|---------|------------------------------------------|--------------------------------------------------|
| 0..*      | SystemOperator           | 0..1    | <a href="#">SystemOperator</a>           | (NC) inherited from: <a href="#">ControlArea</a> |
| 0..*      | OutageCoordinationRegion | 0..1    | <a href="#">OutageCoordinationRegion</a> | (NC) inherited from: <a href="#">ControlArea</a> |
| 0..*      | PartOf                   | 0..1    | <a href="#">ControlArea</a>              | (NC) inherited from: <a href="#">ControlArea</a> |

3183  
3184 **3.182 (NC) EdgeSchedulingArea**3185 Inheritance path = [SubSchedulingArea](#) : [SchedulingArea](#) : [PowerSystemResource](#) :  
3186 [IdentifiedObject](#)3187 An EdgeSchedulingArea is a electrical area that is part of a SubSchedulingArea with one or  
3188 more Installations connected.3189 It serves as the smallest energy level scheduling, forecasting and aggregated measurement  
3190 used for coordinating energy production, consumption, and storage across its constituent  
3191 connections.3192 An EdgeSchedulingArea may represent physical locations with multiple grid connection, such  
3193 as a shopping mall, university campus, industrial facility, or private microgrid that are normally  
3194 connected to the grid.

3195 Table 261 shows all attributes of EdgeSchedulingArea.

3196 **Table 261 – Attributes of EquipmentReliabilityProfile::EdgeSchedulingArea**

| name                      | mult | type                    | description                                         |
|---------------------------|------|-------------------------|-----------------------------------------------------|
| isIslandingEnabled        | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">SchedulingArea</a> |
| isMeteringGridArea        | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">SchedulingArea</a> |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>   | (NC) inherited from: <a href="#">SchedulingArea</a> |
| type                      | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">SchedulingArea</a> |

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 262 shows all association ends of EdgeSchedulingArea with other classes.

**Table 262 – Association ends of EquipmentReliabilityProfile::EdgeSchedulingArea with other classes**

| mult from | name                     | mult to | type                                     | description                                         |
|-----------|--------------------------|---------|------------------------------------------|-----------------------------------------------------|
| 0..*      | EnergyCoordinationRegion | 0..1    | <a href="#">EnergyCoordinationRegion</a> | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | LoadFrequencyControlArea | 0..1    | <a href="#">LoadFrequencyControlArea</a> | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | SystemOperator           | 0..1    | <a href="#">SystemOperator</a>           | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | SynchronousArea          | 0..1    | <a href="#">SynchronousArea</a>          | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | BiddingZone              | 0..1    | <a href="#">BiddingZone</a>              | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 1..*      | ControlArea              | 0..1    | <a href="#">ControlArea</a>              | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..1      | GridPowerCapacity        | 0..1    | <a href="#">GridPowerCapacity</a>        | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | PartOf                   | 0..1    | <a href="#">SchedulingArea</a>           | (NC) inherited from: <a href="#">SchedulingArea</a> |

### 3.183 (NC) ElectricalChargingUnit

Inheritance path = [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A unit that supplies electrical power for charging electrical non-stationary entities, e.g. electrical vehicle, trucks, buses, ferries, boats and airplanes. The characteristic is that the energy consumption is highly schedule dependent.

Table 263 shows all attributes of ElectricalChargingUnit.

**Table 263 – Attributes of EquipmentReliabilityProfile::ElectricalChargingUnit**

| name                      | mult | type                        | description                                                            |
|---------------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a>       | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>              |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>              |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>              |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                      | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                      | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 264 shows all association ends of ElectricalChargingUnit with other classes.

**Table 264 – Association ends of EquipmentReliabilityProfile::ElectricalChargingUnit with other classes**

| mult from | name                           | mult to | type                                           | description                                               |
|-----------|--------------------------------|---------|------------------------------------------------|-----------------------------------------------------------|
| 0..*      | ScheduleResource               | 0..1    | <a href="#">ScheduleResource</a>               | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | PowerElectronicsUnitController | 0..1    | <a href="#">PowerElectronicsUnitController</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | Circuit                        | 0..1    | <a href="#">Circuit</a>                        | (NC) inherited from: <a href="#">Equipment</a>            |
| 0..*      | AggregatedEquipment            | 0..1    | <a href="#">Equipment</a>                      | (NC) inherited from: <a href="#">Equipment</a>            |

**3.184 (NC) EnergyAlignmentCoordinator**

Inheritance path = [SystemOperationCoordinator](#) : [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

A post that is responsible for alignment of forecast and schedule energy to a given energy coordination region.

Table 265 shows all attributes of EnergyAlignmentCoordinator.

**Table 265 – Attributes of EquipmentReliabilityProfile::EnergyAlignmentCoordinator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 266 shows all association ends of EnergyAlignmentCoordinator with other classes.

**Table 266 – Association ends of EquipmentReliabilityProfile::EnergyAlignmentCoordinator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

**3.185 (NC) EnergyBlockComponent**

Inheritance path = [EnergyComponent](#) : [IdentifiedObject](#)

Energy block component where the energy group is distributed according to the energy block order of each energy component in an energy group.

Table 267 shows all attributes of EnergyBlockComponent.

**Table 267 – Attributes of EquipmentReliabilityProfile::EnergyBlockComponent**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 268 shows all association ends of EnergyBlockComponent with other classes.

**Table 268 – Association ends of EquipmentReliabilityProfile::EnergyBlockComponent with other classes**

| mult from | name                        | mult to | type                                        | description                                          |
|-----------|-----------------------------|---------|---------------------------------------------|------------------------------------------------------|
| 0..*      | HydroPump                   | 0..1    | <a href="#">HydroPump</a>                   | (NC) inherited from: <a href="#">EnergyComponent</a> |
| 0..*      | GeneratingUnit              | 0..1    | <a href="#">GeneratingUnit</a>              | (NC) inherited from: <a href="#">EnergyComponent</a> |
| 0..*      | EnergyConsumer              | 0..1    | <a href="#">EnergyConsumer</a>              | (NC) inherited from: <a href="#">EnergyComponent</a> |
| 0..*      | PowerElectronicsUnit        | 0..1    | <a href="#">PowerElectronicsUnit</a>        | (NC) inherited from: <a href="#">EnergyComponent</a> |
| 0..*      | EnergyResourceGroupCapacity | 0..1    | <a href="#">EnergyResourceGroupCapacity</a> | (NC) inherited from: <a href="#">EnergyComponent</a> |

### 3.186 (NC) EnergyBlockOrder

Inheritance path = [IdentifiedObject](#)

The energy block order is a block (an amount) of energy that forms the sequence of orders that are going to be distributed to an energy block component.

Table 269 shows all attributes of EnergyBlockOrder.

**Table 269 – Attributes of EquipmentReliabilityProfile::EnergyBlockOrder**

| name                      | mult | type                     | description                                                                                                                                                                                                                                                                                 |
|---------------------------|------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a>    | (NC) Normal participation factor.                                                                                                                                                                                                                                                           |
| normalSequence            | 0..1 | <a href="#">Integer</a>  | (NC) Normal sequence represents the local order of the power block order.<br>The sequence order for a given block dispatch instruction. The sequence number need to be unique for a given block dispatch instruction, e.g. two order in the same instruction cannot have the same sequence. |
| powerDuration             | 0..1 | <a href="#">Duration</a> | (NC) Duration for the active power.                                                                                                                                                                                                                                                         |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>   | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                      |
| description               | 0..1 | <a href="#">String</a>   | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                            |
| mRID                      | 1..1 | <a href="#">String</a>   | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                            |
| name                      | 0..1 | <a href="#">String</a>   | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                            |

Table 270 shows all association ends of EnergyBlockOrder with other classes.

**Table 270 – Association ends of EquipmentReliabilityProfile::EnergyBlockOrder with other classes**

| mult from | name                 | mult to | type                                 | description                                                       |
|-----------|----------------------|---------|--------------------------------------|-------------------------------------------------------------------|
| 1..*      | EnergyBlockComponent | 1..1    | <a href="#">EnergyBlockComponent</a> | (NC) The energy block component that has this energy block order. |

### 3.187 (abstract,NC) EnergyComponent

Inheritance path = [IdentifiedObject](#)

The energy component for a producer or a consumer that has the same energy characteristic, e.g. fuel type and technology.

3253 Table 271 shows all attributes of EnergyComponent.

3254 **Table 271 – Attributes of EquipmentReliabilityProfile::EnergyComponent**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3255

3256 Table 272 shows all association ends of EnergyComponent with other classes.

3257 **Table 272 – Association ends of EquipmentReliabilityProfile::EnergyComponent with**  
3258 **other classes**

| mult from | name                        | mult to | type                                        | description                                                             |
|-----------|-----------------------------|---------|---------------------------------------------|-------------------------------------------------------------------------|
| 0..*      | HydroPump                   | 0..1    | <a href="#">HydroPump</a>                   | (NC) The hydro pump that relates to this energy component.              |
| 0..*      | GeneratingUnit              | 0..1    | <a href="#">GeneratingUnit</a>              | (NC) The generating unit that is part of this energy component.         |
| 0..*      | EnergyConsumer              | 0..1    | <a href="#">EnergyConsumer</a>              | (NC) The energy consumer that relates to this energy component.         |
| 0..*      | PowerElectronicsUnit        | 0..1    | <a href="#">PowerElectronicsUnit</a>        | (NC) The power electronics unit that relates to this energy component.  |
| 0..*      | EnergyResourceGroupCapacity | 0..1    | <a href="#">EnergyResourceGroupCapacity</a> | (NC) The Energy Resource Group Capacity that has this energy component. |

3259

### 3260 3.188 (Description) EnergyConsumer

3261 Inheritance path = [EnergyConnection](#) : [ConductingEquipment](#) : [Equipment](#) :  
3262 [PowerSystemResource](#) : [IdentifiedObject](#)

3263 Generic user of energy - a point of consumption on the power system model.

3264 EnergyConsumer.pfixed, .qfixed, .pfixedPct and .qfixedPct have meaning only if there is no

3265 LoadResponseCharacteristic associated with EnergyConsumer or if

3266 LoadResponseCharacteristic.exponentModel is set to False.

3267 Table 273 shows all attributes of EnergyConsumer.

3268 **Table 273 – Attributes of EquipmentReliabilityProfile::EnergyConsumer**

| name                      | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------|------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a>       | (deprecated,NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.<br><br>In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\sum(PF)$ .<br><br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a> | (deprecated,NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| name               | mult | type                        | description                                                                                                                      |
|--------------------|------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| minEconomicP       | 0..1 | <a href="#">ActivePower</a> | (deprecated,NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                           |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                 |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                 |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                 |

Table 274 shows all association ends of EnergyConsumer with other classes.

**Table 274 – Association ends of EquipmentReliabilityProfile::EnergyConsumer with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.189 (NC) EnergyCoordinationRegion

Inheritance path = [Region](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A region that has a common organisation or a service that is responsible for alignment of forecast and scheduling of energy.

Table 275 shows all attributes of EnergyCoordinationRegion.

**Table 275 – Attributes of EquipmentReliabilityProfile::EnergyCoordinationRegion**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 276 shows all association ends of EnergyCoordinationRegion with other classes.

**Table 276 – Association ends of EquipmentReliabilityProfile::EnergyCoordinationRegion with other classes**

| mult from | name                       | mult to | type                                       | description                                                                          |
|-----------|----------------------------|---------|--------------------------------------------|--------------------------------------------------------------------------------------|
| 0..*      | EnergyAlignmentCoordinator | 0..1    | <a href="#">EnergyAlignmentCoordinator</a> | (NC) The energy alignment coordinator that operates this energy coordination region. |
| 0..*      | OverlappingZone            | 0..1    | <a href="#">OverlappingZone</a>            | (NC) inherited from: <a href="#">Region</a>                                          |

### 3.190 (NC) EnergyExchangePoint

Inheritance path = [CommonResponsibilityPoint](#) : [IdentifiedObject](#)

An EnergyExchangePoint is a CommonResponsibilityPoint that identifies the point at which two or more adjacent grid providers establish shared responsibility for the measurement, accounting, and reconciliation of exchanged energy.

Note: The EnergyExchangePoint represents the inter-operator interface used for energy measurement and energy accounting (including settlement-relevant quantities where applicable). It is the reference point at which the participating grid providers define and apply their agreed responsibilities for metering data, data quality, validation, and exchange processes.

An EnergyExchangePoint may also be used as the reference for operational coordination requirements related to the exchange (for example observability/telemetry requirements, agreed transfer capability constraints, or coordination of switching and outage conditions), without changing its primary purpose as the responsibility point for energy measurement and accounting.

Table 277 shows all attributes of EnergyExchangePoint.

**Table 277 – Attributes of EquipmentReliabilityProfile::EnergyExchangePoint**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| isDirectCurrent    | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a>         |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 278 shows all association ends of EnergyExchangePoint with other classes.

**Table 278 – Association ends of EquipmentReliabilityProfile::EnergyExchangePoint with other classes**

| mult from | name             | mult to | type                             | description                                                    |
|-----------|------------------|---------|----------------------------------|----------------------------------------------------------------|
| 0..*      | ConnectivityNode | 0..1    | <a href="#">ConnectivityNode</a> | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a> |
| 0..*      | DCNode           | 0..1    | <a href="#">DCNode</a>           | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a> |

### 3.191 (NC) EnergyResourceGroupCapacity

Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

An aggregation of energy resources having common energy characteristics for which installed, available, or effective capacity is represented.

Note: EnergyResourceGroupCapacity groups energy resources for capacity modelling, forecasting, scenario analysis and aggregation. The group may be characterised by an energy kind, energy source, technology, location, scenario, weather condition or other modelling context.

The aggregated capacity may be represented by static values or by time-series values describing forecast, scheduled, actual or hindcast conditions. An EnergyComponent represents the part of an aggregated value associated with a particular underlying unit or resource. The aggregated value of the EnergyResourceGroupCapacity may therefore be distributed among its associated EnergyComponents, for example in proportion to the capability of the corresponding units or according to an ordered block-based allocation.

Weather or other environmental information may be referenced where it is relevant to the capacity or availability of the grouped resources/

Table 279 shows all attributes of EnergyResourceGroupCapacity.

3324 **Table 279 – Attributes of EquipmentReliabilityProfile::EnergyResourceGroupCapacity**

| name                           | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------|------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalParticipationFactor      | 1..1 | <a href="#">Float</a>       | (NC) Normal participation factor for the power group in relation to scheduling area. Must be a positive value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| powerDuration                  | 0..1 | <a href="#">Duration</a>    | (NC) Duration for the active power.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| normalAvailabilityFactor       | 0..1 | <a href="#">PerCent</a>     | (NC) The normal ratio (in percent) between the effective available capacity and the installed capacity over a defined time interval. For weather-dependent resources, the value reflects climate-driven availability as derived from meteorological or hydrological conditions.                                                                                                                                                                                                                                                                                                                  |
| normalAvailableCapacity        | 0..1 | <a href="#">ActivePower</a> | (NC) The weather or condition-dependent active power capacity that is realistically available for operation at a given time. This value reflects normal reduction due to climatic, hydrological, or operational constraints.                                                                                                                                                                                                                                                                                                                                                                     |
| normalInstalledCapacity        | 0..1 | <a href="#">ActivePower</a> | (NC) The nominal installed active power capacity of the energy type, independent of weather or normal operating conditions. This is the maximum technical power rating under standard design assumptions and optimum operation condition.                                                                                                                                                                                                                                                                                                                                                        |
| scenarioCode                   | 0..1 | <a href="#">URI</a>         | (NC) Code identifying the study, scenario, or modelling configuration from which the capacity or availability values are derived. Examples include TYNDP scenario identifiers, national estimates, or dataset versions.                                                                                                                                                                                                                                                                                                                                                                          |
| scenarioRef                    | 0..1 | <a href="#">URI</a>         | (NC) Reference to the study, scenario, or modelling configuration from which the capacity or availability values are derived. Examples include TYNDP scenario identifiers, national estimates, or dataset versions.                                                                                                                                                                                                                                                                                                                                                                              |
| weatherDatasetCode             | 0..1 | <a href="#">URI</a>         | (NC) Code identifying the external weather or climate dataset used to determine availability or effective capacity for weather-dependent resources. Examples include datasets from the Pan-European Climate Database (PECD) or similar climate data services.                                                                                                                                                                                                                                                                                                                                    |
| weatherDatasetRef              | 0..1 | <a href="#">URI</a>         | (NC) Reference to the external weather or climate dataset used to determine availability or effective capacity for weather-dependent resources. Examples include datasets from the Pan-European Climate Database (PECD) or similar climate data services.                                                                                                                                                                                                                                                                                                                                        |
| normalCapacityAllocationFactor | 0..1 | <a href="#">Float</a>       | (NC) The normal relative weighting used to allocate an aggregate capacity requirement to this energy resource group.<br><br>Note: The value provides the default weighting for top-down capacity allocation when a more specific 'capacityAllocationFactor' is not provided. The factor is relative to the factors of other applicable energy resource groups and is not required to represent a percentage or to sum to 1 across the groups. The allocation algorithm may normalize the applicable factors and take account of availability, existing capacity and other modelling constraints. |
| energyIdentCodeEic             | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| description                    | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 280 shows all association ends of EnergyResourceGroupCapacity with other classes.

**Table 280 – Association ends of  
EquipmentReliabilityProfile::EnergyResourceGroupCapacity with other classes**

| mult from | name               | mult to | type                               | description                                                                 |
|-----------|--------------------|---------|------------------------------------|-----------------------------------------------------------------------------|
| 0..*      | SchedulingArea     | 1..1    | <a href="#">SchedulingArea</a>     | (NC) The scheduling area that has this energy group.                        |
| 0..*      | ClimateZone        | 0..1    | <a href="#">ClimateZone</a>        | (NC) The climate zone for the energy group.                                 |
| 0..*      | EnergyResourceType | 0..1    | <a href="#">EnergyResourceType</a> | (NC) The energy resource type represented by the aggregated capacity group. |

### 3.192 (NC) EnergyResourceType

Inheritance path = [IdentifiedObject](#)

A reference classification of an energy resource based on its energy kind, primary energy source and conversion technology.

Note: An energy resource type provides a common classification for forecasting, capacity aggregation, scheduling and reporting. Codes and references may identify entries in external controlled vocabularies, such as the European Energy Certificate System (EECS) energy source and technology classifications. Technical and environmental attributes represent reference or default characteristics used for modelling and reporting and do not represent measurements of an individual resource.

Example: (1) Name = "Solar-Photovoltaic-Thin Film", kind = solar, technologyCode = T010102  
(2) Name = "Renewable-Solid-Wood-Unspecified", kind = biomass, energySourceCode = F01010300.

Table 281 shows all attributes of EnergyResourceType.

**Table 281 – Attributes of EquipmentReliabilityProfile::EnergyResourceType**

| name              | mult | type                       | description                                                                                                                                                                                                                                                                                  |
|-------------------|------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| kind              | 0..1 | <a href="#">EnergyKind</a> | (NC) The general kind of energy resource.<br>Note: The value provides a broad functional classification suitable for aggregation and forecasting. More detailed classifications of the energy input and technology are provided by fuelCode, fuelRef, technologyCode and technologyRef.      |
| co2EmissionFactor | 0..1 | <a href="#">Emission</a>   | (NC) The reference carbon dioxide emission factor of the energy resource type.<br>Note: The value represents a default factor used for modelling or reporting rather than measured emissions from an individual resource.                                                                    |
| energySourceRef   | 0..1 | <a href="#">URI</a>        | (NC) URI or URN identifying the same primary energy source classification as energySourceCode.<br>Note: URI or URN identifying the same primary energy source as energySourceCode. The URI may be resolvable (HTTP) or non-resolvable (URN). CIM does not mandate any identification scheme. |

| name                 | mult | type                    | description                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |      |                         | Example: <a href="https://www.aib-net.org/eecs/F01010300">https://www.aib-net.org/eecs/F01010300</a> to point to Renewable–Solid–Wood–Unspecified.                                                                                                                                                                                                                                                                                                  |
| energySourceCode     | 0..1 | <a href="#">String</a>  | (NC) Code identifying the primary energy source.<br>Note: The code is assigned by a controlled vocabulary. The identified energy source need not be a combustible fuel; it may represent solar radiation, wind, hydro, ambient heat, biomass or another primary energy source.<br>Example: F01010300 identifies Renewable–Solid–Wood–Unspecified in the European Energy Certificate System (EECS) energy source classification.                     |
| electricalEfficiency | 0..1 | <a href="#">PerCent</a> | (NC) The reference ratio of electrical energy output to energy input for the energy resource type.<br>Note: The value represents a default or reference efficiency used for modelling and reporting. It is not necessarily the measured efficiency of an individual resource.<br>Example: An energy resource type representing a combined-cycle gas turbine may have a reference electrical efficiency of 60 %.                                     |
| technologyRef        | 0..1 | <a href="#">URI</a>     | (NC) URI or URN identifying the same technology classification as technologyCode.<br>Note: URI or URN identifying the same technology as technologyCode. The URI may be resolvable (HTTP) or non-resolvable (URN). CIM does not mandate any identification scheme.<br>Example: <a href="https://www.aib-net.org/eecs/T010102">https://www.aib-net.org/eecs/T010102</a> to point to Solar–Photovoltaic–Thin Film.                                    |
| technologyCode       | 0..1 | <a href="#">String</a>  | (NC) Code identifying the production, conversion, storage or consumption technology.<br>Note: The code is assigned by an external controlled vocabulary. For electricity production, the code may identify a technology defined by the European Energy Certificate System (EECS) technology classification.<br>Example: T010102 identifies Solar–Photovoltaic–Thin Film in the European Energy Certificate System (EECS) technology classification. |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                              |
| description          | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                    |
| mRID                 | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                    |
| name                 | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                    |

3345

3346 **3.193 (abstract,NC) EnergyStoragePlant**3347 Inheritance path = [PowerPlant](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3348 A power plant that coordinates one or more energy storage facilities and associated equipment for receiving, storing and subsequently delivering energy to the power system.

