



European Network of  
Transmission System Operators  
for Electricity

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# EQUIPMENT RELIABILITY PROFILE SPECIFICATION

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ICTC APPROVED  
VERSION 2.3.1

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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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34	<b>CONTENTS</b>		
35	Copyright notice:.....		2
36	Revision History.....		3
37	CONTENTS .....		4
38	1 Introduction .....		23
39	2 Application profile specification .....		23
40	2.1 Version information .....		23
41	2.2 Constraints naming convention .....		23
42	2.3 Profile constraints .....		24
43	2.4 Metadata.....		27
44	2.4.1 Constraints .....		27
45	2.4.2 Reference metadata .....		27
46	3 Detailed Profile Specification .....		28
47	3.1 General.....		28
48	3.2 (abstract) ACDCTerminal root class .....		40
49	3.3 (NC) ActivePowerControlFunction .....		40
50	3.4 (NC) AmbientTemperatureDependencyCurve .....		41
51	3.5 (NC) AreaDispatchableUnit .....		41
52	3.6 (abstract,NC) AutomationFunction .....		42
53	3.7 (NC) BaseOverloadLimitCurve .....		43
54	3.8 (NC) BiddingZone .....		43
55	3.9 (NC) BiddingZoneBorder .....		44
56	3.10 (NC) CapacityCalculationRegion .....		44
57	3.11 (NC) ChargingUnit .....		45
58	3.12 (abstract,NC) Circuit .....		46
59	3.13 (NC) CircuitShare .....		46
60	3.14 (NC) ClosedDistributionSystemOperator .....		47
61	3.15 (NC) CompensatorController .....		47
62	3.16 (abstract) ConductingEquipment .....		48
63	3.17 (abstract) ConnectivityNodeContainer .....		48
64	3.18 (Description) ControlArea.....		49
65	3.19 (abstract,NC) ControlFunctionBlock .....		50
66	3.20 (abstract) Curve .....		50
67	3.21 CurveData root class .....		51
68	3.22 (Description) DCConverterUnit.....		51
69	3.23 (abstract) DCEquipmentContainer .....		52
70	3.24 (Description) DCLine root class.....		52
71	3.25 (NC) DCPole .....		52
72	3.26 (NC) DCTieCorridor .....		53
73	3.27 (NC) DirectCurrentMasterController .....		54
74	3.28 (NC) DirectCurrentSystemOperator .....		55
75	3.29 (NC) DistributionSystemOperator .....		55
76	3.30 (NC) DurationOverloadLimitCurve .....		56
77	3.31 (NC) EnergyAlignmentCoordinator .....		56

78	3.32	(NC) EnergyBlockComponent .....	57
79	3.33	(NC) EnergyBlockOrder .....	57
80	3.34	(abstract,NC) EnergyComponent .....	58
81	3.35	(abstract) EnergyConnection.....	59
82	3.36	(Description) EnergyConsumer .....	59
83	3.37	(NC) EnergyCoordinationRegion .....	60
84	3.38	(NC) EnergyType .....	60
85	3.39	(abstract,Description) Equipment .....	61
86	3.40	(abstract) EquipmentContainer.....	61
87	3.41	(abstract,NC) EquipmentController .....	62
88	3.42	(NC) ExceptionalPowerTransferCorridor .....	62
89	3.43	(abstract,NC) FACTSEquipment.....	63
90	3.44	Feeder .....	63
91	3.45	(NC) FlexibleEnergyUnit .....	64
92	3.46	(abstract,NC) FunctionBlock .....	65
93	3.47	(abstract,NC) FunctionInputVariable .....	66
94	3.48	(NC) FunctionOutputVariable .....	66
95	3.49	(NC) GateInputPin .....	67
96	3.50	(Description) GeneratingUnit.....	67
97	3.51	(NC) GeothermalGeneratingUnit .....	69
98	3.52	(Description) HydroPump .....	70
99	3.53	(abstract) IdentifiedObject root class .....	71
100	3.54	(NC) ImpedanceControlFunction .....	71
101	3.55	(abstract,NC) LimitDependencyCurve .....	72
102	3.56	(Description) Line .....	72
103	3.57	(NC) LineCircuit .....	73
104	3.58	(NC) LoadFrequencyControlArea .....	73
105	3.59	(NC) LoadFrequencyControlBlock .....	74
106	3.60	(NC) LoadFrequencyControlOperator .....	75
107	3.61	(NC) ModularStaticSynchronousSeriesCompensator .....	75
108	3.62	(Description) NuclearGeneratingUnit .....	76
109	3.63	(abstract) OperationalLimit.....	77
110	3.64	(Description) OperationalLimitSet .....	78
111	3.65	OperationalLimitType .....	78
112	3.66	(NC) OrdinaryPowerTransferCorridor .....	79
113	3.67	Organisation .....	79
114	3.68	(abstract) OrganisationRole .....	80
115	3.69	(NC) OutageCoordinationRegion.....	80
116	3.70	(NC) OutageCoordinator .....	81
117	3.71	(NC) OutagePlanningAgent .....	81
118	3.72	(NC) PinTerminal .....	82
119	3.73	(NC) PowerElectricalChemicalUnit .....	82
120	3.74	(NC) PowerElectronicsMarineUnit .....	83
121	3.75	(Description) PowerElectronicsUnit .....	84
122	3.76	(NC) PowerFactorControlFunction .....	85
123	3.77	(abstract,NC) PowerSystemOrganisationRole .....	85