3350 Table 282 shows all attributes of EnergyStoragePlant.

3351 **Table 282 – Attributes of EquipmentReliabilityProfile::EnergyStoragePlant**

| name               | mult | type                        | description                                                                                                                   |
|--------------------|------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| nominalCapacity    | 0..1 | <a href="#">RealEnergy</a>  | (NC) The reference amount of stored energy that the energy storage plant is intended to operate with under normal conditions. |
| minCapacity        | 0..1 | <a href="#">RealEnergy</a>  | (NC) The minimum amount of stored energy within the normal operating range of the energy storage plant.                       |
| maxCapacity        | 0..1 | <a href="#">RealEnergy</a>  | (NC) The maximum amount of energy that may be stored by the energy storage plant within its defined operating limits.         |
| nominalP           | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                                                                               |
| maxOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                                                                               |
| minOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                                                                               |
| deadbandMinP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                                                                               |
| deadbandMaxP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                                                                               |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                        |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                              |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                              |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                              |

3352

3353 **3.194 (abstract,Description) Equipment**3354 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

3355 The parts of a power system that are physical devices, electronic or mechanical.

3356 Table 283 shows all attributes of Equipment.

3357 **Table 283 – Attributes of EquipmentReliabilityProfile::Equipment**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3358

3359 Table 284 shows all association ends of Equipment with other classes.

3360 **Table 284 – Association ends of EquipmentReliabilityProfile::Equipment with other classes**

| mult from | name                | mult to | type                      | description                                                  |
|-----------|---------------------|---------|---------------------------|--------------------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) The circuit that contains its member equipment.         |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) An aggregated representation of the detailed equipment. |

3362

3363 **3.195 (abstract,NC) EquipmentController**3364 Inheritance path = [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3365 Equipment controller is an automation function that can control one or multiple equipment  
3366 function to achieve all the targets inside the given tolerance.  
3367 Table 285 shows all attributes of EquipmentController.

3368 **Table 285 – Attributes of EquipmentReliabilityProfile::EquipmentController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

3369  
3370 Table 286 shows all association ends of EquipmentController with other classes.

3371 **Table 286 – Association ends of EquipmentReliabilityProfile::EquipmentController with**  
3372 **other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

3373  
3374 **3.196 (NC) EquivalentACDCConverter**

3375 Inheritance path = [ACDCConverter](#) : [ConductingEquipment](#) : [Equipment](#) :  
3376 [PowerSystemResource](#) : [IdentifiedObject](#)

3377 An equivalent representation of an AC/DC converter used to model the electrical interaction  
3378 between an AC network and a DC system, without explicitly modelling internal converter station  
3379 equipment or DC connectivity. The EquivalentACDCConverter abstracts the behaviour of a DC  
3380 converter by representing its active and reactive power exchange, control characteristics, and  
3381 connectivity at the AC and/or DC interface. It is used where a detailed converter model is not  
3382 exchanged or required. The converter has one AC Terminal and two DC Terminal objects.  
3383 Table 287 shows all attributes of EquivalentACDCConverter.

3384 **Table 287 – Attributes of EquipmentReliabilityProfile::EquivalentACDCConverter**

| name               | mult | type                              | description                                                            |
|--------------------|------|-----------------------------------|------------------------------------------------------------------------|
| type               | 1..1 | <a href="#">ACDCConverterKind</a> | (NC) The type of the converter.                                        |
| baseS              | 0..1 | <a href="#">ApparentPower</a>     | inherited from: <a href="#">ACDCConverter</a>                          |
| maxUdc             | 0..1 | <a href="#">Voltage</a>           | inherited from: <a href="#">ACDCConverter</a>                          |
| minUdc             | 0..1 | <a href="#">Voltage</a>           | inherited from: <a href="#">ACDCConverter</a>                          |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>           | inherited from: <a href="#">ACDCConverter</a>                          |
| maxP               | 0..1 | <a href="#">ActivePower</a>       | inherited from: <a href="#">ACDCConverter</a>                          |
| minP               | 0..1 | <a href="#">ActivePower</a>       | inherited from: <a href="#">ACDCConverter</a>                          |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>            | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>            | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>            | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>            | inherited from: <a href="#">IdentifiedObject</a>                       |

3385

3386 Table 288 shows all association ends of EquivalentACDCConverter with other classes.

3387 **Table 288 – Association ends of EquipmentReliabilityProfile::EquivalentACDCConverter**  
3388 **with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

3389

3390 **3.197 (NC) EquivalentGeneratingUnit**

3391 Inheritance path = [GeneratingUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3392 An indivisible set of installations which can generate electrical energy such that the frequency  
3393 of the generated voltage, the generator speed and the frequency of network voltage are in a  
3394 constant ratio and thus in synchronism. This is often referred as synchronous power-generating  
3395 module.

3396 Table 289 shows all attributes of EquivalentGeneratingUnit.

3397 **Table 289 – Attributes of EquipmentReliabilityProfile::EquivalentGeneratingUnit**

| name                      | mult | type                                  | description                                                            |
|---------------------------|------|---------------------------------------|------------------------------------------------------------------------|
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| maxStartupLoad            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| shutdownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| lowerRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| raiseRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| minimumOffTime            | 0..1 | <a href="#">Seconds</a>               | inherited from: <a href="#">GeneratingUnit</a>                         |
| warmStartupTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| coolDownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| startupRampRate           | 0..1 | <a href="#">ActivePowerChangeRate</a> | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunP            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| runningLeadTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minimumUpTime             | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalStartupCost         | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalWarmStartupCost     | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunQ            | 0..1 | <a href="#">ReactivePower</a>         | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| maxRampDownCountPerDay    | 0..1 | <a href="#">Integer</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| rampLockTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| costCurrency              | 0..1 | <a href="#">Currency</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalShutdownCost        | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>                 | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>                | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                      | 1..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 290 shows all association ends of EquivalentGeneratingUnit with other classes.

**Table 290 – Association ends of EquipmentReliabilityProfile::EquivalentGeneratingUnit with other classes**

| mult from | name                 | mult to | type                                 | description                                                           |
|-----------|----------------------|---------|--------------------------------------|-----------------------------------------------------------------------|
| 0..*      | EquivalentPowerPlant | 0..1    | <a href="#">EquivalentPowerPlant</a> | (NC) Equivalent power plant that has this equivalent generating unit. |
| 0..*      | ScheduleResource     | 0..1    | <a href="#">ScheduleResource</a>     | (NC) inherited from: <a href="#">GeneratingUnit</a>                   |
| 0..*      | Circuit              | 0..1    | <a href="#">Circuit</a>              | (NC) inherited from: <a href="#">Equipment</a>                        |
| 0..*      | AggregatedEquipment  | 0..1    | <a href="#">Equipment</a>            | (NC) inherited from: <a href="#">Equipment</a>                        |

### 3.198 (Description) EquivalentInjection root class

This class represents equivalent injections (generation or load). Voltage regulation is allowed only at the point of connection.

Table 291 shows all association ends of EquivalentInjection with other classes.

**Table 291 – Association ends of EquipmentReliabilityProfile::EquivalentInjection with other classes**

| mult from | name                | mult to | type                                | description                                                        |
|-----------|---------------------|---------|-------------------------------------|--------------------------------------------------------------------|
| 0..*      | InjectionController | 0..1    | <a href="#">InjectionController</a> | (NC) Injection controller which controls the equivalent injection. |

### 3.199 (NC) EquivalentPowerElectronicsUnit

Inheritance path = [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

An equivalent unit or ensemble of units generating electricity, which is either non-synchronously connected to the network or connected through power electronics, and that also has a single connection point to a transmission system, distribution system including closed distribution system or an equivalent representation of a HVDC system. This is often referred as power park module.

Table 292 shows all attributes of EquivalentPowerElectronicsUnit.

**Table 292 – Attributes of EquipmentReliabilityProfile::EquivalentPowerElectronicsUnit**

| name                      | mult | type                        | description                                                             |
|---------------------------|------|-----------------------------|-------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a>       | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>               |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>               |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>               |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>      | (deprecated, European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                        |
| mRID                      | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                        |
| name                      | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                        |

Table 293 shows all association ends of EquivalentPowerElectronicsUnit with other classes.

**Table 293 – Association ends of  
EquipmentReliabilityProfile::EquivalentPowerElectronicsUnit with other classes**

| mult from | name                           | mult to | type                                           | description                                                                 |
|-----------|--------------------------------|---------|------------------------------------------------|-----------------------------------------------------------------------------|
| 0..*      | EquivalentPowerPlant           | 0..1    | <a href="#">EquivalentPowerPlant</a>           | (NC) Equivalent power plan that has this equivalent power electronics unit. |
| 0..*      | ScheduleResource               | 0..1    | <a href="#">ScheduleResource</a>               | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>                   |
| 0..*      | PowerElectronicsUnitController | 0..1    | <a href="#">PowerElectronicsUnitController</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>                   |
| 0..*      | Circuit                        | 0..1    | <a href="#">Circuit</a>                        | (NC) inherited from: <a href="#">Equipment</a>                              |
| 0..*      | AggregatedEquipment            | 0..1    | <a href="#">Equipment</a>                      | (NC) inherited from: <a href="#">Equipment</a>                              |

### 3.200 (NC) EquivalentPowerPlant

Inheritance path = [PowerPlant](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Collection of equivalent equipment for purposes of generation.

Table 294 shows all attributes of EquivalentPowerPlant.

**Table 294 – Attributes of EquipmentReliabilityProfile::EquivalentPowerPlant**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| nominalP           | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| maxOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| minOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| deadbandMinP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| deadbandMaxP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

### 3.201 (NC) ExceptionalPowerTransferCorridor

Inheritance path = [PowerTransferCorridor](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Potential power transfer corridor that can be triggered by equipment which changes its in service status or it is operating in an island.

Table 295 shows all attributes of ExceptionalPowerTransferCorridor.

**Table 295 – Attributes of  
EquipmentReliabilityProfile::ExceptionalPowerTransferCorridor**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">PowerTransferCorridor</a>             |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

3439 **3.202 (Description) ExternalNetworkInjection**

3440 Inheritance path = [RegulatingCondEq](#) : [EnergyConnection](#) : [ConductingEquipment](#) :  
 3441 [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3442 This class represents the external network and it is used for IEC 60909 calculations.

3443 Table 296 shows all attributes of ExternalNetworkInjection.

3444 **Table 296 – Attributes of EquipmentReliabilityProfile::ExternalNetworkInjection**

| name            | mult | type                   | description                                                            |
|-----------------|------|------------------------|------------------------------------------------------------------------|
| energyIdCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description     | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID            | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name            | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3445  
 3446 Table 297 shows all association ends of ExternalNetworkInjection with other classes.

3447 **Table 297 – Association ends of EquipmentReliabilityProfile::ExternalNetworkInjection**  
 3448 **with other classes**

| mult from | name                     | mult to | type                                     | description                                                               |
|-----------|--------------------------|---------|------------------------------------------|---------------------------------------------------------------------------|
| 0..*      | EquivalentGeneratingUnit | 0..1    | <a href="#">EquivalentGeneratingUnit</a> | (NC) Equivalent generating unit that has this external network injection. |
| 0..*      | EquipmentController      | 0..1    | <a href="#">EquipmentController</a>      | (NC) inherited from: <a href="#">RegulatingCondEq</a>                     |
| 0..*      | Circuit                  | 0..1    | <a href="#">Circuit</a>                  | (NC) inherited from: <a href="#">Equipment</a>                            |
| 0..*      | AggregatedEquipment      | 0..1    | <a href="#">Equipment</a>                | (NC) inherited from: <a href="#">Equipment</a>                            |

3449  
 3450 **3.203 (abstract,NC) FACTSEquipment**

3451 Inheritance path = [RegulatingCondEq](#) : [EnergyConnection](#) : [ConductingEquipment](#) :  
 3452 [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3453 Flexible Alternating Current Transmission System regulating equipment.

3454 Table 298 shows all attributes of FACTSEquipment.

3455 **Table 298 – Attributes of EquipmentReliabilityProfile::FACTSEquipment**

| name   | mult | type                                    | description                                                                                                                                                                                                                     |
|--------|------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| slope  | 1..1 | <a href="#">VoltagePerReactivePower</a> | (NC) The characteristics slope which defines how the reactive power output changes in proportion to the difference between the regulated bus voltage and the voltage setpoint. The attribute shall be a positive value or zero. |
| ratedI | 0..1 | <a href="#">CurrentFlow</a>             | (NC) Rated current of the FACTS equipment.                                                                                                                                                                                      |
| ratedU | 0..1 | <a href="#">Voltage</a>                 | (NC) Rated voltage of the FACTS equipment.                                                                                                                                                                                      |
| ratedC | 0..1 | <a href="#">Reactance</a>               | (NC) Capacitive reactance at maximum reactive power. Shall always be positive.                                                                                                                                                  |
| ratedL | 0..1 | <a href="#">Reactance</a>               | (NC) Inductive rating at maximum inductive reactive power. Shall always be negative.                                                                                                                                            |
| minC   | 0..1 | <a href="#">Reactance</a>               | (NC) Capacitive reactance at minimum reactive power. Shall always be positive.                                                                                                                                                  |
| maxC   | 0..1 | <a href="#">Reactance</a>               | (NC) Capacitive reactance at maximum reactive power. Shall always be positive.                                                                                                                                                  |

| name               | mult | type                      | description                                                                          |
|--------------------|------|---------------------------|--------------------------------------------------------------------------------------|
| minL               | 0..1 | <a href="#">Reactance</a> | (NC) Inductive rating at minimum inductive reactive power. Shall always be negative. |
| maxL               | 0..1 | <a href="#">Reactance</a> | (NC) Inductive rating at maximum inductive reactive power. Shall always be negative. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>    | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>               |
| description        | 0..1 | <a href="#">String</a>    | inherited from: <a href="#">IdentifiedObject</a>                                     |
| mRID               | 1..1 | <a href="#">String</a>    | inherited from: <a href="#">IdentifiedObject</a>                                     |
| name               | 0..1 | <a href="#">String</a>    | inherited from: <a href="#">IdentifiedObject</a>                                     |

Table 299 shows all association ends of FACTSEquipment with other classes.

**Table 299 – Association ends of EquipmentReliabilityProfile::FACTSEquipment with other classes**

| mult from | name                | mult to | type                                | description                                           |
|-----------|---------------------|---------|-------------------------------------|-------------------------------------------------------|
| 0..*      | EquipmentController | 0..1    | <a href="#">EquipmentController</a> | (NC) inherited from: <a href="#">RegulatingCondEq</a> |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>             | (NC) inherited from: <a href="#">Equipment</a>        |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>           | (NC) inherited from: <a href="#">Equipment</a>        |

### 3.204 (NC) FlexibleEnergyUnit

Inheritance path = [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Flexible consumer or embedded producer of energy. The unit cannot be a net producer.

Table 300 shows all attributes of FlexibleEnergyUnit.

**Table 300 – Attributes of EquipmentReliabilityProfile::FlexibleEnergyUnit**

| name           | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| uncontrollable | 0..1 | <a href="#">ActivePower</a> | (NC) The active power, that forms the base consumption for the unit. This is measured and expected consumption. Load sign convention is used, i.e. positive sign means flow out from a node.                                                                                                                                                                                                     |
| timeShift      | 0..1 | <a href="#">ActivePower</a> | (NC) The active power, that can be shifted from one pricing interval (market time unit) to another. It is expected to be a limited on the length of the shift. Example from household could be washing machine or dishwasher. Example from industry is the possible to shut down a machine for the relevant period. Load sign convention is used, i.e. positive sign means flow out from a node. |
| buffer         | 0..1 | <a href="#">ActivePower</a> | (NC) The active power, that has the flexibility to operate as production and/or consumption. The buffer is bound. Example are heat pump, cooling system, embedded batteries including electric vehicle. Load sign convention is used, i.e. positive sign means flow out from a node.                                                                                                             |
| unconstrained  | 0..1 | <a href="#">ActivePower</a> | (NC) The active power, that has the flexibility to operate as production without any bound by a buffer. Example are alternative heating (wood, gas, diesel etc) or power generators. Load sign convention is used, i.e. positive sign means flow out from a node.                                                                                                                                |

| name                      | mult | type                        | description                                                            |
|---------------------------|------|-----------------------------|------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a>       | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>              |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>              |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>              |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                      | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                      | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 301 shows all association ends of FlexibleEnergyUnit with other classes.

**Table 301 – Association ends of EquipmentReliabilityProfile::FlexibleEnergyUnit with other classes**

| mult from | name                           | mult to | type                                           | description                                               |
|-----------|--------------------------------|---------|------------------------------------------------|-----------------------------------------------------------|
| 0..*      | ScheduleResource               | 0..1    | <a href="#">ScheduleResource</a>               | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | PowerElectronicsUnitController | 0..1    | <a href="#">PowerElectronicsUnitController</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | Circuit                        | 0..1    | <a href="#">Circuit</a>                        | (NC) inherited from: <a href="#">Equipment</a>            |
| 0..*      | AggregatedEquipment            | 0..1    | <a href="#">Equipment</a>                      | (NC) inherited from: <a href="#">Equipment</a>            |

### 3.205 (Description) FossilFuel root class

The fossil fuel consumed by the non-nuclear thermal generating unit. For example, coal, oil, gas, etc. These are the specific fuels that the generating unit can consume.

Table 302 shows all association ends of FossilFuel with other classes.

**Table 302 – Association ends of EquipmentReliabilityProfile::FossilFuel with other classes**

| mult from | name        | mult to | type                        | description                                |
|-----------|-------------|---------|-----------------------------|--------------------------------------------|
| 0..*      | FuelStorage | 0..1    | <a href="#">FuelStorage</a> | (NC) Fuel storage that store fossil fuels. |

### 3.206 (NC) FrequencyControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

Frequency control function is a function block that calculate the operating point of the controlled equipment to achieve the target frequency.

Table 303 shows all attributes of FrequencyControlFunction.

**Table 303 – Attributes of EquipmentReliabilityProfile::FrequencyControlFunction**

| name                  | mult | type                    | description                                               |
|-----------------------|------|-------------------------|-----------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a> |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a> |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a> |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a> |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>        |

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 304 shows all association ends of FrequencyControlFunction with other classes.

**Table 304 – Association ends of EquipmentReliabilityProfile::FrequencyControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 3.207 (NC) FrequencyMonitoringTerminal root class

Frequency monitoring terminal provides location in the model where the frequency is monitored for the purpose of power frequency control.

Table 305 shows all attributes of FrequencyMonitoringTerminal.

**Table 305 – Attributes of EquipmentReliabilityProfile::FrequencyMonitoringTerminal**

| name     | mult | type                    | description                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------|------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mRID     | 1..1 | <a href="#">String</a>  | (NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br><br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| priority | 1..1 | <a href="#">Integer</a> | (NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority.                                                                                                                                                                                                                                                                                                                |

Table 306 shows all association ends of FrequencyMonitoringTerminal with other classes.

**Table 306 – Association ends of EquipmentReliabilityProfile::FrequencyMonitoringTerminal with other classes**

| mult from | name                     | mult to | type                                     | description                                                                  |
|-----------|--------------------------|---------|------------------------------------------|------------------------------------------------------------------------------|
| 0..*      | Terminal                 | 0..1    | <a href="#">Terminal</a>                 | (NC) The terminal for this frequency monitoring terminal.                    |
| 0..*      | PowerFrequencyController | 0..1    | <a href="#">PowerFrequencyController</a> | (NC) Power frequency controller that has this frequency monitoring terminal. |

### 3.208 (NC) FuelStorage

Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

Fuel storage. e.g. pile of coal that can be shared between multiple thermal generating units.

Table 307 shows all attributes of FuelStorage.

3504 **Table 307 – Attributes of EquipmentReliabilityProfile::FuelStorage**

| name                | mult | type                       | description                                                            |
|---------------------|------|----------------------------|------------------------------------------------------------------------|
| normalEnergyStorage | 0..1 | <a href="#">RealEnergy</a> | (NC) Normal amount of energy available in the storage.                 |
| energyIdentCodeEic  | 0..1 | <a href="#">String</a>     | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description         | 0..1 | <a href="#">String</a>     | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                | 1..1 | <a href="#">String</a>     | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                | 0..1 | <a href="#">String</a>     | inherited from: <a href="#">IdentifiedObject</a>                       |

3505

3506 **3.209 (abstract,NC) FunctionBlock**3507 Inheritance path = [IdentifiedObject](#)3508 Function block is a function described as a set of elementary blocks. The blocks describe the  
3509 function between input variables and output variables.

3510 Table 308 shows all attributes of FunctionBlock.

3511 **Table 308 – Attributes of EquipmentReliabilityProfile::FunctionBlock**

| name               | mult | type                    | description                                                                     |
|--------------------|------|-------------------------|---------------------------------------------------------------------------------|
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) True, if the function block is normally enabled (active). Otherwise false. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>          |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                |

3512

3513 Table 309 shows all association ends of FunctionBlock with other classes.

3514 **Table 309 – Association ends of EquipmentReliabilityProfile::FunctionBlock with other**  
3515 **classes**

| mult from | name                 | mult to | type                                 | description                                                                       |
|-----------|----------------------|---------|--------------------------------------|-----------------------------------------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) Automation block group which has function blocks.                            |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) Automation function describe automation that this function block is part of. |

3516

3517 **3.210 (abstract,NC) FunctionInputVariable**3518 Inheritance path = [IdentifiedObject](#)

3519 Functional input variable defines the domain of the function.

3520 Table 310 shows all attributes of FunctionInputVariable.

3521 **Table 310 – Attributes of EquipmentReliabilityProfile::FunctionInputVariable**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 311 shows all association ends of FunctionInputVariable with other classes.

**Table 311 – Association ends of EquipmentReliabilityProfile::FunctionInputVariable with other classes**

| mult from | name     | mult to | type                          | description                                                                                     |
|-----------|----------|---------|-------------------------------|-------------------------------------------------------------------------------------------------|
| 1..*      | Function | 0..1    | <a href="#">FunctionBlock</a> | (NC) Function block describe the function that function input variable provides the domain for. |

### 3.211 (NC) FunctionOutputVariable

Inheritance path = [IdentifiedObject](#)

Functional output variable defines the codomain of the function.

Table 312 shows all attributes of FunctionOutputVariable.

**Table 312 – Attributes of EquipmentReliabilityProfile::FunctionOutputVariable**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 313 shows all association ends of FunctionOutputVariable with other classes.

**Table 313 – Association ends of EquipmentReliabilityProfile::FunctionOutputVariable with other classes**

| mult from | name              | mult to | type                              | description                                                                                                     |
|-----------|-------------------|---------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 1..*      | FunctionBlock     | 1..1    | <a href="#">FunctionBlock</a>     | (NC) Function block describe the function that function output variable provides the codomain for.              |
| 0..*      | PropertyReference | 1..1    | <a href="#">PropertyReference</a> | (NC) Property reference refers to a given class and property that is populated by the function output variable. |

### 3.212 (NC) GateInputPin

Inheritance path = [FunctionInputVariable](#) : [IdentifiedObject](#)

Input pin for a logical gate. The condition described in the input pin gives a logical true or false.

The result from measurement and calculation are converted to a true or false.

Table 314 shows all attributes of GateInputPin.

**Table 314 – Attributes of EquipmentReliabilityProfile::GateInputPin**

| name          | mult | type                    | description                                                                                                                             |
|---------------|------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| absoluteValue | 0..1 | <a href="#">Boolean</a> | (NC) Indicates if the absolute value is used for comparison. If true, use the absolute value. If false, use the complex value (vector). |

| name                | mult | type                                 | description                                                                                                                                                           |
|---------------------|------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| duration            | 0..1 | <a href="#">Duration</a>             | (NC) The time duration for which the condition is satisfied before acting. Default is 0 seconds.                                                                      |
| logicKind           | 0..1 | <a href="#">LogicalOperatorsKind</a> | (NC) The logical operator kind used for comparison.                                                                                                                   |
| negate              | 0..1 | <a href="#">Boolean</a>              | (NC) Invert/negate the result of the comparison.                                                                                                                      |
| thresholdPercentage | 0..1 | <a href="#">PerCent</a>              | (NC) The threshold percentage that should be used for compare with the percentage change between input value and threshold value. The allowed value range is [0,100]. |
| thresholdValue      | 0..1 | <a href="#">Float</a>                | (NC) The threshold value that should be used for compare with the input value.                                                                                        |
| normalEnabled       | 0..1 | <a href="#">Boolean</a>              | (NC) True, if the gate input pin is normally enabled (active). Otherwise false.                                                                                       |
| energyIdentCodeEic  | 0..1 | <a href="#">String</a>               | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                |
| description         | 0..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                      |
| mRID                | 1..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                      |
| name                | 0..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                      |

Table 315 shows all association ends of GateInputPin with other classes.

**Table 315 – Association ends of EquipmentReliabilityProfile::GateInputPin with other classes**

| mult from | name     | mult to | type                          | description                                                |
|-----------|----------|---------|-------------------------------|------------------------------------------------------------|
| 1..*      | Function | 0..1    | <a href="#">FunctionBlock</a> | (NC) inherited from: <a href="#">FunctionInputVariable</a> |

### 3.213 (NC) GateTurnOffThyristorValve

Inheritance path = [DCValve](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

The Gate Turn-Off Thyristor (GTO) is an advanced version of a standard thyristor. While a standard thyristor can only be turned on by a gate signal, the GTO can be turned both on and off through its gate. Key advantage is that GTOs can handle massive power levels (higher voltages and currents) than most standard IGBTs. Historically used in heavy industrial motor drives and bulk power transmission, though they are increasingly being replaced by IGBTs. Table 316 shows all attributes of GateTurnOffThyristorValve.

**Table 316 – Attributes of EquipmentReliabilityProfile::GateTurnOffThyristorValve**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| valveU0            | 0..1 | <a href="#">Voltage</a>     | (NC) inherited from: <a href="#">DCValve</a>                           |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

3559 Table 317 shows all association ends of GateTurnOffThyristorValve with other classes.

3560 **Table 317 – Association ends of**  
3561 **EquipmentReliabilityProfile::GateTurnOffThyristorValve with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

3562

### 3563 3.214 (Description) GeneratingUnit

3564 Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3565 A single or set of synchronous machines for converting mechanical power into alternating-  
3566 current power. For example, individual machines within a set may be defined for scheduling  
3567 purposes while a single control signal is derived for the set. In this case there would be a  
3568 GeneratingUnit for each member of the set and an additional GeneratingUnit corresponding to  
3569 the set.

3570 Table 318 shows all attributes of GeneratingUnit.

3571 **Table 318 – Attributes of EquipmentReliabilityProfile::GeneratingUnit**

| name            | mult | type                                  | description                                                                                                                                                                                                                                                                                            |
|-----------------|------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| maxEconomicP    | 0..1 | <a href="#">ActivePower</a>           | Maximum high economic active power limit, that should not exceed the maximum operating active power limit.                                                                                                                                                                                             |
| maxStartupLoad  | 0..1 | <a href="#">ActivePower</a>           | (NC) Maximum consumption by the generating unit as part of the startup process.                                                                                                                                                                                                                        |
| minEconomicP    | 0..1 | <a href="#">ActivePower</a>           | Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.                                                                                                                                                                                       |
| shutdownTime    | 0..1 | <a href="#">Duration</a>              | (NC) Time it takes to shutdown the unit.                                                                                                                                                                                                                                                               |
| lowerRampRate   | 0..1 | <a href="#">ActivePowerChangeRate</a> | The normal maximum rate the generating unit active power output can be lowered by control actions.                                                                                                                                                                                                     |
| raiseRampRate   | 0..1 | <a href="#">ActivePowerChangeRate</a> | The normal maximum rate the generating unit active power output can be raised by control actions.                                                                                                                                                                                                      |
| minimumOffTime  | 0..1 | <a href="#">Seconds</a>               | Minimum time interval between unit shutdown and startup.                                                                                                                                                                                                                                               |
| warmStartupTime | 0..1 | <a href="#">Duration</a>              | (NC) Time it takes to startup the unit when it is warm.                                                                                                                                                                                                                                                |
| coolDownTime    | 0..1 | <a href="#">Duration</a>              | (NC) Time it takes from a unit shutdown until it is considered cold.                                                                                                                                                                                                                                   |
| startupRampRate | 0..1 | <a href="#">ActivePowerChangeRate</a> | (NC) The startup ramp rate of the generating unit which describes the speed of change of active power from zero to the minimum active power. When the ramp is not provided, the optimisation process shall consider the change as an instant change of active power from zero to minimum active power. |
| normalMustRunP  | 0..1 | <a href="#">ActivePower</a>           | (NC) Normal minimum active power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.                                                                   |
| runningLeadTime | 0..1 | <a href="#">Duration</a>              | (NC) Time it takes to change the schedule when the unit is operating due to technical                                                                                                                                                                                                                  |

| name                      | mult | type                          | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------|------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           |      |                               | configuration of a supporting system, e.g. gas pipeline.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| minimumUpTime             | 0..1 | <a href="#">Duration</a>      | (NC) The time that a generating unit has to stay running after it has been switched on by the Remedial Action Optimizer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| normalStartupCost         | 0..1 | <a href="#">Decimal</a>       | (NC) The normal initial startup cost incurred for each start of the GeneratingUnit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| normalWarmStartupCost     | 0..1 | <a href="#">Decimal</a>       | (NC) The normal warm startup cost incurred for each start of the GeneratingUnit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| normalMustRunQ            | 0..1 | <a href="#">ReactivePower</a> | (NC) Normal minimum reactive power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.                                                                                                                                                                                                                                                                                                                                                           |
| maxRampDownCountPerDay    | 0..1 | <a href="#">Integer</a>       | (NC) Number of times the unit can do ramp down within a calendar day. One ramp down consists of a decrease of a power plant production level from a stable schedule to another regardless of how much time the power plant stays in such stable operating stage.                                                                                                                                                                                                                                                                                                                                 |
| rampLockTime              | 0..1 | <a href="#">Duration</a>      | (NC) Time between end or start of ramping. If a unit has just stopped the ramping, it will need to wait this time until a new ramping can start.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| costCurrency              | 0..1 | <a href="#">Currency</a>      | (NC) Currency the cost is given in.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| normalShutdownCost        | 0..1 | <a href="#">Decimal</a>       | (NC) The normal shutdown cost incurred for each shutdown of the GeneratingUnit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>         | (NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.<br><br>In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$ .<br><br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>        | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| description               | 0..1 | <a href="#">String</a>        | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| mRID                      | 1..1 | <a href="#">String</a>        | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| name                      | 0..1 | <a href="#">String</a>        | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

Table 319 shows all association ends of GeneratingUnit with other classes.

**Table 319 – Association ends of EquipmentReliabilityProfile::GeneratingUnit with other classes**

| mult from | name                | mult to | type                             | description                                               |
|-----------|---------------------|---------|----------------------------------|-----------------------------------------------------------|
| 0..*      | ScheduleResource    | 0..1    | <a href="#">ScheduleResource</a> | (NC) The schedule resource that has this generating unit. |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>          | (NC) inherited from: <a href="#">Equipment</a>            |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>        | (NC) inherited from: <a href="#">Equipment</a>            |

3577 **3.215 (NC) GeothermalGeneratingUnit**3578 Inheritance path = [GeneratingUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3579 Generating unit that is generating electrical power from geothermal energy.

3580 Table 320 shows all attributes of GeothermalGeneratingUnit.

3581 **Table 320 – Attributes of EquipmentReliabilityProfile::GeothermalGeneratingUnit**

| name                      | mult | type                                  | description                                                            |
|---------------------------|------|---------------------------------------|------------------------------------------------------------------------|
| kind                      | 1..1 | <a href="#">GeothermalUnitKind</a>    | (NC) Kind of geothermal generating unit.                               |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| maxStartupLoad            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| shutdownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| lowerRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| raiseRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| minimumOffTime            | 0..1 | <a href="#">Seconds</a>               | inherited from: <a href="#">GeneratingUnit</a>                         |
| warmStartupTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| coolDownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| startupRampRate           | 0..1 | <a href="#">ActivePowerChangeRate</a> | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunP            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| runningLeadTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minimumUpTime             | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalStartupCost         | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalWarmStartupCost     | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunQ            | 0..1 | <a href="#">ReactivePower</a>         | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| maxRampDownCountPerDay    | 0..1 | <a href="#">Integer</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| rampLockTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| costCurrency              | 0..1 | <a href="#">Currency</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalShutdownCost        | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>                 | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>                | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                      | 1..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                      | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |

3582  
3583 Table 321 shows all association ends of GeothermalGeneratingUnit with other classes.3584 **Table 321 – Association ends of EquipmentReliabilityProfile::GeothermalGeneratingUnit**  
3585 **with other classes**

| mult from | name                | mult to | type                             | description                                         |
|-----------|---------------------|---------|----------------------------------|-----------------------------------------------------|
| 0..*      | ScheduleResource    | 0..1    | <a href="#">ScheduleResource</a> | (NC) inherited from: <a href="#">GeneratingUnit</a> |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>          | (NC) inherited from: <a href="#">Equipment</a>      |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>        | (NC) inherited from: <a href="#">Equipment</a>      |

3586

3587 **3.216 (NC) GridConnectionPoint**3588 Inheritance path = [CommonResponsibilityPoint](#) : [IdentifiedObject](#)3589 A GridConnectionPoint is a CommonResponsibilityPoint that identifies the point at which a grid  
3590 operator and a connecting entity establish the shared responsibility for connection to the grid  
3591 and where the connection agreement between the parties is applied.3592 Note: The GridConnectionPoint represents the contractual and operational interface between a  
3593 grid provider (for example a TSO, DSO, or CDSO) and a connecting entity such as a generating  
3594 facility, industrial installation, distribution network, or other grid user.3595 Conditions defined by applicable grid connection codes or agreements—such as voltage and  
3596 frequency operating ranges, fault ride-through capability, power quality limits, protection  
3597 coordination, and observability requirements—may be specified with reference to the  
3598 GridConnectionPoint.3599 The GridConnectionPoint is typically associated with the electrical reference location  
3600 represented by a PointOfCommonCoupling and therefore serves as the point where compliance  
3601 with connection requirements and operational responsibilities between the connected parties is  
3602 evaluated.

3603 Table 322 shows all attributes of GridConnectionPoint.

3604 **Table 322 – Attributes of EquipmentReliabilityProfile::GridConnectionPoint**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| isDirectCurrent    | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a>         |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

3605

3606 Table 323 shows all association ends of GridConnectionPoint with other classes.

3607 **Table 323 – Association ends of EquipmentReliabilityProfile::GridConnectionPoint with**  
3608 **other classes**

| mult from | name             | mult to | type                             | description                                                    |
|-----------|------------------|---------|----------------------------------|----------------------------------------------------------------|
| 0..*      | ConnectivityNode | 0..1    | <a href="#">ConnectivityNode</a> | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a> |
| 0..*      | DCNode           | 0..1    | <a href="#">DCNode</a>           | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a> |

3609

3610 **3.217 (NC) GridPowerCapacity**3611 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)3612 Grid power capacity defines the active power capacity that can be imported, exported,  
3613 generated, consumed, or transferred within a defined power system area, or a combination of  
3614 multiple areas (e.g. a bidding zone), considering relevant grid constraints required for secure  
3615 and reliable operation.3616 Note: Grid power capacity represents a power system or network-constrained capacity, not the  
3617 technical installed capacity of individual resources or groups of resources. It may describe limits  
3618 on generation, consumption, import, export, or power transfer resulting from operational  
3619 security limits, network constraints, capacity allocation, forecasted grid availability, planned  
3620 outages, remedial actions, or market-relevant transmission limitations.

3621 Table 324 shows all attributes of GridPowerCapacity.

3622 **Table 324 – Attributes of EquipmentReliabilityProfile::GridPowerCapacity**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3623

3624 **3.218 (Description) HydroPowerPlant root class**

3625 A hydro power station which can generate or pump. When generating, the generator turbines  
 3626 receive water from an upper reservoir. When pumping, the pumps receive their water from a  
 3627 lower reservoir.

3628 Table 325 shows all attributes of HydroPowerPlant.

3629 **Table 325 – Attributes of EquipmentReliabilityProfile::HydroPowerPlant**

| name                          | mult | type                    | description                                                                                                                                                                                                                                                                                 |
|-------------------------------|------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| numberOfPenstocks             | 0..1 | <a href="#">Integer</a> | (NC) Number of penstocks hydraulically serving the hydro generating units and hydro pumps of the hydro power plant. When the value is one, the hydro generating units and hydro pumps are assumed to share a common penstock unless a detailed hydraulic network model specifies otherwise. |
| simultaneousPumpAndGeneration | 0..1 | <a href="#">Boolean</a> | (NC) Indicates whether at least one hydro pump and at least one hydro generating unit of the hydro power plant may operate simultaneously.                                                                                                                                                  |

3630

3631 Table 326 shows all association ends of HydroPowerPlant with other classes.

3632 **Table 326 – Association ends of EquipmentReliabilityProfile::HydroPowerPlant with**  
 3633 **other classes**

| mult from | name      | mult to | type                      | description                                                                            |
|-----------|-----------|---------|---------------------------|----------------------------------------------------------------------------------------|
| 0..*      | Reservoir | 0..1    | <a href="#">Reservoir</a> | Generators discharge water to or pumps are supplied water from a downstream reservoir. |

3634

3635 **3.219 (Description) HydroPump**

3636 Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3637 A synchronous motor-driven pump, typically associated with a pumped storage plant.

3638 Table 327 shows all attributes of HydroPump.

3639 **Table 327 – Attributes of EquipmentReliabilityProfile::HydroPump**

| name                      | mult | type                  | description                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------|------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a> | (NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.<br><br>In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated |

| name               | mult | type                        | description                                                                                                                                                                     |
|--------------------|------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |      |                             | value (T) divided by sum of participation factors (PF), i.e. $V=T/\sum(PF)$ .<br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| maxEconomicP       | 0..1 | <a href="#">ActivePower</a> | (NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.                                                                 |
| maxOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) This is the maximum operating active power limit the dispatcher can enter for this unit.                                                                                   |
| minEconomicP       | 0..1 | <a href="#">ActivePower</a> | (NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.                                                           |
| minOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) This is the minimum operating active power limit the dispatcher can enter for this unit.                                                                                   |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                          |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                |

Table 328 shows all association ends of HydroPump with other classes.

**Table 328 – Association ends of EquipmentReliabilityProfile::HydroPump with other classes**

| mult from | name                | mult to | type                             | description                                          |
|-----------|---------------------|---------|----------------------------------|------------------------------------------------------|
| 0..*      | ScheduleResource    | 0..1    | <a href="#">ScheduleResource</a> | (NC) The schedule resource that has this hydro pump. |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>          | (NC) inherited from: <a href="#">Equipment</a>       |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>        | (NC) inherited from: <a href="#">Equipment</a>       |

### 3.220 (NC) ImpedanceControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

Impedance control function is a function block that calculates the operating point of the controlled equipment to achieve the target impedance.

Table 329 shows all attributes of ImpedanceControlFunction.

**Table 329 – Attributes of EquipmentReliabilityProfile::ImpedanceControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 330 shows all association ends of ImpedanceControlFunction with other classes.

**Table 330 – Association ends of  
EquipmentReliabilityProfile::ImpedanceControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 3.221 (NC) IndustryUnit

Inheritance path = [GeneratingUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

An industrial energy conversion facility that primarily consumes electrical energy for mechanical processes, typically involving large rotating machines (e.g., motors, compressors, pumps, or mills).

The IndustryUnit may represent one or more concrete machine installations or an equivalent aggregated model of an industrial process.

Table 331 shows all attributes of IndustryUnit.

**Table 331 – Attributes of EquipmentReliabilityProfile::IndustryUnit**

| name                      | mult | type                                  | description                                                            |
|---------------------------|------|---------------------------------------|------------------------------------------------------------------------|
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| maxStartupLoad            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| shutdownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| lowerRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| raiseRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| minimumOffTime            | 0..1 | <a href="#">Seconds</a>               | inherited from: <a href="#">GeneratingUnit</a>                         |
| warmStartupTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| coolDownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| startupRampRate           | 0..1 | <a href="#">ActivePowerChangeRate</a> | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunP            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| runningLeadTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minimumUpTime             | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalStartupCost         | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalWarmStartupCost     | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunQ            | 0..1 | <a href="#">ReactivePower</a>         | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| maxRampDownCountPerDay    | 0..1 | <a href="#">Integer</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| rampLockTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| costCurrency              | 0..1 | <a href="#">Currency</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalShutdownCost        | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>                 | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>                | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 332 shows all association ends of IndustryUnit with other classes.

**Table 332 – Association ends of EquipmentReliabilityProfile::IndustryUnit with other classes**

| mult from | name                | mult to | type                             | description                                         |
|-----------|---------------------|---------|----------------------------------|-----------------------------------------------------|
| 0..*      | ScheduleResource    | 0..1    | <a href="#">ScheduleResource</a> | (NC) inherited from: <a href="#">GeneratingUnit</a> |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>          | (NC) inherited from: <a href="#">Equipment</a>      |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>        | (NC) inherited from: <a href="#">Equipment</a>      |

### 3.222 (NC) InfeedLimit

Inheritance path = [OperationalLimit](#) : [IdentifiedObject](#)

Infeed limit set constraints fed in to the network by two or more terminals.

Table 333 shows all attributes of InfeedLimit.

**Table 333 – Attributes of EquipmentReliabilityProfile::InfeedLimit**

| name               | mult | type                        | description                                                                                   |
|--------------------|------|-----------------------------|-----------------------------------------------------------------------------------------------|
| normalValueW       | 0..1 | <a href="#">ActivePower</a> | (NC) The normal value of active power limit. The attribute shall be a positive value or zero. |
| normalValueA       | 0..1 | <a href="#">CurrentFlow</a> | (NC) The normal current limit. The attribute shall be a positive value or zero.               |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                        |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                              |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                              |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                              |

Table 334 shows all association ends of InfeedLimit with other classes.

**Table 334 – Association ends of EquipmentReliabilityProfile::InfeedLimit with other classes**

| mult from | name                 | mult to | type                                 | description                                      |
|-----------|----------------------|---------|--------------------------------------|--------------------------------------------------|
| 1..*      | OperationalLimitType | 1..1    | <a href="#">OperationalLimitType</a> | inherited from: <a href="#">OperationalLimit</a> |
| 1..*      | OperationalLimitSet  | 1..1    | <a href="#">OperationalLimitSet</a>  | inherited from: <a href="#">OperationalLimit</a> |

### 3.223 (NC) InfeedTerminal root class

Infeed terminal defines the terminals that are linked to an infeed limit.

Table 335 shows all attributes of InfeedTerminal.

**Table 335 – Attributes of EquipmentReliabilityProfile::InfeedTerminal**

| name | mult | type                   | description                                                                                                                             |
|------|------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | (NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily |

| name | mult | type | description                                                                                                                                                                                                                                                                |
|------|------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |      |      | achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br><br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |

Table 336 shows all association ends of InfeedTerminal with other classes.

**Table 336 – Association ends of EquipmentReliabilityProfile::InfeedTerminal with other classes**

| mult from | name             | mult to | type                         | description                                                 |
|-----------|------------------|---------|------------------------------|-------------------------------------------------------------|
| 0..*      | ACDCTerminal     | 1..1    | <a href="#">ACDCTerminal</a> | (NC) ACDCTerminal which is connected to an infeed terminal. |
| 0..*      | InfeedConstraint | 1..1    | <a href="#">InfeedLimit</a>  | (NC) Infeed constraint which belongs to an infeed terminal. |

### 3.224 (NC) InjectionController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Injection controller is controlling the equipment which represents an injection or an external network.

Table 337 shows all attributes of InjectionController.

**Table 337 – Attributes of EquipmentReliabilityProfile::InjectionController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 338 shows all association ends of InjectionController with other classes.

**Table 338 – Association ends of EquipmentReliabilityProfile::InjectionController with other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

### 3.225 (NC) Installation

Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

An Installation represents a functionally integrated system at a premises or facility that is connected to an energy infrastructure, but is not itself an energy device (e.g., generator, load, or storage).

It serves as a system-level abstraction of the internal infrastructure—such as intake cable, switchboards, internal cabling, distribution panels, protection devices, and auxiliary equipment

3708 —that enables and constraints the connection to one or more energy connections (electrical,  
3709 thermal, gas, etc.).  
3710 Installations are typically owned and operated by the site holder, not the utility, and exist within  
3711 buildings, industrial sites, or campus.  
3712 Table 339 shows all attributes of Installation.

3713 **Table 339 – Attributes of EquipmentReliabilityProfile::Installation**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3714  
3715 Table 340 shows all association ends of Installation with other classes.

3716 **Table 340 – Association ends of EquipmentReliabilityProfile::Installation with other**  
3717 **classes**

| mult from | name                | mult to | type                               | description                                                       |
|-----------|---------------------|---------|------------------------------------|-------------------------------------------------------------------|
| 0..1      | EnergyConnection    | 0..1    | <a href="#">EnergyConnection</a>   | (NC) The energy connection that is connected to the installation. |
| 0..*      | EdgeSchedulingArea  | 0..1    | <a href="#">EdgeSchedulingArea</a> | (NC) The edge scheduling area for this installation.              |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>            | (NC) inherited from: <a href="#">Equipment</a>                    |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>          | (NC) inherited from: <a href="#">Equipment</a>                    |

### 3718 3719 **3.226 (NC) InsulatedGateBipolarTransistorValve**

3720 Inheritance path = [DCValve](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
3721 [IdentifiedObject](#)

3722 Insulated Gate Bipolar Transistor (IGBT) is a fully controlled valve. Unlike thyristors, an IGBT  
3723 valve can be turned on and off at any time by the gate signal. This allows for "Voltage Source  
3724 Converters" (VSC) that provide more precise control over the electrical grid.

3725 Table 341 shows all attributes of InsulatedGateBipolarTransistorValve.

3726 **Table 341 – Attributes of**  
3727 **EquipmentReliabilityProfile::InsulatedGateBipolarTransistorValve**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| valveU0            | 0..1 | <a href="#">Voltage</a>     | (NC) inherited from: <a href="#">DCValve</a>                           |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

3728  
3729 Table 342 shows all association ends of InsulatedGateBipolarTransistorValve with other  
3730 classes.

**Table 342 – Association ends of EquipmentReliabilityProfile::InsulatedGateBipolarTransistorValve with other classes**

| mult from | name                | mult to | type                        | description                                                        |
|-----------|---------------------|---------|-----------------------------|--------------------------------------------------------------------|
| 0..*      | VsConverter         | 0..1    | <a href="#">VsConverter</a> | (NC) The VsConverter that has InsulatedGateBipolarTransistorValve. |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>     | (NC) inherited from: <a href="#">Equipment</a>                     |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>   | (NC) inherited from: <a href="#">Equipment</a>                     |

### 3.227 (NC,new) Irradiation datatype

Energy carried by electromagnetic radiation incident on a surface per unit area over a time interval.

Note: Intended for accumulated solar energy such as annual global, direct or diffuse solar irradiation.

Table 343 shows all attributes of Irradiation.

**Table 343 – Attributes of EquipmentReliabilityProfile::Irradiation**

| name       | mult | type                           | description |
|------------|------|--------------------------------|-------------|
| multiplier | 0..1 | <a href="#">UnitMultiplier</a> |             |
| unit       | 0..1 | <a href="#">UnitSymbol</a>     |             |
| value      | 0..1 | <a href="#">Float</a>          |             |

### 3.228 (abstract,NC) LimitDependencyCurve

Inheritance path = [Curve](#) : [IdentifiedObject](#)

A curve or functional relationship between an independent variable (X-axis) and limiting dependent (Y-axis) variables.

Table 344 shows all attributes of LimitDependencyCurve.

**Table 344 – Attributes of EquipmentReliabilityProfile::LimitDependencyCurve**

| name               | mult | type                           | description                                                            |
|--------------------|------|--------------------------------|------------------------------------------------------------------------|
| curveStyle         | 1..1 | <a href="#">CurveStyle</a>     | inherited from: <a href="#">Curve</a>                                  |
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |

### 3.229 (Description) Line

Inheritance path = [EquipmentContainer](#) : [ConnectivityNodeContainer](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3752 Contains equipment beyond a substation belonging to a power transmission line.  
3753 Table 345 shows all attributes of Line.

3754 **Table 345 – Attributes of EquipmentReliabilityProfile::Line**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3755  
3756 Table 346 shows all association ends of Line with other classes.

3757 **Table 346 – Association ends of EquipmentReliabilityProfile::Line with other classes**

| mult from | name           | mult to | type                           | description                                  |
|-----------|----------------|---------|--------------------------------|----------------------------------------------|
| 0..*      | ACTieCorridor  | 0..1    | <a href="#">ACTieCorridor</a>  | (NC) ACTieCorridor that the line is part of. |
| 0..*      | SchedulingArea | 0..1    | <a href="#">SchedulingArea</a> | (NC) The scheduling area that has this line. |

3758  
3759 **3.230 (NC) LineCircuit**

3760 Inheritance path = [Circuit](#) : [PowerSystemResource](#) : [IdentifiedObject](#)  
3761 A line circuit is a circuit that has at least one ACLineSegment and may or may not include  
3762 related switching and/or auxiliary equipment.  
3763 Table 347 shows all attributes of LineCircuit.

3764 **Table 347 – Attributes of EquipmentReliabilityProfile::LineCircuit**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| positiveFlowIn     | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">Circuit</a>                           |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

3765  
3766 Table 348 shows all association ends of LineCircuit with other classes.

3767 **Table 348 – Association ends of EquipmentReliabilityProfile::LineCircuit with other classes**

| mult from | name                | mult to | type                     | description                                  |
|-----------|---------------------|---------|--------------------------|----------------------------------------------|
| 0..1      | IdentifyingTerminal | 0..1    | <a href="#">Terminal</a> | (NC) inherited from: <a href="#">Circuit</a> |

3769  
3770 **3.231 (NC) LoadFrequencyControlArea**

3771 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)  
3772 A part of a synchronous area or an entire synchronous area, physically demarcated by points  
3773 of measurement at interconnectors to other load frequency control (LFC) areas, operated by  
3774 one or more TSOs fulfilling the obligations of load-frequency control.  
3775 Table 349 shows all attributes of LoadFrequencyControlArea.

3776 **Table 349 – Attributes of EquipmentReliabilityProfile::LoadFrequencyControlArea**

| name                     | mult | type                                  | description                                                                                                                                                             |
|--------------------------|------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| deficientGenerationLimit | 0..1 | <a href="#">PerCent</a>               | (NC) Percentage of average dispatch target plus average regulation used to calculate Deficient Generation Limit. The value shall be a positive value between 0 and 100. |
| frequencyBiasFactor      | 0..1 | <a href="#">Float</a>                 | (NC) Frequency bias in MW/Hz.                                                                                                                                           |
| includeFrequencyBias     | 1..1 | <a href="#">Boolean</a>               | (NC) True means the frequency bias that is taken into consideration in the frequency bias computation.                                                                  |
| frrDelay                 | 0..1 | <a href="#">Seconds</a>               | (NC) FRR delay expressed in seconds. Must be a positive multiple of AGC's cycle duration.                                                                               |
| frrMaxRamp               | 0..1 | <a href="#">ActivePowerChangeRate</a> | (NC) Maximum authorized ramp for both FRR dispatching and ramp to zero.                                                                                                 |
| frrThreshold             | 0..1 | <a href="#">ActivePower</a>           | (NC) Authorized threshold for both FRR dispatching and ramp to zero.                                                                                                    |
| energyIdentCodeEic       | 0..1 | <a href="#">String</a>                | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                  |
| description              | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                        |
| mRID                     | 1..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                        |
| name                     | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                        |

3777 Table 350 shows all association ends of LoadFrequencyControlArea with other classes.

3778 **Table 350 – Association ends of**  
3779 **EquipmentReliabilityProfile::LoadFrequencyControlArea with other classes**  
3780

| mult from | name                      | mult to | type                                         | description                                                                      |
|-----------|---------------------------|---------|----------------------------------------------|----------------------------------------------------------------------------------|
| 0..*      | FrequencyControlOperator  | 0..1    | <a href="#">LoadFrequencyControlOperator</a> | (NC) The frequency control operator that operates this frequency control area.   |
| 0..*      | LoadFrequencyControlBlock | 0..1    | <a href="#">LoadFrequencyControlBlock</a>    | (NC) The load frequency control block that has this load frequency control area. |

### 3781 3.232 (NC) LoadFrequencyControlBlock

3782 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

3783 A part of a synchronous area or an entire synchronous area, physically demarcated by points  
3784 of measurement at interconnectors to other load frequency control (LFC) blocks, consisting of  
3785 one or more LFC areas, operated by one or more TSOs fulfilling the obligations of load-  
3786 frequency control.

3787 Table 351 shows all attributes of LoadFrequencyControlBlock.

3788 **Table 351 – Attributes of EquipmentReliabilityProfile::LoadFrequencyControlBlock**  
3789

| name         | mult | type                        | description                                                                                                                                                                                                    |
|--------------|------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fcrProvision | 0..1 | <a href="#">ActivePower</a> | (NC) The required active power capacity reserved for Frequency Containment Reserves (FCR) in accordance with dimensioning rules. Represents the LFC Block obligation, independent of contracting arrangements. |
| frrProvision | 0..1 | <a href="#">ActivePower</a> | (NC) The required active power capacity reserved for Frequency Restoration Reserves (FRR) as determined by dimensioning rules. Represents the obligation of an LFC Block to                                    |

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
|                    |      |                        | ensure sufficient FRR capacity for system frequency restoration.       |
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 352 shows all association ends of LoadFrequencyControlBlock with other classes.

**Table 352 – Association ends of  
EquipmentReliabilityProfile::LoadFrequencyControlBlock with other classes**

| mult from | name            | mult to | type                            | description                                                           |
|-----------|-----------------|---------|---------------------------------|-----------------------------------------------------------------------|
| 0..*      | SynchronousArea | 0..1    | <a href="#">SynchronousArea</a> | (NC) The synchronous area that has this load frequency control block. |

### 3.233 (NC) LoadFrequencyControlOperator

Inheritance path = [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

A post that is responsible for operational security by operating the load frequency control (LFC) mechanism.

Table 353 shows all attributes of LoadFrequencyControlOperator.

**Table 353 – Attributes of EquipmentReliabilityProfile::LoadFrequencyControlOperator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 354 shows all association ends of LoadFrequencyControlOperator with other classes.

**Table 354 – Association ends of  
EquipmentReliabilityProfile::LoadFrequencyControlOperator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

### 3.234 (NC) LossCurve

Inheritance path = [Curve](#) : [IdentifiedObject](#)

Represents the losses in the equipment due to operation position.

Table 355 shows all attributes of LossCurve.

**Table 355 – Attributes of EquipmentReliabilityProfile::LossCurve**

| name       | mult | type                       | description                           |
|------------|------|----------------------------|---------------------------------------|
| curveStyle | 1..1 | <a href="#">CurveStyle</a> | inherited from: <a href="#">Curve</a> |

| name               | mult | type                           | description                                                            |
|--------------------|------|--------------------------------|------------------------------------------------------------------------|
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 356 shows all association ends of LossCurve with other classes.

**Table 356 – Association ends of EquipmentReliabilityProfile::LossCurve with other classes**

| mult from | name           | mult to | type                           | description                                      |
|-----------|----------------|---------|--------------------------------|--------------------------------------------------|
| 0..*      | FACTSEquipment | 0..1    | <a href="#">FACTSEquipment</a> | (NC) The FACTS equipment which has a loss curve. |

### 3.235 (NC) MobileElectricalUnit

Inheritance path = [BatteryUnit](#) : [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A MobileElectricalUnit represents a persistent power system resource that can act as a source or sink of electrical energy within the grid. It is designed to interface with the grid through defined connection points for charging or discharging, while the physical energy storage asset associated with it (e.g., an electric vehicle or battery trailer) may be mobile.

The MobileElectricalUnit abstracts the system-side functionality of mobile energy storage, independent of specific assets or charging events. It typically stores electrical energy in batteries or equivalent storage media and supports flexible, temporary, or location-variable integration into the power system.

Examples include, but are not limited to:

- Electric vehicles (EVs)
- Electrically powered ferries
- Trailer-based battery storage units
- Mobile battery systems for backup or temporary grid support
- This concept supports consistent modeling of mobile energy systems in grid studies by treating the grid-facing connection as a stable power system element, while the associated physical unit is managed as an asset.

Table 357 shows all attributes of MobileElectricalUnit.

**Table 357 – Attributes of EquipmentReliabilityProfile::MobileElectricalUnit**

| name                      | mult | type                        | description                                               |
|---------------------------|------|-----------------------------|-----------------------------------------------------------|
| ratedE                    | 1..1 | <a href="#">RealEnergy</a>  | inherited from: <a href="#">BatteryUnit</a>               |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>       | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 358 shows all association ends of MobileElectricalUnit with other classes.

**Table 358 – Association ends of EquipmentReliabilityProfile::MobileElectricalUnit with other classes**

| mult from | name                           | mult to | type                                           | description                                                 |
|-----------|--------------------------------|---------|------------------------------------------------|-------------------------------------------------------------|
| 0..*      | ElectricalChargingUnit         | 0..1    | <a href="#">ElectricalChargingUnit</a>         | Electrical charging unit that has a mobile electrical unit. |
| 0..*      | ScheduleResource               | 0..1    | <a href="#">ScheduleResource</a>               | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>   |
| 0..*      | PowerElectronicsUnitController | 0..1    | <a href="#">PowerElectronicsUnitController</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>   |
| 0..*      | Circuit                        | 0..1    | <a href="#">Circuit</a>                        | (NC) inherited from: <a href="#">Equipment</a>              |
| 0..*      | AggregatedEquipment            | 0..1    | <a href="#">Equipment</a>                      | (NC) inherited from: <a href="#">Equipment</a>              |

### 3.236 (NC) ModularMultilevelConverter

Inheritance path = [VsConverter](#) : [ACDCCConverter](#) : [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Specialized voltage source converter based on modular multilevel converter (MMC) topology using cascaded converter submodules for voltage synthesis and power conversion.

Table 359 shows all attributes of ModularMultilevelConverter.

**Table 359 – Attributes of EquipmentReliabilityProfile::ModularMultilevelConverter**

| name               | mult | type                          | description                                                            |
|--------------------|------|-------------------------------|------------------------------------------------------------------------|
| maxModulationIndex | 0..1 | <a href="#">Float</a>         | inherited from: <a href="#">VsConverter</a>                            |
| qShare             | 0..1 | <a href="#">PerCent</a>       | inherited from: <a href="#">VsConverter</a>                            |
| baseS              | 0..1 | <a href="#">ApparentPower</a> | inherited from: <a href="#">ACDCCConverter</a>                         |
| maxUdc             | 0..1 | <a href="#">Voltage</a>       | inherited from: <a href="#">ACDCCConverter</a>                         |
| minUdc             | 0..1 | <a href="#">Voltage</a>       | inherited from: <a href="#">ACDCCConverter</a>                         |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>       | inherited from: <a href="#">ACDCCConverter</a>                         |
| maxP               | 0..1 | <a href="#">ActivePower</a>   | inherited from: <a href="#">ACDCCConverter</a>                         |
| minP               | 0..1 | <a href="#">ActivePower</a>   | inherited from: <a href="#">ACDCCConverter</a>                         |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>        | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>        | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>        | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>        | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 360 shows all association ends of ModularMultilevelConverter with other classes.

**Table 360 – Association ends of  
EquipmentReliabilityProfile::ModularMultilevelConverter with other classes**

| mult from | name                | mult to | type                      | description                                    |
|-----------|---------------------|---------|---------------------------|------------------------------------------------|
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>   | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a> | (NC) inherited from: <a href="#">Equipment</a> |

### 3.237 (NC) ModularMultilevelConverterValve

Inheritance path = [InsulatedGateBipolarTransistorValve](#) : [DCValve](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Represents a specialized DC valve used in a Modular Multilevel Converter (MMC) topology in DC systems. Unlike a conventional DCValve, which only identifies the semiconductor technology (thyristor, IGBT, etc.), DCValveMMC models the MMC submodule valve configuration used inside a Voltage Source Converter (VSC). An MMC valve is composed of many cascaded submodules arranged in converter arms. The valve configuration determines: switching topology, fault blocking capability, losses, control behavior, and voltage generation capability.

Table 361 shows all attributes of ModularMultilevelConverterValve.

**Table 361 – Attributes of EquipmentReliabilityProfile::ModularMultilevelConverterValve**

| name               | mult | type                                                | description                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| configurationKind  | 0..1 | <a href="#">ModularMultilevelConverterValveKind</a> | (NC) Defines the MMC submodule valve topology/configuration used by the valve. It identifies how the semiconductor switches are arranged within the MMC submodule.                                                                                                                                                                                   |
| numberOfSubmodules | 0..1 | <a href="#">Integer</a>                             | (NC) Defines the total number of modular submodule cells connected in series within the MMC valve or converter arm. The number of submodules determines: achievable valve voltage, waveform resolution, converter voltage levels, and energy storage distribution. Typical MMC implementations contain tens to hundreds of submodules per valve arm. |
| armInductance      | 0..1 | <a href="#">Inductance</a>                          | (NC) Represents the inductive component connected in series with the MMC valve arm, typically used to: limit circulating currents, reduce fault currents, smooth arm current transitions, support converter stability. Often physically implemented as an arm reactor.                                                                               |
| armResistance      | 0..1 | <a href="#">Resistance</a>                          | (NC) Represents the effective series resistance of the MMC valve arm, including contributions from: arm reactor winding resistance, conductor resistance, semiconductor conduction losses, internal connection losses. The resistance affects: converter losses, damping characteristics, circulating current behavior, transient performance.       |
| valveU0            | 0..1 | <a href="#">Voltage</a>                             | (NC) inherited from: <a href="#">DCValve</a>                                                                                                                                                                                                                                                                                                         |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a>                         | (NC) inherited from: <a href="#">DCConductingEquipment</a>                                                                                                                                                                                                                                                                                           |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>                             | inherited from: <a href="#">DCConductingEquipment</a>                                                                                                                                                                                                                                                                                                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                              | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                               |
| description        | 0..1 | <a href="#">String</a>                              | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                     |
| mRID               | 1..1 | <a href="#">String</a>                              | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                     |
| name               | 0..1 | <a href="#">String</a>                              | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                     |

Table 362 shows all association ends of ModularMultilevelConverterValve with other classes.

**Table 362 – Association ends of  
EquipmentReliabilityProfile::ModularMultilevelConverterValve with other classes**

| mult from | name                       | mult to | type                                       | description                                                                  |
|-----------|----------------------------|---------|--------------------------------------------|------------------------------------------------------------------------------|
| 1..*      | ModularMultilevelConverter | 1..1    | <a href="#">ModularMultilevelConverter</a> | (NC) The ModularMultilevelConverter the has ModularMultilevelConverterValve. |
| 0..*      | VsConverter                | 0..1    | <a href="#">VsConverter</a>                | (NC) inherited from: <a href="#">InsulatedGateBipolarTransistorValve</a>     |
| 0..*      | Circuit                    | 0..1    | <a href="#">Circuit</a>                    | (NC) inherited from: <a href="#">Equipment</a>                               |
| 0..*      | AggregatedEquipment        | 0..1    | <a href="#">Equipment</a>                  | (NC) inherited from: <a href="#">Equipment</a>                               |

### 3.238 (NC) ModularStaticSynchronousSeriesCompensator

Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) : [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Modular static synchronous series compensator (MSSSC) is a type of flexible AC transmission system regulating equipment which consists of solid-state voltage source inverter connected in series with a transmission line. This is similar to static synchronous series compensator (SSSC), but without injection transformer. This enables the MSSSC to be truly modular with the ability to simply install a number of equipment in series to provide a desired maximum level of impedance. MSSSC can be dispersed into multiple location in a circuit working collectively under the same controller scheme.

Table 363 shows all attributes of ModularStaticSynchronousSeriesCompensator.

**Table 363 – Attributes of  
EquipmentReliabilityProfile::ModularStaticSynchronousSeriesCompensator**

| name               | mult | type                                    | description                                                             |
|--------------------|------|-----------------------------------------|-------------------------------------------------------------------------|
| slope              | 1..1 | <a href="#">VoltagePerReactivePower</a> | (NC) inherited from: <a href="#">FACTSEquipment</a>                     |
| ratedI             | 0..1 | <a href="#">CurrentFlow</a>             | (NC) inherited from: <a href="#">FACTSEquipment</a>                     |
| ratedU             | 0..1 | <a href="#">Voltage</a>                 | (NC) inherited from: <a href="#">FACTSEquipment</a>                     |
| ratedC             | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                     |
| ratedL             | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                     |
| minC               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                     |
| maxC               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                     |
| minL               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                     |
| maxL               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                     |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                  | (deprecated, European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                        |
| mRID               | 1..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                        |
| name               | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                        |

Table 364 shows all association ends of ModularStaticSynchronousSeriesCompensator with other classes.

**Table 364 – Association ends of EquipmentReliabilityProfile::ModularStaticSynchronousSeriesCompensator with other classes**

| mult from | name                | mult to | type                                | description                                           |
|-----------|---------------------|---------|-------------------------------------|-------------------------------------------------------|
| 0..*      | EquipmentController | 0..1    | <a href="#">EquipmentController</a> | (NC) inherited from: <a href="#">RegulatingCondEq</a> |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>             | (NC) inherited from: <a href="#">Equipment</a>        |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>           | (NC) inherited from: <a href="#">Equipment</a>        |

### 3.239 (abstract,NC) MonitoringArea

Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

A coherent part of the interconnected electrical power system, that includes the system operators' responsibility area and the surrounding parts of other system operators' responsibility area, that need to be monitored for security assessment.

Table 365 shows all attributes of MonitoringArea.

**Table 365 – Attributes of EquipmentReliabilityProfile::MonitoringArea**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

### 3.240 (NC) MonopolarDCSystem

Inheritance path = [DCSystem](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Monopolar DC system (IEC 60633) is a DC system with only one pole.

Table 366 shows all attributes of MonopolarDCSystem.

**Table 366 – Attributes of EquipmentReliabilityProfile::MonopolarDCSystem**

| name               | mult | type                                     | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| isSymmetrical      | 1..1 | <a href="#">Boolean</a>                  | (NC) if true, the monopolar DC system is symmetrical monopolar DC system (IEC 60633). It is a DC system with only one symmetrical monopole. A symmetrical monopole is part of an DC system consisting of all the equipment in the DC substations and the interconnecting transmission lines, if any, which during normal operation exhibits equal and opposite direct voltage polarities with respect to earth but without series connection of converters in each converter station. The term "symmetrical monopole" is used even though there are two polarities with DC voltages, because with only one converter it is not possible to provide the redundancy which is normally associated with the term "bipole". |
| directionKind      | 0..1 | <a href="#">DCSystemDirectionKind</a>    | (NC) inherited from: <a href="#">DCSystem</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| transmissionKind   | 0..1 | <a href="#">DCSystemTransmissionKind</a> | (NC) inherited from: <a href="#">DCSystem</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                   | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| name        | mult | type                   | description                                      |
|-------------|------|------------------------|--------------------------------------------------|
| description | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| mRID        | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| name        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

3904

3905 **3.241 (Description) NuclearGeneratingUnit**3906 Inheritance path = [GeneratingUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3907 A nuclear generating unit.

3908 Table 367 shows all attributes of NuclearGeneratingUnit.

3909 **Table 367 – Attributes of EquipmentReliabilityProfile::NuclearGeneratingUnit**

| name                      | mult | type                                  | description                                                            |
|---------------------------|------|---------------------------------------|------------------------------------------------------------------------|
| reactorKind               | 1..1 | <a href="#">NuclearReactorKind</a>    | (NC) Kind of nuclear reactor.                                          |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| maxStartupLoad            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a>           | inherited from: <a href="#">GeneratingUnit</a>                         |
| shutdownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| lowerRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| raiseRampRate             | 0..1 | <a href="#">ActivePowerChangeRate</a> | inherited from: <a href="#">GeneratingUnit</a>                         |
| minimumOffTime            | 0..1 | <a href="#">Seconds</a>               | inherited from: <a href="#">GeneratingUnit</a>                         |
| warmStartupTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| coolDownTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| startupRampRate           | 0..1 | <a href="#">ActivePowerChangeRate</a> | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunP            | 0..1 | <a href="#">ActivePower</a>           | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| runningLeadTime           | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| minimumUpTime             | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalStartupCost         | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalWarmStartupCost     | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalMustRunQ            | 0..1 | <a href="#">ReactivePower</a>         | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| maxRampDownCountPerDay    | 0..1 | <a href="#">Integer</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| rampLockTime              | 0..1 | <a href="#">Duration</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| costCurrency              | 0..1 | <a href="#">Currency</a>              | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalShutdownCost        | 0..1 | <a href="#">Decimal</a>               | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>                 | (NC) inherited from: <a href="#">GeneratingUnit</a>                    |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>                | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                      | 1..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                      | 0..1 | <a href="#">String</a>                | inherited from: <a href="#">IdentifiedObject</a>                       |

3910

3911 Table 368 shows all association ends of NuclearGeneratingUnit with other classes.

**Table 368 – Association ends of EquipmentReliabilityProfile::NuclearGeneratingUnit with other classes**

| mult from | name                | mult to | type                             | description                                         |
|-----------|---------------------|---------|----------------------------------|-----------------------------------------------------|
| 0..*      | ScheduleResource    | 0..1    | <a href="#">ScheduleResource</a> | (NC) inherited from: <a href="#">GeneratingUnit</a> |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>          | (NC) inherited from: <a href="#">Equipment</a>      |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>        | (NC) inherited from: <a href="#">Equipment</a>      |

**3.242 (Description) OperationalLimitSet**

Inheritance path = [IdentifiedObject](#)

A set of limits associated with equipment. Sets of limits might apply to a specific temperature, or season for example. A set of limits may contain different severities of limit levels that would apply to the same equipment. The set may contain limits of different types such as apparent power and current limits or high and low voltage limits that are logically applied together as a set.

Table 369 shows all attributes of OperationalLimitSet.

**Table 369 – Attributes of EquipmentReliabilityProfile::OperationalLimitSet**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 370 shows all association ends of OperationalLimitSet with other classes.

**Table 370 – Association ends of EquipmentReliabilityProfile::OperationalLimitSet with other classes**

| mult from | name                  | mult to | type                                  | description                                                           |
|-----------|-----------------------|---------|---------------------------------------|-----------------------------------------------------------------------|
| 0..*      | Terminal              | 1..1    | <a href="#">ACDCTerminal</a>          | The terminal where the operational limit set apply.                   |
| 0..*      | PowerTransferCorridor | 0..1    | <a href="#">PowerTransferCorridor</a> | (NC) The power transfer corridor that has this operational limit set. |

**3.243 (NC) OrdinaryPowerTransferCorridor**

Inheritance path = [PowerTransferCorridor](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Power transfer corridor defined for normal operating network.

Table 371 shows all attributes of OrdinaryPowerTransferCorridor.

**Table 371 – Attributes of EquipmentReliabilityProfile::OrdinaryPowerTransferCorridor**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">PowerTransferCorridor</a>             |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

3934

3935 **3.244 (NC) OutageCoordinationRegion**3936 Inheritance path = [Region](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3937 A region that has a common organisation or service responsible for outage planning and coordination and its impact on grid operation.

3938 Table 372 shows all attributes of OutageCoordinationRegion.

3939 **Table 372 – Attributes of EquipmentReliabilityProfile::OutageCoordinationRegion**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3941

3942 Table 373 shows all association ends of OutageCoordinationRegion with other classes.

3943 **Table 373 – Association ends of**  
3944 **EquipmentReliabilityProfile::OutageCoordinationRegion with other classes**

| mult from | name                | mult to | type                                | description                                                                            |
|-----------|---------------------|---------|-------------------------------------|----------------------------------------------------------------------------------------|
| 0..*      | OutageCoordinator   | 0..1    | <a href="#">OutageCoordinator</a>   | (NC) The outage coordinator responsible for this outage coordination region.           |
| 0..*      | SecurityCoordinator | 0..1    | <a href="#">SecurityCoordinator</a> | (NC) The security coordinator that is responsible for this outage coordination region. |
| 0..*      | OverlappingZone     | 0..1    | <a href="#">OverlappingZone</a>     | (NC) inherited from: <a href="#">Region</a>                                            |

3945

3946 **3.245 (NC) OutageCoordinator**3947 Inheritance path = [SystemOperationCoordinator](#) : [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

3948 A post that coordinates the planned availability status of relevant power system equipment to meet the need by the asset owner or operator and the security of the power system.

3949 Table 374 shows all attributes of OutageCoordinator.

3950 **Table 374 – Attributes of EquipmentReliabilityProfile::OutageCoordinator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3953

3954 Table 375 shows all association ends of OutageCoordinator with other classes.

**Table 375 – Association ends of EquipmentReliabilityProfile::OutageCoordinator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

**3.246 (NC) OutagePlanningAgent**

Inheritance path = [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

An entity with the task of planning the availability status of a relevant power generating module, a relevant demand facility or a relevant grid element.

Table 376 shows all attributes of OutagePlanningAgent.

**Table 376 – Attributes of EquipmentReliabilityProfile::OutagePlanningAgent**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 377 shows all association ends of OutagePlanningAgent with other classes.

**Table 377 – Association ends of EquipmentReliabilityProfile::OutagePlanningAgent with other classes**

| mult from | name                     | mult to | type                                     | description                                                                      |
|-----------|--------------------------|---------|------------------------------------------|----------------------------------------------------------------------------------|
| 0..*      | OutageCoordinationRegion | 1..1    | <a href="#">OutageCoordinationRegion</a> | (NC) Outage coordination region that this agent has outage planning responsible. |
| 0..*      | Organisation             | 0..1    | <a href="#">Organisation</a>             | inherited from: <a href="#">OrganisationRole</a>                                 |

**3.247 (NC) OverlappingZone**

Inheritance path = [IdentifiedObject](#)

A collection of all the overlapping cross border assessed elements which have the same sets of impacted and impacting regions.

Table 378 shows all attributes of OverlappingZone.

**Table 378 – Attributes of EquipmentReliabilityProfile::OverlappingZone**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

3976 **3.248 (abstract,NC) PeerTemporalDependency root class**

3977 An abstract directed dependency between two peer instances of the same domain class that  
 3978 defines temporal and operational constraints governing their relative execution or operation.

3979 Note: Temporal lag constraints relate the next applicable transition of the dependent to the  
 3980 latest applicable transition of the dependee. A dependee transition remains applicable while the  
 3981 dependee remains in the state resulting from that transition. If the dependee subsequently  
 3982 changes state before the corresponding transition of the dependent occurs, the previous  
 3983 transition is superseded and the constraint is evaluated from the next applicable transition.  
 3984 Once the corresponding transition of the dependent has occurred, the lag constraint is satisfied  
 3985 for that operating cycle.

3986 Each lag is qualified by its corresponding ReferenceValueKind, which specifies whether the lag  
 3987 represents an exact, minimum, or maximum temporal constraint.

3988 Table 379 shows all attributes of PeerTemporalDependency.

3989 **Table 379 – Attributes of EquipmentReliabilityProfile::PeerTemporalDependency**

| name                  | mult | type                                     | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------|------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| constraintKind        | 1..1 | <a href="#">DependencyConstraintKind</a> | (NC) The kind of temporal or operational constraint defined between the dependee and the dependent.<br><br>Note: Certain dependency constraint kinds may require or prohibit the use of temporal constraint attributes, depending on the semantics of the specialization.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| finishToFinishLag     | 0..1 | <a href="#">Duration</a>                 | (NC) The duration constraining the next finish or deactivation of the dependent relative to the latest applicable finish or deactivation of the dependee.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| finishToFinishLagKind | 0..1 | <a href="#">ReferenceValueKind</a>       | (NC) Specifies whether finishToFinishLag is an exact, minimum, or maximum temporal constraint.<br><br>Note: This attribute shall be specified when finishToFinishLag is provided.<br><br>Example: finishToFinishLag = 2D1H30M is interpreted together with finishToFinishLagKind:<br>- exact: the dependent finishes exactly 2 days, 1 hour and 30 minutes after the latest applicable finish of the dependee.<br>- minimum: the dependent may finish no earlier than 2 days, 1 hour and 30 minutes after the latest applicable finish of the dependee.<br>- maximum: the dependent shall finish no later than 2 days, 1 hour and 30 minutes after the latest applicable finish of the dependee.<br><br>In all cases, the dependee finish remains applicable only while the dependee remains in the state resulting from that finish. If the dependee subsequently changes state before the dependent finishes, the applicability of the previous finish is re-evaluated. |
| finishToStartLag      | 0..1 | <a href="#">Duration</a>                 | (NC) The duration constraining the next start or activation of the dependent relative to the latest applicable finish or deactivation of the dependee.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| finishToStartLagKind  | 0..1 | <a href="#">ReferenceValueKind</a>       | (NC) Specifies whether finishToStartLag is an exact, minimum, or maximum temporal constraint.<br><br>Note: This attribute shall be specified when finishToStartLag is provided.<br><br>Example: finishToStartLag = 20M is interpreted together with finishToStartLagKind:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| name                | mult | type                               | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |      |                                    | <p>- exact: the dependent starts exactly 20 minutes after the latest applicable finish of the dependee.</p> <p>- minimum: the dependent may start no earlier than 20 minutes after the latest applicable finish of the dependee.</p> <p>- maximum: the dependent shall start no later than 20 minutes after the latest applicable finish of the dependee.</p> <p>In all cases, the dependee finish remains applicable only while the dependee remains in the state resulting from that finish. If the dependee subsequently changes state before the dependent starts, the constraint is evaluated from the next applicable finish of the dependee.</p>                                                                                                                                                                                                                 |
| mRID                | 1..1 | <a href="#">String</a>             | <p>(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.</p> <p>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| overlap             | 0..1 | <a href="#">Duration</a>           | <p>(NC) The duration constraining the period for which the dependee and dependent are simultaneously active or effective.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| overlapKind         | 0..1 | <a href="#">ReferenceValueKind</a> | <p>(NC) Specifies whether overlap is an exact, minimum, or maximum duration of simultaneous activity or effectiveness.</p> <p>Note: This attribute shall be specified when overlap is provided.</p> <p>Example: overlap = 1H28M45S is interpreted together with overlapKind:</p> <p>- exact: the dependee and dependent are simultaneously active or effective for exactly 1 hour, 28 minutes, and 45 seconds.</p> <p>- minimum: the dependee and dependent shall be simultaneously active or effective for at least 1 hour, 28 minutes, and 45 seconds.</p> <p>- maximum: the dependee and dependent shall be simultaneously active or effective for no more than 1 hour, 28 minutes, and 45 seconds.</p> <p>Unlike the lag attributes, overlap constrains the duration of a simultaneous state rather than the temporal separation between two state transitions.</p> |
| startToStartLag     | 0..1 | <a href="#">Duration</a>           | <p>(NC) The duration constraining the next start or activation of the dependent relative to the latest applicable start or activation of the dependee.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| startToStartLagKind | 0..1 | <a href="#">ReferenceValueKind</a> | <p>(NC) Specifies whether startToStartLag is an exact, minimum, or maximum temporal constraint.</p> <p>Note: This attribute shall be specified when startToStartLag is provided.</p> <p>Example: startToStartLag = 2H is interpreted together with startToStartLagKind:</p> <p>- exact: the dependent starts exactly 2 hours after the latest applicable start of the dependee.</p> <p>- minimum: the dependent may start no earlier than 2 hours after the latest applicable start of the dependee.</p>                                                                                                                                                                                                                                                                                                                                                                |

| name | mult | type | description                                                                                                                                                                                                                                                                                                                                                                                                 |
|------|------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |      |      | <p>- maximum: the dependent shall start no later than 2 hours after the latest applicable start of the dependee.</p> <p>In all cases, the dependee start remains applicable only while the dependee remains in the state resulting from that start. If the dependee subsequently changes state before the dependent starts, the constraint is evaluated from the next applicable start of the dependee.</p> |

3990

3991 **3.249 (NC) PhaseControlFunction**3992 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

3993 Phase control function is a function block that calculate the operating point of the controlled equipment to achieve the target voltage.

3995 Table 380 shows all attributes of PhaseControlFunction.

3996 **Table 380 – Attributes of EquipmentReliabilityProfile::PhaseControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

3997

3998 Table 381 shows all association ends of PhaseControlFunction with other classes.

3999 **Table 381 – Association ends of EquipmentReliabilityProfile::PhaseControlFunction**  
4000 **with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

4001

4002 **3.250 (NC) PinDCTerminal**4003 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : [IdentifiedObject](#)

4004 Input pin associated with a DCTerminal. It is used for comparison.

4005 Table 382 shows all attributes of PinDCTerminal.

4006 **Table 382 – Attributes of EquipmentReliabilityProfile::PinDCTerminal**

| name          | mult | type                              | description                                                |
|---------------|------|-----------------------------------|------------------------------------------------------------|
| kind          | 1..1 | <a href="#">PinDCTerminalKind</a> | (NC) The kind of quantity which is used as an input value. |
| absoluteValue | 0..1 | <a href="#">Boolean</a>           | (NC) inherited from: <a href="#">GateInputPin</a>          |
| duration      | 0..1 | <a href="#">Duration</a>          | (NC) inherited from: <a href="#">GateInputPin</a>          |

| name                | mult | type                                 | description                                                            |
|---------------------|------|--------------------------------------|------------------------------------------------------------------------|
| logicKind           | 0..1 | <a href="#">LogicalOperatorsKind</a> | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| negate              | 0..1 | <a href="#">Boolean</a>              | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| thresholdPercentage | 0..1 | <a href="#">PerCent</a>              | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| thresholdValue      | 0..1 | <a href="#">Float</a>                | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| normalEnabled       | 0..1 | <a href="#">Boolean</a>              | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| energyIdentCodeEic  | 0..1 | <a href="#">String</a>               | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description         | 0..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                | 1..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                | 0..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 383 shows all association ends of PinDCTerminal with other classes.

**Table 383 – Association ends of EquipmentReliabilityProfile::PinDCTerminal with other classes**

| mult from | name       | mult to | type                          | description                                                |
|-----------|------------|---------|-------------------------------|------------------------------------------------------------|
| 0..*      | DCTerminal | 1..1    | <a href="#">DCTerminal</a>    | (NC) The DC terminal that has this pin DC terminal.        |
| 1..*      | Function   | 0..1    | <a href="#">FunctionBlock</a> | (NC) inherited from: <a href="#">FunctionInputVariable</a> |

### 3.251 (NC) PinTerminal

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : [IdentifiedObject](#)

Input pin associated with a Terminal. It is used for comparison.

Table 384 shows all attributes of PinTerminal.

**Table 384 – Attributes of EquipmentReliabilityProfile::PinTerminal**

| name                | mult | type                                 | description                                                            |
|---------------------|------|--------------------------------------|------------------------------------------------------------------------|
| kind                | 1..1 | <a href="#">PinTerminalKind</a>      | (NC) The kind of quantity which is used as an input value.             |
| absoluteValue       | 0..1 | <a href="#">Boolean</a>              | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| duration            | 0..1 | <a href="#">Duration</a>             | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| logicKind           | 0..1 | <a href="#">LogicalOperatorsKind</a> | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| negate              | 0..1 | <a href="#">Boolean</a>              | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| thresholdPercentage | 0..1 | <a href="#">PerCent</a>              | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| thresholdValue      | 0..1 | <a href="#">Float</a>                | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| normalEnabled       | 0..1 | <a href="#">Boolean</a>              | (NC) inherited from: <a href="#">GateInputPin</a>                      |
| energyIdentCodeEic  | 0..1 | <a href="#">String</a>               | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description         | 0..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                | 1..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                | 0..1 | <a href="#">String</a>               | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 385 shows all association ends of PinTerminal with other classes.

**Table 385 – Association ends of EquipmentReliabilityProfile::PinTerminal with other classes**

| mult from | name     | mult to | type                          | description                                                |
|-----------|----------|---------|-------------------------------|------------------------------------------------------------|
| 0..*      | Terminal | 1..1    | <a href="#">Terminal</a>      | (NC) The Terminal that is used in the input pin.           |
| 1..*      | Function | 0..1    | <a href="#">FunctionBlock</a> | (NC) inherited from: <a href="#">FunctionInputVariable</a> |

**3.252 (NC) PointOfCommonCoupling**

Inheritance path = [CommonResponsibilityPoint](#) : [IdentifiedObject](#)

A PointOfCommonCoupling (PCC) is a CommonResponsibilityPoint that identifies the electrical location in a power system where voltage and current are considered common for the purpose of analysing, controlling, and coordinating the interaction between connected parts of the system.

The PCC serves as the reference location at which electrical characteristics and operational conditions—such as voltage quality, harmonic distortion, fault levels, power flow behaviour, and grid-code compliance—are defined, evaluated, or enforced.

Note: Operational requirements associated with the PCC are typically achieved through coordinated control of equipment located on both sides of the point. These controls operate with a common reference objective for the electrical conditions at the PCC.

A PCC may simultaneously serve multiple governance roles. In the CIM model, the same physical location in the network may therefore be represented by multiple specialised CommonResponsibilityPoint instances, such as:

- GridConnectionPoint
- EnergyExchangePoint
- BoundaryPoint

Each of these represents a different responsibility or agreement applied to the same electrical reference location.

Table 386 shows all attributes of PointOfCommonCoupling.

**Table 386 – Attributes of EquipmentReliabilityProfile::PointOfCommonCoupling**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| isDirectCurrent    | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a>         |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 387 shows all association ends of PointOfCommonCoupling with other classes.

**Table 387 – Association ends of EquipmentReliabilityProfile::PointOfCommonCoupling with other classes**

| mult from | name             | mult to | type                             | description                                                    |
|-----------|------------------|---------|----------------------------------|----------------------------------------------------------------|
| 0..*      | ConnectivityNode | 0..1    | <a href="#">ConnectivityNode</a> | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a> |
| 0..*      | DCNode           | 0..1    | <a href="#">DCNode</a>           | (NC) inherited from: <a href="#">CommonResponsibilityPoint</a> |

4049 **3.253 (NC) PowerElectricalChemicalUnit**4050 Inheritance path = [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) :  
4051 [IdentifiedObject](#)4052 A unit capable of either generating electrical energy from chemical reactions or using electrical  
4053 energy to cause chemical reactions.

4054 Table 388 shows all attributes of PowerElectricalChemicalUnit.

4055 **Table 388 – Attributes of EquipmentReliabilityProfile::PowerElectricalChemicalUnit**

| name                      | mult | type                                            | description                                                            |
|---------------------------|------|-------------------------------------------------|------------------------------------------------------------------------|
| kind                      | 1..1 | <a href="#">PowerElectricalChemicalUnitKind</a> | (NC) Kind of power electrical chemical unit.                           |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>                           | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>              |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a>                     | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>              |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a>                     | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>              |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>                          | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>                          | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                      | 1..1 | <a href="#">String</a>                          | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                      | 0..1 | <a href="#">String</a>                          | inherited from: <a href="#">IdentifiedObject</a>                       |

4056  
4057 Table 389 shows all association ends of PowerElectricalChemicalUnit with other classes.4058 **Table 389 – Association ends of**  
4059 **EquipmentReliabilityProfile::PowerElectricalChemicalUnit with other classes**

| mult from | name                           | mult to | type                                           | description                                               |
|-----------|--------------------------------|---------|------------------------------------------------|-----------------------------------------------------------|
| 0..*      | ScheduleResource               | 0..1    | <a href="#">ScheduleResource</a>               | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | PowerElectronicsUnitController | 0..1    | <a href="#">PowerElectronicsUnitController</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | Circuit                        | 0..1    | <a href="#">Circuit</a>                        | (NC) inherited from: <a href="#">Equipment</a>            |
| 0..*      | AggregatedEquipment            | 0..1    | <a href="#">Equipment</a>                      | (NC) inherited from: <a href="#">Equipment</a>            |

4060  
4061 **3.254 (NC) PowerElectronicsConnectionController**4062 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
4063 [IdentifiedObject](#)4064 Power electronics connection controller is controlling the equipment to optimize the power  
4065 electronics connection.

4066 Table 390 shows all attributes of PowerElectronicsConnectionController.

4067 **Table 390 – Attributes of**  
4068 **EquipmentReliabilityProfile::PowerElectronicsConnectionController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 391 shows all association ends of PowerElectronicsConnectionController with other classes.

**Table 391 – Association ends of EquipmentReliabilityProfile::PowerElectronicsConnectionController with other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

### 3.255 (NC) PowerElectronicsMarineUnit

Inheritance path = [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A unit that capture energy from marine sources, e.g. waves, for generating electrical power.

Table 392 shows all attributes of PowerElectronicsMarineUnit.

**Table 392 – Attributes of EquipmentReliabilityProfile::PowerElectronicsMarineUnit**

| name                      | mult | type                           | description                                                             |
|---------------------------|------|--------------------------------|-------------------------------------------------------------------------|
| kind                      | 1..1 | <a href="#">MarineUnitKind</a> | (NC) Kind of marine unit.                                               |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>          | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>               |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a>    | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>               |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a>    | (NC) inherited from: <a href="#">PowerElectronicsUnit</a>               |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>         | (deprecated, European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                        |
| mRID                      | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                        |
| name                      | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                        |

Table 393 shows all association ends of PowerElectronicsMarineUnit with other classes.

**Table 393 – Association ends of EquipmentReliabilityProfile::PowerElectronicsMarineUnit with other classes**

| mult from | name                           | mult to | type                                           | description                                               |
|-----------|--------------------------------|---------|------------------------------------------------|-----------------------------------------------------------|
| 0..*      | ScheduleResource               | 0..1    | <a href="#">ScheduleResource</a>               | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | PowerElectronicsUnitController | 0..1    | <a href="#">PowerElectronicsUnitController</a> | (NC) inherited from: <a href="#">PowerElectronicsUnit</a> |
| 0..*      | Circuit                        | 0..1    | <a href="#">Circuit</a>                        | (NC) inherited from: <a href="#">Equipment</a>            |
| 0..*      | AggregatedEquipment            | 0..1    | <a href="#">Equipment</a>                      | (NC) inherited from: <a href="#">Equipment</a>            |

### 3.256 (Description) PowerElectronicsUnit

Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A generating unit or battery or aggregation that connects to the AC network using power electronics rather than rotating machines.

4090 Table 394 shows all attributes of PowerElectronicsUnit.

4091 **Table 394 – Attributes of EquipmentReliabilityProfile::PowerElectronicsUnit**

| name                      | mult | type                        | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------|------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a>       | (NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.<br><br>In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$ .<br><br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| maxEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| minEconomicP              | 0..1 | <a href="#">ActivePower</a> | (NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| description               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| mRID                      | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| name                      | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

4092  
4093 Table 395 shows all association ends of PowerElectronicsUnit with other classes.

4094 **Table 395 – Association ends of EquipmentReliabilityProfile::PowerElectronicsUnit with**  
4095 **other classes**

| mult from | name                           | mult to | type                                           | description                                                             |
|-----------|--------------------------------|---------|------------------------------------------------|-------------------------------------------------------------------------|
| 0..*      | ScheduleResource               | 0..1    | <a href="#">ScheduleResource</a>               | (NC) The schedule resource that has this power electronics unit.        |
| 0..*      | PowerElectronicsUnitController | 0..1    | <a href="#">PowerElectronicsUnitController</a> | (NC) Power electronics unit controller for this power electronics unit. |
| 0..*      | Circuit                        | 0..1    | <a href="#">Circuit</a>                        | (NC) inherited from: <a href="#">Equipment</a>                          |
| 0..*      | AggregatedEquipment            | 0..1    | <a href="#">Equipment</a>                      | (NC) inherited from: <a href="#">Equipment</a>                          |

4096  
4097 **3.257 (NC) PowerElectronicsUnitController**

4098 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
4099 [IdentifiedObject](#)

4100 Power electronics unit controller is controlling the equipment to optimize the power electronics  
4101 unit.

4102 Table 396 shows all attributes of PowerElectronicsUnitController.

4103 **Table 396 – Attributes of EquipmentReliabilityProfile::PowerElectronicsUnitController**

| name          | mult | type                    | description                                             |
|---------------|------|-------------------------|---------------------------------------------------------|
| type          | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a> |
| normalEnabled | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 397 shows all association ends of PowerElectronicsUnitController with other classes.

**Table 397 – Association ends of  
EquipmentReliabilityProfile::PowerElectronicsUnitController with other classes**

| mult from | name                                 | mult to | type                                                 | description                                                                             |
|-----------|--------------------------------------|---------|------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 0..*      | PowerElectronicsConnectionController | 0..1    | <a href="#">PowerElectronicsConnectionController</a> | (NC) Power electronics connection controller for the power electronics unit controller. |
| 0..*      | PartOf                               | 0..1    | <a href="#">AutomationFunction</a>                   | (NC) inherited from: <a href="#">AutomationFunction</a>                                 |

### 3.258 (NC) PowerFactorControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

Power factor control function is a function block that calculates the operating point of the controlled equipment to achieve the target power factor.

Table 398 shows all attributes of PowerFactorControlFunction.

**Table 398 – Attributes of EquipmentReliabilityProfile::PowerFactorControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 399 shows all association ends of PowerFactorControlFunction with other classes.

**Table 399 – Association ends of  
EquipmentReliabilityProfile::PowerFactorControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

4120 **3.259 (NC) PowerFrequencyController**

4121 Inheritance path = [SystemControl](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

4122 Power frequency controller is controlling the active power balance as typically done by the  
4123 secondary control. If an unbalance between the scheduled active power values of each  
4124 generation unit and the loads plus losses occurs, primary control will adapt (increase/decrease)  
4125 the active power production of each unit (depending on the power shift key strategy), leading  
4126 to an over- or under-frequency situation. The secondary frequency controller will then control  
4127 the frequency back to its nominal value, re- establishing a cost-efficient generation delivered  
4128 by each unit.

4129 Table 400 shows all attributes of PowerFrequencyController.

4131 **Table 400 – Attributes of EquipmentReliabilityProfile::PowerFrequencyController**

| name               | mult | type                                      | description                                                            |
|--------------------|------|-------------------------------------------|------------------------------------------------------------------------|
| mode               | 1..1 | <a href="#">PowerFrequencyControlKind</a> | (NC) Mode of the power frequency controller.                           |
| type               | 0..1 | <a href="#">String</a>                    | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a>                   | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                    | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>                    | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>                    | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>                    | inherited from: <a href="#">IdentifiedObject</a>                       |

4132

4133 Table 401 shows all association ends of PowerFrequencyController with other classes.

4134 **Table 401 – Association ends of**  
4135 **EquipmentReliabilityProfile::PowerFrequencyController with other classes**

| mult from | name                  | mult to | type                                  | description                                                        |
|-----------|-----------------------|---------|---------------------------------------|--------------------------------------------------------------------|
| 0..1      | ControlArea           | 0..1    | <a href="#">ControlArea</a>           | (NC) Control area which has a power frequency controller.          |
| 0..1      | MonitoringArea        | 0..1    | <a href="#">MonitoringArea</a>        | (NC) Monitoring area that has this power frequency controller.     |
| 0..*      | PowerShiftKeyStrategy | 0..1    | <a href="#">PowerShiftKeyStrategy</a> | (NC) Power shift key strategy for this power frequency controller. |
| 0..1      | EquipmentController   | 1..*    | <a href="#">EquipmentController</a>   | (NC) inherited from: <a href="#">SystemControl</a>                 |
| 0..*      | PartOf                | 0..1    | <a href="#">AutomationFunction</a>    | (NC) inherited from: <a href="#">AutomationFunction</a>            |

4136

4137 **3.260 (abstract,NC) PowerPlant**

4138 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

4139 A functional aggregation of one or more generating units and associated equipment that is  
4140 coordinated to produce, consume or exchange active power with the power system.

4141 Table 402 shows all attributes of PowerPlant.

4142 **Table 402 – Attributes of EquipmentReliabilityProfile::PowerPlant**

| name     | mult | type                        | description                                                  |
|----------|------|-----------------------------|--------------------------------------------------------------|
| nominalP | 0..1 | <a href="#">ActivePower</a> | (NC) The reference active power capacity of the power plant. |

| name               | mult | type                        | description                                                                                                                 |
|--------------------|------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| maxOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) The maximum net active power at which the power plant is designed to operate.                                          |
| minOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) The minimum signed net active power at which the power plant is designed to operate.                                   |
| deadbandMinP       | 0..1 | <a href="#">ActivePower</a> | (NC) The lower active-power boundaries of the range around zero in which continuous power-plant operation is not supported. |
| deadbandMaxP       | 0..1 | <a href="#">ActivePower</a> | (NC) The upper active-power boundaries of the range around zero in which continuous power-plant operation is not supported. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                      |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                            |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                            |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                            |

4143

4144 **3.261 (NC) PowerPlantController**

4145 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

4146 Power plant controller is controlling the equipment of a power plant.

4148 Table 403 shows all attributes of PowerPlantController.

4149 **Table 403 – Attributes of EquipmentReliabilityProfile::PowerPlantController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4150

4151 Table 404 shows all association ends of PowerPlantController with other classes.

4152 **Table 404 – Association ends of EquipmentReliabilityProfile::PowerPlantController with**  
4153 **other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

4154

4155 **3.262 (NC) PowerShiftKeyStrategy**

4156 Inheritance path = [IdentifiedObject](#)

4157 Strategy of the power shift key.

4158 Table 405 shows all attributes of PowerShiftKeyStrategy.

4159 **Table 405 – Attributes of EquipmentReliabilityProfile::PowerShiftKeyStrategy**

| name                      | mult | type                              | description                                                                                                                                                                                                                                                                                                                                    |
|---------------------------|------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| powerShiftKey             | 0..1 | <a href="#">PowerShiftKeyKind</a> | (NC) Power shift keys strategy gives instruction on how the value (Active power) is going to be distributed inside the relevant bidding zone.                                                                                                                                                                                                  |
| method                    | 0..1 | <a href="#">ShiftMethodKind</a>   | (NC) Shift method used for the power shift strategy.                                                                                                                                                                                                                                                                                           |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>             | (NC) Normal participation factor describing the entities part of the power shift strategy. Must be a positive value.                                                                                                                                                                                                                           |
| powerBlockKind            | 0..1 | <a href="#">PowerBlockKind</a>    | (NC) Power block kind creates block (one or more) of power shift key strategy to address increase and/or decrease of power for a given scheduling area.                                                                                                                                                                                        |
| dispatchableUnitOnly      | 0..1 | <a href="#">Boolean</a>           | (NC) If true, only dispatchable units are included in the power shift key strategy. A unit is considered dispatchable if it is associated with an area dispatchable unit that is linked to the same scheduling area as the power shift key strategy.<br>Exceptions are done for units that are included in explicit or distributed strategies. |
| normalEnabled             | 0..1 | <a href="#">Boolean</a>           | (NC) If true, the assessed element shall be considered under normal operating conditions.                                                                                                                                                                                                                                                      |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>            | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                         |
| description               | 0..1 | <a href="#">String</a>            | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                               |
| mRID                      | 1..1 | <a href="#">String</a>            | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                               |
| name                      | 0..1 | <a href="#">String</a>            | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                               |

4160 Table 406 shows all association ends of PowerShiftKeyStrategy with other classes.

4161 **Table 406 – Association ends of EquipmentReliabilityProfile::PowerShiftKeyStrategy**  
4162 **with other classes**

| mult from | name           | mult to | type                           | description                                                    |
|-----------|----------------|---------|--------------------------------|----------------------------------------------------------------|
| 0..*      | SchedulingArea | 0..1    | <a href="#">SchedulingArea</a> | (NC) Scheduling area associated with power shift key strategy. |

### 4164 3.263 (abstract,NC) PowerTransferCorridor

4165 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

4166 A power transfer corridor is defined as a set of circuits (transmission lines or transformers)  
4167 separating two portions of the power system, or a subset of circuits exposed to a substantial  
4168 portion of the transmission exchange between two parts of the system.

4169 Table 407 shows all attributes of PowerTransferCorridor.

4170 **Table 407 – Attributes of EquipmentReliabilityProfile::PowerTransferCorridor**

| name          | mult | type                    | description                                                                                                                                                                                                                      |
|---------------|------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalEnabled | 0..1 | <a href="#">Boolean</a> | (NC) It is the normal enable/disable the monitoring/assessment of a power transfer corridor. True means that the monitoring of the power transfer corridor is assessed. False means the power transfer corridor is not assessed. |

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

4172

4173 **3.264 (NC) PowerTransformerCircuit**4174 Inheritance path = [Circuit](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

4175 A power transformer circuit is a circuit that has at least one PowerTransformer and may or may not include related switching and/or auxiliary equipment.

4177 Table 408 shows all attributes of PowerTransformerCircuit.

4178 **Table 408 – Attributes of EquipmentReliabilityProfile::PowerTransformerCircuit**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| positiveFlowIn     | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">Circuit</a>                           |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4179

4180 Table 409 shows all association ends of PowerTransformerCircuit with other classes.

4181 **Table 409 – Association ends of EquipmentReliabilityProfile::PowerTransformerCircuit**  
4182 **with other classes**

| mult from | name                | mult to | type                     | description                                  |
|-----------|---------------------|---------|--------------------------|----------------------------------------------|
| 0..1      | IdentifyingTerminal | 0..1    | <a href="#">Terminal</a> | (NC) inherited from: <a href="#">Circuit</a> |

4183

4184 **3.265 (abstract,cims) PropertyReference root class**

4185 The reference to a class and one of its properties.

4186 **3.266 (NC) ProportionalEnergyComponent**4187 Inheritance path = [EnergyComponent](#) : [IdentifiedObject](#)

4188 Serves for grouping components within an energy group, with proportional energy allocation to all components.

4190 Table 410 shows all attributes of ProportionalEnergyComponent.

4191 **Table 410 – Attributes of EquipmentReliabilityProfile::ProportionalEnergyComponent**

| name                      | mult | type                     | description                                                            |
|---------------------------|------|--------------------------|------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a>    | (NC) Normal participation factor.                                      |
| powerDuration             | 0..1 | <a href="#">Duration</a> | (NC) Duration for the active power.                                    |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>   | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>   | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                      | 1..1 | <a href="#">String</a>   | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 411 shows all association ends of ProportionalEnergyComponent with other classes.

**Table 411 – Association ends of EquipmentReliabilityProfile::ProportionalEnergyComponent with other classes**

| mult from | name                        | mult to | type                                        | description                                          |
|-----------|-----------------------------|---------|---------------------------------------------|------------------------------------------------------|
| 0..*      | HydroPump                   | 0..1    | <a href="#">HydroPump</a>                   | (NC) inherited from: <a href="#">EnergyComponent</a> |
| 0..*      | GeneratingUnit              | 0..1    | <a href="#">GeneratingUnit</a>              | (NC) inherited from: <a href="#">EnergyComponent</a> |
| 0..*      | EnergyConsumer              | 0..1    | <a href="#">EnergyConsumer</a>              | (NC) inherited from: <a href="#">EnergyComponent</a> |
| 0..*      | PowerElectronicsUnit        | 0..1    | <a href="#">PowerElectronicsUnit</a>        | (NC) inherited from: <a href="#">EnergyComponent</a> |
| 0..*      | EnergyResourceGroupCapacity | 0..1    | <a href="#">EnergyResourceGroupCapacity</a> | (NC) inherited from: <a href="#">EnergyComponent</a> |

### 3.267 (NC,Description) PTCTriggeredEquipment

Inheritance path = [IdentifiedObject](#)

Power Transfer Corridor triggered equipment connects the equipment that will create the exceptional power transfer corridor when taking out of service. e.g. A system with three lines gets an exceptional power transfer corridor when one of the lines is taken out of service.

Table 412 shows all attributes of PTCTriggeredEquipment.

**Table 412 – Attributes of EquipmentReliabilityProfile::PTCTriggeredEquipment**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 413 shows all association ends of PTCTriggeredEquipment with other classes.

**Table 413 – Association ends of EquipmentReliabilityProfile::PTCTriggeredEquipment with other classes**

| mult from | name                             | mult to | type                                             | description                                                             |
|-----------|----------------------------------|---------|--------------------------------------------------|-------------------------------------------------------------------------|
| 0..*      | Equipment                        | 1..1    | <a href="#">Equipment</a>                        | (NC) The equipment which is part of power transfer corridor triggering. |
| 1..*      | ExceptionalPowerTransferCorridor | 1..1    | <a href="#">ExceptionalPowerTransferCorridor</a> | (NC) The power transfer corridor which is triggered by this equipment.  |

### 3.268 (NC) ReactivePowerControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

Reactive power control function is a function block that calculate the operating point of the controlled equipment to achieve the target reactive power.

Table 414 shows all attributes of ReactivePowerControlFunction.

4214 **Table 414 – Attributes of EquipmentReliabilityProfile::ReactivePowerControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4215 Table 415 shows all association ends of ReactivePowerControlFunction with other classes.

4216 **Table 415 – Association ends of**  
4217 **EquipmentReliabilityProfile::ReactivePowerControlFunction with other classes**  
4218

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 4219 3.269 (NC) RecoveryOverloadLimitCurve

4220 Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

4221 The relation between the recovery time and an overload limit.

4222 Table 416 shows all attributes of RecoveryOverloadLimitCurve.

4223 **Table 416 – Attributes of EquipmentReliabilityProfile::RecoveryOverloadLimitCurve**  
4224

| name               | mult | type                           | description                                                            |
|--------------------|------|--------------------------------|------------------------------------------------------------------------|
| curveStyle         | 1..1 | <a href="#">CurveStyle</a>     | inherited from: <a href="#">Curve</a>                                  |
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |

### 4225 3.270 (abstract,NC) Region

4226 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

4227 A region where the system operator belongs to.  
4228

4229 Table 417 shows all attributes of Region.

4230 **Table 417 – Attributes of EquipmentReliabilityProfile::Region**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

4231  
4232 Table 418 shows all association ends of Region with other classes.  
4233 **Table 418 – Association ends of EquipmentReliabilityProfile::Region with other classes**

| mult from | name            | mult to | type                            | description                                                 |
|-----------|-----------------|---------|---------------------------------|-------------------------------------------------------------|
| 0..*      | OverlappingZone | 0..1    | <a href="#">OverlappingZone</a> | (NC) The overlapping zone which is impacted by this region. |

4234  
4235 **3.271 (NC) RotatingMachineController**  
4236 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
4237 [IdentifiedObject](#)  
4238 Rotating machine controller is controlling the equipment which may be used as a generator or  
4239 motor.  
4240 Table 419 shows all attributes of RotatingMachineController.

4241 **Table 419 – Attributes of EquipmentReliabilityProfile::RotatingMachineController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4242  
4243 Table 420 shows all association ends of RotatingMachineController with other classes.

4244 **Table 420 – Association ends of**  
4245 **EquipmentReliabilityProfile::RotatingMachineController with other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

4246  
4247 **3.272 (NC) ScheduleResource**  
4248 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)  
4249 A schedule resource is a market-based method for handling participation of small units,  
4250 particularly located on the lower voltage level that is controlled by a Distributed System  
4251 Operator (DSO). It is a collection of units that can operate in the market by providing bids, offers  
4252 and a resulting committed operational schedule for the collection.

4253 Table 421 shows all attributes of ScheduleResource.

4254 **Table 421 – Attributes of EquipmentReliabilityProfile::ScheduleResource**

| name                      | mult | type                   | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------|------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalParticipationFactor | 0..1 | <a href="#">Float</a>  | (NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.<br><br>In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$ .<br><br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| description               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| mRID                      | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| name                      | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

4255

4256 Table 422 shows all association ends of ScheduleResource with other classes.

4257 **Table 422 – Association ends of EquipmentReliabilityProfile::ScheduleResource with**  
4258 **other classes**

| mult from | name                       | mult to | type                                       | description                                                                                                                                                                                                                                     |
|-----------|----------------------------|---------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0..*      | SchedulingArea             | 0..1    | <a href="#">SchedulingArea</a>             | (NC) The scheduling area that has this schedule resource.                                                                                                                                                                                       |
| 0..*      | ResourceOf                 | 0..1    | <a href="#">ScheduleResource</a>           | (NC) The schedule resource that has this subschedule resource.                                                                                                                                                                                  |
| 0..*      | PrimaryEnergyResource Type | 0..1    | <a href="#">EnergyResourceType</a>         | (NC) The primary energy resource type represented by the schedule resource.<br>Note: Where a schedule resource represents multiple energy resource types, the detailed resource model should be used to determine the individual contributions. |
| 0..1      | ScheduleResourceController | 0..1    | <a href="#">ScheduleResourceController</a> | (NC) Schedule resource controller for this schedule resource.                                                                                                                                                                                   |

4259

### 4260 3.273 (NC) ScheduleResourceController

4261 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
4262 [IdentifiedObject](#)

4263 Schedule resource controller is controlling the equipment to optimize the schedule resource.

4264 Table 423 shows all attributes of ScheduleResourceController.

4265 **Table 423 – Attributes of EquipmentReliabilityProfile::ScheduleResourceController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |

| name        | mult | type                   | description                                      |
|-------------|------|------------------------|--------------------------------------------------|
| description | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| mRID        | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| name        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 424 shows all association ends of ScheduleResourceController with other classes.

**Table 424 – Association ends of  
EquipmentReliabilityProfile::ScheduleResourceController with other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

### 3.274 (NC) SchedulingArea

Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

An area where production and/or consumption of energy can be forecasted, scheduled and measured. The area is operated by only one system operator, typically a Transmission System Operator (TSO). The area can consist of a sub area, which has the same definition as the main area, but it can be operated by another system operator (typically Distributed System Operator (DSO) or a Closed Distributed System Operator (CDSO)). This includes microgrid concept. A substation is the smallest grouping that can be included in the area. The area size should be considered in terms of the possibility of accumulated reading (settlement metering) and the capability of operating as an island.

Table 425 shows all attributes of SchedulingArea.

**Table 425 – Attributes of EquipmentReliabilityProfile::SchedulingArea**

| name                      | mult | type                    | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------|------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| isIslandingEnabled        | 0..1 | <a href="#">Boolean</a> | (NC) Identifies if the area can operate in island operation. If true, the area is enabled (capable) of operating as an electrical island. If false, the area does not have the capability or it is not enabled to operate as an electrical island.                                                                                                                                                                                                                                                                                                                                 |
| isMeteringGridArea        | 0..1 | <a href="#">Boolean</a> | (NC) Identifies if the area is settlement metered for all import and export to the area. If true, the area is metered area. If false, it is not.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>   | (NC) Normal participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.<br>In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\sum(PF)$ .<br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| type                      | 0..1 | <a href="#">String</a>  | (NC) Type of scheduling area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| description               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| mRID                      | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| name                      | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

4284 Table 426 shows all association ends of SchedulingArea with other classes.

4285 **Table 426 – Association ends of EquipmentReliabilityProfile::SchedulingArea with other**  
4286 **classes**

| mult from | name                     | mult to | type                                     | description                                                          |
|-----------|--------------------------|---------|------------------------------------------|----------------------------------------------------------------------|
| 0..*      | EnergyCoordinationRegion | 0..1    | <a href="#">EnergyCoordinationRegion</a> | (NC) The energy coordination region that has this scheduling area.   |
| 0..*      | LoadFrequencyControlArea | 0..1    | <a href="#">LoadFrequencyControlArea</a> | (NC) The load frequency control area which has this scheduling area. |
| 0..*      | SystemOperator           | 0..1    | <a href="#">SystemOperator</a>           | (NC) The system operator for this scheduling area.                   |
| 0..*      | SynchronousArea          | 0..1    | <a href="#">SynchronousArea</a>          | (NC) The synchronous area that has this scheduling area.             |
| 0..*      | BiddingZone              | 0..1    | <a href="#">BiddingZone</a>              | (NC) The bidding zone related to this scheduling area.               |
| 1..*      | ControlArea              | 0..1    | <a href="#">ControlArea</a>              | (NC) The control area for this scheduling area.                      |
| 0..1      | GridPowerCapacity        | 0..1    | <a href="#">GridPowerCapacity</a>        | (NC) Grid Power capacity of this scheduling area.                    |
| 0..*      | PartOf                   | 0..1    | <a href="#">SchedulingArea</a>           | (NC) The scheduling area is part of this scheduling area.            |

4287

### 4288 3.275 (NC) SchedulingAreaExchangePoint root class

4289 Combination of scheduling area and one or more energy exchange point to define the relevant  
4290 exchange point for a given scheduling area.

4291 Table 427 shows all attributes of SchedulingAreaExchangePoint.

4292 **Table 427 – Attributes of EquipmentReliabilityProfile::SchedulingAreaExchangePoint**

| name | mult | type                   | description                                                                                                                                                                                                                                                                                                                                                                                                   |
|------|------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br><br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |

4293

4294 Table 428 shows all association ends of SchedulingAreaExchangePoint with other classes.

4295 **Table 428 – Association ends of**  
4296 **EquipmentReliabilityProfile::SchedulingAreaExchangePoint with other classes**

| mult from | name                | mult to | type                                | description                                                         |
|-----------|---------------------|---------|-------------------------------------|---------------------------------------------------------------------|
| 0..*      | EnergyExchangePoint | 1..1    | <a href="#">EnergyExchangePoint</a> | (NC) The energy exchange point associated with the scheduling area. |
| 0..*      | SchedulingArea      | 1..1    | <a href="#">SchedulingArea</a>      | (NC) The scheduling area that has a scheduling area exchange point. |

4297

4298 **3.276 (NC) SecondarySubstation**

4299 Inheritance path = [Substation](#) : [EquipmentContainer](#) : [ConnectivityNodeContainer](#) :  
4300 [PowerSystemResource](#) : [IdentifiedObject](#)

4301 A SecondarySubstation is a substation that is either supplied by or serves a primary substation.  
4302 It is responsible for transforming, distributing, or aggregating power to and from installations  
4303 such as homes, industrial facilities, or prosumer sites.

4304 A secondary substation supports bidirectional power flows, enabling both consumption and  
4305 injection of energy within the distribution network.

4306 It typically includes transformers, switchgear, protection, and measurement equipment, and  
4307 may be equipped for remote monitoring or autonomous control

4308 Table 429 shows all attributes of SecondarySubstation.

4309 **Table 429 – Attributes of EquipmentReliabilityProfile::SecondarySubstation**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

4310

4311 Table 430 shows all association ends of SecondarySubstation with other classes.

4312 **Table 430 – Association ends of EquipmentReliabilityProfile::SecondarySubstation with**  
4313 **other classes**

| mult from | name              | mult to | type                              | description                                                              |
|-----------|-------------------|---------|-----------------------------------|--------------------------------------------------------------------------|
| 0..*      | SubSchedulingArea | 0..1    | <a href="#">SubSchedulingArea</a> | (NC) The subscheduling area that has the secondary substation connected. |
| 0..1      | PrimarySubstation | 0..1    | <a href="#">Substation</a>        | (NC) The primary substation that serves the secondary substation.        |
| 0..*      | SchedulingArea    | 0..1    | <a href="#">SchedulingArea</a>    | (NC) inherited from: <a href="#">Substation</a>                          |

4314

4315 **3.277 (NC) SecurityCoordinator**

4316 Inheritance path = [SystemOperationCoordinator](#) : [SystemOperationOrganisationPost](#) :  
4317 [OrganisationRole](#) : [IdentifiedObject](#)

4318 A post that coordinates the relevant remedial actions and their optimisation to ensure efficient  
4319 use to achieve required operational security of the power system.

4320 Table 431 shows all attributes of SecurityCoordinator.

4321 **Table 431 – Attributes of EquipmentReliabilityProfile::SecurityCoordinator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

4322

4323 Table 432 shows all association ends of SecurityCoordinator with other classes.

**Table 432 – Association ends of EquipmentReliabilityProfile::SecurityCoordinator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

**3.278 (NC) SolarRadiationDependencyCurve**

Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

A curve or functional relationship between

- the solar radiation independent variable (X-axis), and

- relative dependent (Y-axis) variables.

Table 433 shows all attributes of SolarRadiationDependencyCurve.

**Table 433 – Attributes of EquipmentReliabilityProfile::SolarRadiationDependencyCurve**

| name               | mult | type                           | description                                                            |
|--------------------|------|--------------------------------|------------------------------------------------------------------------|
| curveStyle         | 1..1 | <a href="#">CurveStyle</a>     | inherited from: <a href="#">Curve</a>                                  |
| xMultiplier        | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| xUnit              | 1..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y1Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y1Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| y2Multiplier       | 0..1 | <a href="#">UnitMultiplier</a> | inherited from: <a href="#">Curve</a>                                  |
| y2Unit             | 0..1 | <a href="#">UnitSymbol</a>     | inherited from: <a href="#">Curve</a>                                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>         | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>         | inherited from: <a href="#">IdentifiedObject</a>                       |

**3.279 (NC) SSSCController**

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

The controller of a Static synchronous series compensator (SSSC).

Table 434 shows all attributes of SSSCController.

**Table 434 – Attributes of EquipmentReliabilityProfile::SSSCController**

| name          | mult | type                        | description                                                                                                         |
|---------------|------|-----------------------------|---------------------------------------------------------------------------------------------------------------------|
| minInjectionU | 1..1 | <a href="#">Voltage</a>     | (NC) Minimum voltage that the device can inject.                                                                    |
| maxInjectionU | 1..1 | <a href="#">Voltage</a>     | (NC) Maximum voltage that the device can inject.                                                                    |
| maxLimitI     | 0..1 | <a href="#">CurrentFlow</a> | (NC) Maximum operating current limit applied for the controller and used by any of the available control functions. |
| minLimitI     | 0..1 | <a href="#">CurrentFlow</a> | (NC) Minimum operating current limit applied for the controller and used by any of the available control functions. |
| type          | 0..1 | <a href="#">String</a>      | (NC) inherited from: <a href="#">AutomationFunction</a>                                                             |
| normalEnabled | 0..1 | <a href="#">Boolean</a>     | (NC) inherited from: <a href="#">AutomationFunction</a>                                                             |

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 435 shows all association ends of SSSCController with other classes.

**Table 435 – Association ends of EquipmentReliabilityProfile::SSSCController with other classes**

| mult from | name                   | mult to | type                                   | description                                                  |
|-----------|------------------------|---------|----------------------------------------|--------------------------------------------------------------|
| 0..*      | SSSCSimulationSettings | 0..1    | <a href="#">SSSCSimulationSettings</a> | (NC) The simulation settings that apply for this controller. |
| 0..*      | PartOf                 | 0..1    | <a href="#">AutomationFunction</a>     | (NC) inherited from: <a href="#">AutomationFunction</a>      |

### 3.280 (NC) SSSCSimulationSettings root class

SSSC control simulation settings used by the algorithm for power flow calculations.

Table 436 shows all attributes of SSSCSimulationSettings.

**Table 436 – Attributes of EquipmentReliabilityProfile::SSSCSimulationSettings**

| name                       | mult | type                      | description                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------|------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| deltaX                     | 1..1 | <a href="#">Reactance</a> | (NC) Reactance delta for the solution algorithm. The solution “outer-loop” algorithm is based on a secant method which needs two initial points. The second point is calculated from the first one by either adding or subtracting this “delta”. The “seed” is assumed to be 0 ohms.                                                                                                                               |
| maxIterations              | 1..1 | <a href="#">Integer</a>   | (NC) Maximum number of iterations before claiming an open line condition. The algorithm uses it to assess if a line is really open by making sure low-currents are observed on various consecutive iterations.                                                                                                                                                                                                     |
| maxMismatch                | 1..1 | <a href="#">Voltage</a>   | (NC) Maximum mismatch tolerance of voltage target value. If mismatch is lower, convergence is claimed. It is only used for voltageInjection and currentDroop control modes.                                                                                                                                                                                                                                        |
| maxCorrectionX             | 1..1 | <a href="#">Reactance</a> | (NC) Maximum value of the reactance correction applied between iterations of the power flow calculation algorithm for the purpose of achieving control target value.                                                                                                                                                                                                                                               |
| isEstimateDLVDVsensitivity | 1..1 | <a href="#">Boolean</a>   | (NC) Defines if the estimate is considering the dI/dV sensitivity (true) instead of the secant algorithm (false).                                                                                                                                                                                                                                                                                                  |
| mRID                       | 1..1 | <a href="#">String</a>    | (NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br><br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |

**3.281 (NC) StaticSynchronousCompensator**

Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) : [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Static synchronous compensator (STATCOM), also known as a static synchronous condenser (STATCON), is a type of flexible AC transmission system regulating equipment used on alternating current electricity transmission networks. It is based on a power electronics voltage-source converter and can act as either a source or sink of reactive AC power to an electricity network. If connected to a source of power it can also provide active AC power.

Table 437 shows all attributes of StaticSynchronousCompensator.

**Table 437 – Attributes of EquipmentReliabilityProfile::StaticSynchronousCompensator**

| name               | mult | type                                    | description                                                            |
|--------------------|------|-----------------------------------------|------------------------------------------------------------------------|
| slope              | 1..1 | <a href="#">VoltagePerReactivePower</a> | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedI             | 0..1 | <a href="#">CurrentFlow</a>             | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedU             | 0..1 | <a href="#">Voltage</a>                 | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedC             | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedL             | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| minC               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| maxC               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| minL               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| maxL               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 438 shows all association ends of StaticSynchronousCompensator with other classes.

**Table 438 – Association ends of EquipmentReliabilityProfile::StaticSynchronousCompensator with other classes**

| mult from | name                | mult to | type                                | description                                           |
|-----------|---------------------|---------|-------------------------------------|-------------------------------------------------------|
| 0..*      | EquipmentController | 0..1    | <a href="#">EquipmentController</a> | (NC) inherited from: <a href="#">RegulatingCondEq</a> |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>             | (NC) inherited from: <a href="#">Equipment</a>        |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>           | (NC) inherited from: <a href="#">Equipment</a>        |

**3.282 (NC) StaticSynchronousSeriesCompensator**

Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) : [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Static synchronous series compensator (SSSC) is a type of flexible AC transmission system which consists of a solid-state voltage source inverter coupled with a transformer that is connected in series with a transmission line. This device can inject an almost sinusoidal voltage in series with the line. This injected voltage could be considered as an inductive or capacitive reactance, which is connected in series with the transmission line. This feature can provide controllable voltage compensation. In addition, SSSC is able to reverse the power flow by injecting a sufficiently large series reactive compensating voltage. Moreover it can inject a

4376 voltage proportional to the difference between the line current and the pre-configured current  
4377 threshold. It shall have two Terminal-s associated with it.  
4378 Table 439 shows all attributes of StaticSynchronousSeriesCompensator.

4379 **Table 439 – Attributes of**  
4380 **EquipmentReliabilityProfile::StaticSynchronousSeriesCompensator**

| name               | mult | type                                    | description                                                            |
|--------------------|------|-----------------------------------------|------------------------------------------------------------------------|
| slope              | 1..1 | <a href="#">VoltagePerReactivePower</a> | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedI             | 0..1 | <a href="#">CurrentFlow</a>             | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedU             | 0..1 | <a href="#">Voltage</a>                 | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedC             | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedL             | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| minC               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| maxC               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| minL               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| maxL               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                       |

4381  
4382 Table 440 shows all association ends of StaticSynchronousSeriesCompensator with other  
4383 classes.

4384 **Table 440 – Association ends of**  
4385 **EquipmentReliabilityProfile::StaticSynchronousSeriesCompensator with other classes**

| mult from | name                | mult to | type                                | description                                           |
|-----------|---------------------|---------|-------------------------------------|-------------------------------------------------------|
| 0..*      | EquipmentController | 0..1    | <a href="#">EquipmentController</a> | (NC) inherited from: <a href="#">RegulatingCondEq</a> |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>             | (NC) inherited from: <a href="#">Equipment</a>        |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>           | (NC) inherited from: <a href="#">Equipment</a>        |

4386  
4387 **3.283 (NC) StaticVarCompensator**

4388 Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) :  
4389 [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

4390 A facility for providing variable and controllable shunt reactive power. The SVC typically  
4391 consists of a stepdown transformer, filter, thyristor-controlled reactor, and thyristor-switched  
4392 capacitor arms.

4393 The SVC may operate in fixed MVar output mode or in voltage control mode. When in voltage  
4394 control mode, the output of the SVC will be proportional to the deviation of voltage at the  
4395 controlled bus from the voltage setpoint. The SVC characteristic slope defines the proportion.  
4396 If the voltage at the controlled bus is equal to the voltage setpoint, the SVC MVar output is zero.  
4397 Table 441 shows all attributes of StaticVarCompensator.

4398 **Table 441 – Attributes of EquipmentReliabilityProfile::StaticVarCompensator**

| name               | mult | type                                    | description                                                            |
|--------------------|------|-----------------------------------------|------------------------------------------------------------------------|
| slope              | 1..1 | <a href="#">VoltagePerReactivePower</a> | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedI             | 0..1 | <a href="#">CurrentFlow</a>             | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedU             | 0..1 | <a href="#">Voltage</a>                 | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedC             | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| ratedL             | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| minC               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| maxC               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| minL               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| maxL               | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                    |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>                  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                       |

4399 Table 442 shows all association ends of StaticVarCompensator with other classes.

4400 **Table 442 – Association ends of EquipmentReliabilityProfile::StaticVarCompensator**  
4401 **with other classes**

| mult from | name                | mult to | type                                | description                                           |
|-----------|---------------------|---------|-------------------------------------|-------------------------------------------------------|
| 0..*      | EquipmentController | 0..1    | <a href="#">EquipmentController</a> | (NC) inherited from: <a href="#">RegulatingCondEq</a> |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>             | (NC) inherited from: <a href="#">Equipment</a>        |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>           | (NC) inherited from: <a href="#">Equipment</a>        |

### 4404 3.284 (NC) SubControlArea

4405 Inheritance path = [ControlArea](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

4406 A SubControlArea representing the operational control domain within a higher-level control  
4407 area. It is typically operated by a Distribution System Operator (DSO) and covers the  
4408 monitoring, control, scheduling, and application of operational limits for distribution system  
4409 resources and exchanges at its boundary.

4410 Table 443 shows all attributes of SubControlArea.

4411 **Table 443 – Attributes of EquipmentReliabilityProfile::SubControlArea**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| areaType           | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">ControlArea</a>                       |
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

4412 Table 444 shows all association ends of SubControlArea with other classes.

**Table 444 – Association ends of EquipmentReliabilityProfile::SubControlArea with other classes**

| mult from | name                     | mult to | type                                     | description                                      |
|-----------|--------------------------|---------|------------------------------------------|--------------------------------------------------|
| 0..*      | SystemOperator           | 0..1    | <a href="#">SystemOperator</a>           | (NC) inherited from: <a href="#">ControlArea</a> |
| 0..*      | OutageCoordinationRegion | 0..1    | <a href="#">OutageCoordinationRegion</a> | (NC) inherited from: <a href="#">ControlArea</a> |
| 0..*      | PartOf                   | 0..1    | <a href="#">ControlArea</a>              | (NC) inherited from: <a href="#">ControlArea</a> |

**3.285 (NC) SubSchedulingArea**

Inheritance path = [SchedulingArea](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

An area that is a part of another scheduling area. Typically part of a Transmission System Operator (TSO) scheduling area operated by a Distributed System Operator (DSO) or a Close Distributed System Operator (CDSO). This includes microgrid concept. A sub scheduling area can contain other sub areas. A sub scheduling area leaf will form the smallest entity of any given energy area.

Table 445 shows all attributes of SubSchedulingArea.

**Table 445 – Attributes of EquipmentReliabilityProfile::SubSchedulingArea**

| name                      | mult | type                    | description                                                             |
|---------------------------|------|-------------------------|-------------------------------------------------------------------------|
| isIslandingEnabled        | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">SchedulingArea</a>                     |
| isMeteringGridArea        | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">SchedulingArea</a>                     |
| normalParticipationFactor | 0..1 | <a href="#">Float</a>   | (NC) inherited from: <a href="#">SchedulingArea</a>                     |
| type                      | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">SchedulingArea</a>                     |
| energyIdentCodeEic        | 0..1 | <a href="#">String</a>  | (deprecated, European) inherited from: <a href="#">IdentifiedObject</a> |
| description               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                        |
| mRID                      | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                        |
| name                      | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                        |

Table 446 shows all association ends of SubSchedulingArea with other classes.

**Table 446 – Association ends of EquipmentReliabilityProfile::SubSchedulingArea with other classes**

| mult from | name                     | mult to | type                                     | description                                         |
|-----------|--------------------------|---------|------------------------------------------|-----------------------------------------------------|
| 0..*      | EnergyCoordinationRegion | 0..1    | <a href="#">EnergyCoordinationRegion</a> | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | LoadFrequencyControlArea | 0..1    | <a href="#">LoadFrequencyControlArea</a> | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | SystemOperator           | 0..1    | <a href="#">SystemOperator</a>           | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | SynchronousArea          | 0..1    | <a href="#">SynchronousArea</a>          | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | BiddingZone              | 0..1    | <a href="#">BiddingZone</a>              | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 1..*      | ControlArea              | 0..1    | <a href="#">ControlArea</a>              | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..1      | GridPowerCapacity        | 0..1    | <a href="#">GridPowerCapacity</a>        | (NC) inherited from: <a href="#">SchedulingArea</a> |
| 0..*      | PartOf                   | 0..1    | <a href="#">SchedulingArea</a>           | (NC) inherited from: <a href="#">SchedulingArea</a> |

4431 **3.286 (Description) Substation**

4432 Inheritance path = [EquipmentContainer](#) : [ConnectivityNodeContainer](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

4433 A collection of equipment for purposes other than generation or utilization, through which  
4435 electric energy in bulk is passed for the purposes of switching or modifying its characteristics.  
4436 Table 447 shows all attributes of Substation.

4437 **Table 447 – Attributes of EquipmentReliabilityProfile::Substation**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

4438  
4439 Table 448 shows all association ends of Substation with other classes.

4440 **Table 448 – Association ends of EquipmentReliabilityProfile::Substation with other**  
4441 **classes**

| mult from | name           | mult to | type                           | description                                        |
|-----------|----------------|---------|--------------------------------|----------------------------------------------------|
| 0..*      | SchedulingArea | 0..1    | <a href="#">SchedulingArea</a> | (NC) The scheduling area that has this substation. |

4442  
4443 **3.287 (NC) SubstationController**

4444 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

4446 Substation controller is controlling the equipment to optimize the use of the controlling  
4447 equipment within a substation.

4448 Table 449 shows all attributes of SubstationController.

4449 **Table 449 – Attributes of EquipmentReliabilityProfile::SubstationController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4450  
4451 Table 450 shows all association ends of SubstationController with other classes.

4452 **Table 450 – Association ends of EquipmentReliabilityProfile::SubstationController with**  
4453 **other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

4454

4455 **3.288 (NC) SynchronousArea**4456 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

4457 A synchronous area is an electrical area covered by interconnect with a common system frequency in a steady-state.

4459 Table 451 shows all attributes of SynchronousArea.

4460 **Table 451 – Attributes of EquipmentReliabilityProfile::SynchronousArea**

| name               | mult | type                      | description                                                                 |
|--------------------|------|---------------------------|-----------------------------------------------------------------------------|
| nominalFrequency   | 1..1 | <a href="#">Frequency</a> | (NC) The nominal frequency for the Synchronous Area, e.g. 50 Hz for Europe. |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>    | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>      |
| description        | 0..1 | <a href="#">String</a>    | inherited from: <a href="#">IdentifiedObject</a>                            |
| mRID               | 1..1 | <a href="#">String</a>    | inherited from: <a href="#">IdentifiedObject</a>                            |
| name               | 0..1 | <a href="#">String</a>    | inherited from: <a href="#">IdentifiedObject</a>                            |

4461

4462 **3.289 (abstract,NC) SystemControl**4463 Inheritance path = [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

4464 System control is the management and regulation of various parameters within the electrical grid to ensure its stable and reliable operation. The primary goal of system control is to maintain the balance between electricity generation and consumption, while also managing factors such as voltage, frequency, and power quality. This involves the use of control devices, automation, and monitoring systems to respond to changes in the grid and maintain its overall stability.

4469 This serves as Integrated AC and DC control system (IEC 60633) which governs the integrated operation of AC and DC systems of a power system.

4471 Table 452 shows all attributes of SystemControl.

4472 **Table 452 – Attributes of EquipmentReliabilityProfile::SystemControl**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4473

4474 Table 453 shows all association ends of SystemControl with other classes.

4475 **Table 453 – Association ends of EquipmentReliabilityProfile::SystemControl with other classes**

4476

| mult from | name                | mult to | type                                | description                                               |
|-----------|---------------------|---------|-------------------------------------|-----------------------------------------------------------|
| 0..1      | EquipmentController | 1..*    | <a href="#">EquipmentController</a> | (NC) Equipment controller controls by this system control |
| 0..*      | PartOf              | 0..1    | <a href="#">AutomationFunction</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>   |

4477

4478 **3.290 (abstract,NC) SystemOperationCoordinator**4479 Inheritance path = [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

4480 A post that coordinates relevant information and impact in regards to operating the power  
4481 system.

4482 Table 454 shows all attributes of SystemOperationCoordinator.

4483 **Table 454 – Attributes of EquipmentReliabilityProfile::SystemOperationCoordinator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

4484  
4485 Table 455 shows all association ends of SystemOperationCoordinator with other classes.

4486 **Table 455 – Association ends of**  
4487 **EquipmentReliabilityProfile::SystemOperationCoordinator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

4488  
4489 **3.291 (abstract,NC) SystemOperationOrganisationPost**

4490 Inheritance path = [OrganisationRole](#) : [IdentifiedObject](#)

4491 A responsibility-bearing ecosystem post for system operation, held by an agent acting on behalf  
4492 of an organisation, with accountability for coordinating and executing operational functions  
4493 necessary to maintain the secure and reliable operation of the power system within a defined  
4494 scope (e.g., network area, control area, voltage level, or set of resources).

4495 Note: This post is defined from the power system ecosystem viewpoint and may be reassigned  
4496 over time. It covers operational accountability (planning, monitoring, switching/dispatch  
4497 coordination, and operational communication) for the applicable scope, rather than ownership  
4498 of the resources themselves.

4499 Table 456 shows all attributes of SystemOperationOrganisationPost.

4500 **Table 456 – Attributes of**  
4501 **EquipmentReliabilityProfile::SystemOperationOrganisationPost**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

4502  
4503 Table 457 shows all association ends of SystemOperationOrganisationPost with other classes.

4504 **Table 457 – Association ends of**  
4505 **EquipmentReliabilityProfile::SystemOperationOrganisationPost with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

4506

4507 **3.292 (abstract,NC) SystemOperator**4508 Inheritance path = [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)4509 A power system operation post responsible for performing and coordinating the real-time and  
4510 planning functions required to maintain the secure, reliable, and efficient operation of the power  
4511 system within a defined operational scope.4512 Note: SystemOperator represents the execution of power system operational responsibilities in  
4513 practice. While the operational post exists independently at the ecosystem level,  
4514 SystemOperator identifies the specific agent fulfilling that responsibility at a given time. The  
4515 operational scope may correspond to a control area, network, voltage domain, or other defined  
4516 boundary.

4517 Table 458 shows all attributes of SystemOperator.

4518 **Table 458 – Attributes of EquipmentReliabilityProfile::SystemOperator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

4519

4520 Table 459 shows all association ends of SystemOperator with other classes.

4521 **Table 459 – Association ends of EquipmentReliabilityProfile::SystemOperator with**  
4522 **other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

4523

4524 **3.293 (abstract,Description) TapChanger root class**

4525 Mechanism for changing transformer winding tap positions.

4526 Table 460 shows all association ends of TapChanger with other classes.

4527 **Table 460 – Association ends of EquipmentReliabilityProfile::TapChanger with other**  
4528 **classes**

| mult from | name                 | mult to | type                                 | description                                                    |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------------------|
| 0..*      | TapChangerController | 0..1    | <a href="#">TapChangerController</a> | (NC) The tap changer controller that controls this TapChanger. |

4529

4530 **3.294 (NC) TapChangerController**4531 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
4532 [IdentifiedObject](#)4533 Tap changer controller is an equipment controller that controls a tap changer, e.g. how the  
4534 voltage at the end of a line varies with the load level and compensation of the voltage drop by  
4535 tap adjustment.

4536 Table 461 shows all attributes of TapChangerController.

4537 **Table 461 – Attributes of EquipmentReliabilityProfile::TapChangerController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4538

4539 Table 462 shows all association ends of TapChangerController with other classes.

4540 **Table 462 – Association ends of EquipmentReliabilityProfile::TapChangerController**  
4541 **with other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

4542

4543 **3.295 (NC) TCSCCompensationPoint root class**

4544 Compensation point of a TCSC compensator.

4545 Table 463 shows all attributes of TCSCCompensationPoint.

4546 **Table 463 – Attributes of EquipmentReliabilityProfile::TCSCCompensationPoint**

| name          | mult | type                      | description                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| compensationZ | 1..1 | <a href="#">Impedance</a> | (NC) The compensation impedance for this compensation point.                                                                                                                                                                                                                                                                                                                                                       |
| mRID          | 1..1 | <a href="#">String</a>    | (NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br><br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| section       | 1..1 | <a href="#">Integer</a>   | (NC) The number of the section.                                                                                                                                                                                                                                                                                                                                                                                    |

4547

4548 Table 464 shows all association ends of TCSCCompensationPoint with other classes.

4549 **Table 464 – Association ends of EquipmentReliabilityProfile::TCSCCompensationPoint**  
4550 **with other classes**

| mult from | name                                 | mult to | type                                                 | description                                       |
|-----------|--------------------------------------|---------|------------------------------------------------------|---------------------------------------------------|
| 0..*      | ThyristorControlledSeriesCompensator | 1..1    | <a href="#">ThyristorControlledSeriesCompensator</a> | (NC) TCSC that has different compensation points. |

4551

4552 **3.296 (NC) TCSCController**4553 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

4555 TCSC controller is controlling the equipment to optimize the performance of the TCSC.

4556 Table 465 shows all attributes of TCSCController.

4557 **Table 465 – Attributes of EquipmentReliabilityProfile::TCSCController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4558

4559 Table 466 shows all association ends of TCSCController with other classes.

4560 **Table 466 – Association ends of EquipmentReliabilityProfile::TCSCController with other**  
4561 **classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

4562

### 4563 3.297 (NC) ThermalGeneratingUnitDependency

4564 Inheritance path = [PeerTemporalDependency](#)

4565 A peer temporal dependency that defines temporal or operational constraints between two  
4566 thermal generating units participating in combined operation.

4567 Note: The dependency may define required operating relationships, start-up or shutdown  
4568 sequencing, loading conditions, temporal constraints, or overlap between the generating units.  
4569 A lag is evaluated relative to the latest applicable state transition of the dependee generating  
4570 unit. If the dependee changes state again before the corresponding transition of the dependent  
4571 generating unit occurs, the previous reference transition is superseded. Consequently, a  
4572 previous start of the dependee cannot satisfy a start-to-start constraint after the dependee has  
4573 subsequently stopped and started again. Once the dependent has performed the corresponding  
4574 transition, that lag constraint is satisfied for that operating cycle.

4575 Example:

4576 - startToStartLag = 30M, startToStartLagKind = minimum: a dependent steam generating unit  
4577 may start no earlier than 30 minutes after the dependee gas generating unit starts. If the gas  
4578 generating unit stops during this period and subsequently starts again, the 30M duration is  
4579 evaluated from the new start.

4580 - finishToStartLag = 2H, finishToStartLagKind = exact: the dependent generating unit starts  
4581 exactly two hours after the dependee generating unit stops, provided that the dependee has  
4582 not subsequently changed state.

4583 - finishToFinishLag = 20M, finishToFinishLagKind = maximum: the dependent generating unit  
4584 shall stop no later than 20 minutes after the dependee generating unit stops.

4585 Table 467 shows all attributes of ThermalGeneratingUnitDependency.

4586 **Table 467 – Attributes of**  
4587 **EquipmentReliabilityProfile::ThermalGeneratingUnitDependency**

| name                  | mult | type                                     | description                                                 |
|-----------------------|------|------------------------------------------|-------------------------------------------------------------|
| constraintKind        | 1..1 | <a href="#">DependencyConstraintKind</a> | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |
| finishToFinishLag     | 0..1 | <a href="#">Duration</a>                 | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |
| finishToFinishLagKind | 0..1 | <a href="#">ReferenceValueKind</a>       | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |

| name                 | mult | type                               | description                                                 |
|----------------------|------|------------------------------------|-------------------------------------------------------------|
| finishToStartLag     | 0..1 | <a href="#">Duration</a>           | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |
| finishToStartLagKind | 0..1 | <a href="#">ReferenceValueKind</a> | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |
| mRID                 | 1..1 | <a href="#">String</a>             | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |
| overlap              | 0..1 | <a href="#">Duration</a>           | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |
| overlapKind          | 0..1 | <a href="#">ReferenceValueKind</a> | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |
| startToStartLag      | 0..1 | <a href="#">Duration</a>           | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |
| startToStartLagKind  | 0..1 | <a href="#">ReferenceValueKind</a> | (NC) inherited from: <a href="#">PeerTemporalDependency</a> |

Table 468 shows all association ends of ThermalGeneratingUnitDependency with other classes.

**Table 468 – Association ends of  
EquipmentReliabilityProfile::ThermalGeneratingUnitDependency with other classes**

| mult from | name                    | mult to | type                                  | description                                                                                           |
|-----------|-------------------------|---------|---------------------------------------|-------------------------------------------------------------------------------------------------------|
| 0..*      | DependeeGeneratingUnit  | 1..1    | <a href="#">ThermalGeneratingUnit</a> | The thermal generating unit upon which operation of the dependent generating unit depends.            |
| 0..*      | DependentGeneratingUnit | 1..1    | <a href="#">ThermalGeneratingUnit</a> | The thermal generating unit whose timing or operation is constrained by the dependee generating unit. |

### 3.298 (NC) ThermalPowerPlant

Inheritance path = [PowerPlant](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

A power plant that coordinates one or more thermal generating units for producing electrical energy through a thermal energy conversion process.

Table 469 shows all attributes of ThermalPowerPlant.

**Table 469 – Attributes of EquipmentReliabilityProfile::ThermalPowerPlant**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| nominalP           | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| maxOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| minOperatingP      | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| deadbandMinP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| deadbandMaxP       | 0..1 | <a href="#">ActivePower</a> | (NC) inherited from: <a href="#">PowerPlant</a>                        |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

### 3.299 (NC) ThyristorControlledSeriesCompensator

Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) : [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Thyristor-controlled series capacitors (TCSC) is a type of flexible AC transmission system regulating equipment that is configured with controlled reactors in parallel with sections of a capacitor bank. This combination allows smooth control of the fundamental frequency capacitive reactance over a wide range. The thyristor valve contains a string of series connected

4607 high power thyristors. TCSC can control power flows in order to achieve eliminating of line  
4608 overloads, reducing loop flows and minimising system losses.  
4609 Table 470 shows all attributes of ThyristorControlledSeriesCompensator.

4610 **Table 470 – Attributes of**  
4611 **EquipmentReliabilityProfile::ThyristorControlledSeriesCompensator**

| name                | mult | type                                    | description                                                                                                                         |
|---------------------|------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| flexibleCapacitiveZ | 1..1 | <a href="#">Impedance</a>               | (NC) Flexible impedance that can be controlled by the compensator when operating in the capacitive range. Shall always be positive. |
| flexibleInductiveZ  | 1..1 | <a href="#">Impedance</a>               | (NC) Flexible impedance that can be controlled by the compensator when operating in the inductive range. Shall always be negative.  |
| minI                | 1..1 | <a href="#">CurrentFlow</a>             | (NC) Minimum current below which the device bypassed.                                                                               |
| reconnectionI       | 1..1 | <a href="#">CurrentFlow</a>             | (NC) The current for which the TCSC returns back to operation after bypass.                                                         |
| slope               | 1..1 | <a href="#">VoltagePerReactivePower</a> | (NC) inherited from: <a href="#">FACTSEquipment</a>                                                                                 |
| ratedI              | 0..1 | <a href="#">CurrentFlow</a>             | (NC) inherited from: <a href="#">FACTSEquipment</a>                                                                                 |
| ratedU              | 0..1 | <a href="#">Voltage</a>                 | (NC) inherited from: <a href="#">FACTSEquipment</a>                                                                                 |
| ratedC              | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                                                                                 |
| ratedL              | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                                                                                 |
| minC                | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                                                                                 |
| maxC                | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                                                                                 |
| minL                | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                                                                                 |
| maxL                | 0..1 | <a href="#">Reactance</a>               | (NC) inherited from: <a href="#">FACTSEquipment</a>                                                                                 |
| energyIdentCodeEic  | 0..1 | <a href="#">String</a>                  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                              |
| description         | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                                                                                    |
| mRID                | 1..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                                                                                    |
| name                | 0..1 | <a href="#">String</a>                  | inherited from: <a href="#">IdentifiedObject</a>                                                                                    |

4612  
4613 Table 471 shows all association ends of ThyristorControlledSeriesCompensator with other  
4614 classes.

4615 **Table 471 – Association ends of**  
4616 **EquipmentReliabilityProfile::ThyristorControlledSeriesCompensator with other classes**

| mult from | name                | mult to | type                                | description                                           |
|-----------|---------------------|---------|-------------------------------------|-------------------------------------------------------|
| 0..*      | EquipmentController | 0..1    | <a href="#">EquipmentController</a> | (NC) inherited from: <a href="#">RegulatingCondEq</a> |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>             | (NC) inherited from: <a href="#">Equipment</a>        |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>           | (NC) inherited from: <a href="#">Equipment</a>        |

4617  
4618 **3.300 (NC) ThyristorValve**  
4619 Inheritance path = [DCValve](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
4620 [IdentifiedObject](#)  
4621 Thyristor is a semi-controlled valve. A thyristor valve can "block" voltage in both directions until  
4622 a pulse is sent to its gate. Once it starts conducting, it stays on until the current naturally drops  
4623 to zero.

4624 Table 472 shows all attributes of ThyristorValve.

4625 **Table 472 – Attributes of EquipmentReliabilityProfile::ThyristorValve**

| name               | mult | type                        | description                                                            |
|--------------------|------|-----------------------------|------------------------------------------------------------------------|
| valveU0            | 0..1 | <a href="#">Voltage</a>     | (NC) inherited from: <a href="#">DCValve</a>                           |
| ratedCurrent       | 0..1 | <a href="#">CurrentFlow</a> | (NC) inherited from: <a href="#">DCConductingEquipment</a>             |
| ratedUdc           | 0..1 | <a href="#">Voltage</a>     | inherited from: <a href="#">DCConductingEquipment</a>                  |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                       |

4626

4627 Table 473 shows all association ends of ThyristorValve with other classes.

4628 **Table 473 – Association ends of EquipmentReliabilityProfile::ThyristorValve with other**  
4629 **classes**

| mult from | name                | mult to | type                        | description                                    |
|-----------|---------------------|---------|-----------------------------|------------------------------------------------|
| 0..*      | CsConverter         | 0..1    | <a href="#">CsConverter</a> | (NC) The CsConverter that has ThyristorValve.  |
| 0..*      | Circuit             | 0..1    | <a href="#">Circuit</a>     | (NC) inherited from: <a href="#">Equipment</a> |
| 0..*      | AggregatedEquipment | 0..1    | <a href="#">Equipment</a>   | (NC) inherited from: <a href="#">Equipment</a> |

4630

### 4631 3.301 (NC) TieCorridor

4632 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

4633 A collection of one or more tie-lines or direct current poles that connect two different control  
4634 areas.

4635 Table 474 shows all attributes of TieCorridor.

4636 **Table 474 – Attributes of EquipmentReliabilityProfile::TieCorridor**

| name                       | mult | type                        | description                                                                                                                                                    |
|----------------------------|------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| delayRegulatingReserve     | 0..1 | <a href="#">Seconds</a>     | (NC) A positive number that is a multiple of Automatic Generation Control (AGC) run cycles that describes the delay in adapting imbalance of the tie corridor. |
| maxRegulatingReserveRamp   | 0..1 | <a href="#">Float</a>       | (NC) Maximum authorized ramp for regulating reserve.                                                                                                           |
| thresholdRegulatingReserve | 0..1 | <a href="#">ActivePower</a> | (NC) Regulating reserve threshold.                                                                                                                             |
| energyIdentCodeEic         | 0..1 | <a href="#">String</a>      | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                         |
| description                | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                               |
| mRID                       | 1..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                               |
| name                       | 0..1 | <a href="#">String</a>      | inherited from: <a href="#">IdentifiedObject</a>                                                                                                               |

4637

4638 Table 475 shows all association ends of TieCorridor with other classes.

**Table 475 – Association ends of EquipmentReliabilityProfile::TieCorridor with other classes**

| mult from | name                     | mult to | type                                     | description                                                |
|-----------|--------------------------|---------|------------------------------------------|------------------------------------------------------------|
| 0..*      | LoadFrequencyControlArea | 0..1    | <a href="#">LoadFrequencyControlArea</a> | (NC) LoadFrequencyControlArea controlling the TieCorridor. |

**3.302 (Description) TieFlow**

Inheritance path = [IdentifiedObject](#)

Defines the structure (in terms of location and direction) of the net interchange constraint for a control area. This constraint may be used by either AGC or power flow.

Table 476 shows all attributes of TieFlow.

**Table 476 – Attributes of EquipmentReliabilityProfile::TieFlow**

| name               | mult | type                   | description                                                            |
|--------------------|------|------------------------|------------------------------------------------------------------------|
| energyIdentCodeEic | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 477 shows all association ends of TieFlow with other classes.

**Table 477 – Association ends of EquipmentReliabilityProfile::TieFlow with other classes**

| mult from | name        | mult to | type                        | description                               |
|-----------|-------------|---------|-----------------------------|-------------------------------------------|
| 0..*      | TieCorridor | 0..1    | <a href="#">TieCorridor</a> | (NC) Tie corridor which has the tie flow. |

**3.303 (NC) TransmissionSystemOperator**

Inheritance path = [SystemOperator](#) : [SystemOperationOrganisationPost](#) : [OrganisationRole](#) : [IdentifiedObject](#)

A system operator role that is responsible for operating of an energy transmission network.

Table 478 shows all attributes of TransmissionSystemOperator.

**Table 478 – Attributes of EquipmentReliabilityProfile::TransmissionSystemOperator**

| name                 | mult | type                   | description                                                            |
|----------------------|------|------------------------|------------------------------------------------------------------------|
| globalLocationNumber | 0..1 | <a href="#">String</a> | (NC) inherited from: <a href="#">OrganisationRole</a>                  |
| energyIdentCodeEic   | 0..1 | <a href="#">String</a> | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description          | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                 | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                 | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 479 shows all association ends of TransmissionSystemOperator with other classes.

**Table 479 – Association ends of  
EquipmentReliabilityProfile::TransmissionSystemOperator with other classes**

| mult from | name         | mult to | type                         | description                                      |
|-----------|--------------|---------|------------------------------|--------------------------------------------------|
| 0..*      | Organisation | 0..1    | <a href="#">Organisation</a> | inherited from: <a href="#">OrganisationRole</a> |

### 3.304 (NC) UnifiedPowerFlowController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

Unified power flow controller (UPFC) is providing fast-acting reactive power compensation on high-voltage electricity transmission networks.

Table 480 shows all attributes of UnifiedPowerFlowController.

**Table 480 – Attributes of EquipmentReliabilityProfile::UnifiedPowerFlowController**

| name               | mult | type                    | description                                                            |
|--------------------|------|-------------------------|------------------------------------------------------------------------|
| type               | 0..1 | <a href="#">String</a>  | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| normalEnabled      | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">AutomationFunction</a>                |
| energyIdentCodeEic | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description        | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID               | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name               | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

Table 481 shows all association ends of UnifiedPowerFlowController with other classes.

**Table 481 – Association ends of  
EquipmentReliabilityProfile::UnifiedPowerFlowController with other classes**

| mult from | name   | mult to | type                               | description                                             |
|-----------|--------|---------|------------------------------------|---------------------------------------------------------|
| 0..*      | PartOf | 0..1    | <a href="#">AutomationFunction</a> | (NC) inherited from: <a href="#">AutomationFunction</a> |

### 3.305 (NC) VoltageAngleControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

Voltage angle control function is a function block that calculates operating point of the controlled equipment to achieve the target voltage angle.

Table 482 shows all attributes of VoltageAngleControlFunction.

**Table 482 – Attributes of EquipmentReliabilityProfile::VoltageAngleControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

| name | mult | type                   | description                                      |
|------|------|------------------------|--------------------------------------------------|
| mRID | 1..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |
| name | 0..1 | <a href="#">String</a> | inherited from: <a href="#">IdentifiedObject</a> |

Table 483 shows all association ends of VoltageAngleControlFunction with other classes.

**Table 483 – Association ends of  
EquipmentReliabilityProfile::VoltageAngleControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

### 3.306 (NC) VoltageAngleLimit

Inheritance path = [OperationalLimit](#) : [IdentifiedObject](#)

Voltage angle limit between two terminals. The association end OperationalLimitSet.Terminal defines one end and the host of the limit. The association end VoltageAngleLimit.AngleReferenceTerminal defines the reference terminal.

Table 484 shows all attributes of VoltageAngleLimit.

**Table 484 – Attributes of EquipmentReliabilityProfile::VoltageAngleLimit**

| name                | mult | type                         | description                                                                                                                                                                                                                                               |
|---------------------|------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalValue         | 1..1 | <a href="#">AngleDegrees</a> | (NC) The difference in angle degrees between referenced by the association end OperationalLimitSet.Terminal and the Terminal referenced by the association end VoltageAngleLimit.AngleReferenceTerminal. The value shall be positive (greater than zero). |
| isFlowToRefTerminal | 0..1 | <a href="#">Boolean</a>      | (NC) True if the flow is from the operating limit terminal to the angle reference terminal. False means that the flow is the other direction. When it is not given, the limit is the same for both directions.                                            |
| energyIdentCodeEic  | 0..1 | <a href="#">String</a>       | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                    |
| description         | 0..1 | <a href="#">String</a>       | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                          |
| mRID                | 1..1 | <a href="#">String</a>       | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                          |
| name                | 0..1 | <a href="#">String</a>       | inherited from: <a href="#">IdentifiedObject</a>                                                                                                                                                                                                          |

Table 485 shows all association ends of VoltageAngleLimit with other classes.

**Table 485 – Association ends of EquipmentReliabilityProfile::VoltageAngleLimit with other classes**

| mult from | name                   | mult to | type                                 | description                                                    |
|-----------|------------------------|---------|--------------------------------------|----------------------------------------------------------------|
| 0..*      | AngleReferenceTerminal | 1..1    | <a href="#">Terminal</a>             | (NC) The angle reference terminal for the voltage angle limit. |
| 1..*      | OperationalLimitType   | 1..1    | <a href="#">OperationalLimitType</a> | inherited from: <a href="#">OperationalLimit</a>               |
| 1..*      | OperationalLimitSet    | 1..1    | <a href="#">OperationalLimitSet</a>  | inherited from: <a href="#">OperationalLimit</a>               |

4698 **3.307 (NC) VoltageControlFunction**4699 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)4700 Voltage control function is a function block that calculate the operating point of the controlled  
4701 equipment to achieve the target voltage.

4702 Table 486 shows all attributes of VoltageControlFunction.

4703 **Table 486 – Attributes of EquipmentReliabilityProfile::VoltageControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4704

4705 Table 487 shows all association ends of VoltageControlFunction with other classes.

4706 **Table 487 – Association ends of EquipmentReliabilityProfile::VoltageControlFunction**  
4707 **with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

4708

4709 **3.308 (NC) VoltageInjectionControlFunction**4710 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)4711 Voltage injection control function is a function block that calculates the operating point of the  
4712 controlled equipment to achieve the target voltage injection.

4713 Table 488 shows all attributes of VoltageInjectionControlFunction.

4714 **Table 488 – Attributes of EquipmentReliabilityProfile::VoltageInjectionControlFunction**

| name                  | mult | type                    | description                                                            |
|-----------------------|------|-------------------------|------------------------------------------------------------------------|
| isDiscrete            | 1..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| targetValueDeadband   | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| maxAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| minAllowedTargetValue | 0..1 | <a href="#">PerCent</a> | (NC) inherited from: <a href="#">ControlFunctionBlock</a>              |
| normalEnabled         | 0..1 | <a href="#">Boolean</a> | (NC) inherited from: <a href="#">FunctionBlock</a>                     |
| energyIdentCodeEic    | 0..1 | <a href="#">String</a>  | (deprecated,European) inherited from: <a href="#">IdentifiedObject</a> |
| description           | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| mRID                  | 1..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |
| name                  | 0..1 | <a href="#">String</a>  | inherited from: <a href="#">IdentifiedObject</a>                       |

4715

4716 Table 489 shows all association ends of VoltageInjectionControlFunction with other classes.

4717 **Table 489 – Association ends of**  
4718 **EquipmentReliabilityProfile::VoltageInjectionControlFunction with other classes**

| mult from | name                 | mult to | type                                 | description                                        |
|-----------|----------------------|---------|--------------------------------------|----------------------------------------------------|
| 1..*      | AutomationBlockGroup | 0..1    | <a href="#">AutomationBlockGroup</a> | (NC) inherited from: <a href="#">FunctionBlock</a> |
| 0..*      | AutomationFunction   | 0..1    | <a href="#">AutomationFunction</a>   | (NC) inherited from: <a href="#">FunctionBlock</a> |

4719

4720

4721

## 4722 **Annex A(informative): Sample data**

### 4723 **A.1 General**

4724 This Annex is designed to illustrate the profile by using fragments of sample data. It is not meant  
4725 to be a complete set of examples covering all possibilities of using the profile. Defining a  
4726 complete set of test data is considered a separate activity to be performed for the purpose of  
4727 setting up interoperability testing and conformity related to this profile.

### 4728 **A.2 Sample instance data**

4729 Test data files are available in the CIM EG SharePoint.