124	3.78	(abstract) PowerSystemResource .....	86
125	3.79	(abstract,NC) PowerTransferCorridor .....	86
126	3.80	(NC) PowerTransformerCircuit .....	86
127	3.81	(abstract,NC) PropertyReference root class .....	87
128	3.82	(NC) ProportionalEnergyComponent .....	87
129	3.83	(NC,Description) PTCTriggeredEquipment .....	88
130	3.84	(NC) ReactivePowerControlFunction .....	88
131	3.85	(NC) RecoveryOverloadLimitCurve .....	89
132	3.86	(abstract,NC) Region .....	89
133	3.87	(abstract) RegulatingCondEq .....	90
134	3.88	(NC) ScheduleResource .....	90
135	3.89	(NC) SchedulingArea .....	91
136	3.90	(NC) SecurityCoordinator .....	92
137	3.91	(NC) SolarRadiationDependencyCurve .....	92
138	3.92	(NC) StaticSynchronousCompensator .....	93
139	3.93	(NC) StaticSynchronousSeriesCompensator .....	94
140	3.94	(NC) SubSchedulingArea .....	95
141	3.95	(Description) Substation.....	96
142	3.96	(NC) SubstationController .....	96
143	3.97	(NC) SynchronousArea .....	97
144	3.98	(abstract,NC) SystemOperationCoordinator .....	97
145	3.99	(abstract,NC) SystemOperator .....	97
146	3.100	(abstract,Description) TapChanger root class .....	98
147	3.101	(abstract) Terminal.....	98
148	3.102	(NC) TieCorridor .....	98
149	3.103	(NC) ThyristorControlledSeriesCompensator.....	99
150	3.104	(NC) TransmissionSystemOperator .....	100
151	3.105	(NC) UnifiedPowerFlowController.....	100
152	3.106	(NC) VoltageAngleLimit.....	101
153	3.107	(NC) VoltageControlFunction .....	101
154	3.108	Currency enumeration.....	102
155	3.109	CurveStyle enumeration.....	106
156	3.110	(NC) MarineUnitKind enumeration.....	106
157	3.111	OperationalLimitDirectionKind enumeration.....	107
158	3.112	(NC) PinTerminalKind enumeration .....	107
159	3.113	(NC) NuclearReactorKind enumeration .....	107
160	3.114	(NC) GeothermalUnitKind enumeration .....	108
161	3.115	(NC) LogicalOperatorsKind enumeration .....	108
162	3.116	(NC) PowerElectricalChemicalUnitKind enumeration .....	109
163	3.117	UnitMultiplier enumeration .....	109
164	3.118	UnitSymbol enumeration .....	109
165	3.119	ActivePower datatype .....	111
166	3.120	ActivePowerChangeRate datatype .....	111
167	3.121	AngleDegrees datatype.....	111
168	3.122	Frequency datatype .....	111
169	3.123	Impedance datatype.....	112

170	3.124	Money datatype .....	112
171	3.125	PerCent datatype .....	112
172	3.126	Reactance datatype .....	112
173	3.127	Seconds datatype .....	113
174	3.128	VoltagePerReactivePower datatype .....	113
175	3.129	Boolean primitive .....	113
176	3.130	Decimal primitive .....	113
177	3.131	Duration primitive .....	113
178	3.132	Float primitive .....	113
179	3.133	Integer primitive .....	113
180	3.134	String primitive .....	113
181	3.135	(NC) ACTieCorridor .....	113
182	3.136	(abstract) Conductor .....	114
183	3.137	(NC) CurrentControlFunction .....	115
184	3.138	(NC) TCSCCompensationPoint root class .....	115
185	3.139	(NC) StaticVarCompensator .....	116
186	3.140	(NC) LossCurve .....	117
187	3.141	(Description) DCSwitch .....	117
188	3.142	(abstract) DCConductingEquipment .....	118
189	3.143	(Description) DCDisconnecter .....	118
190	3.144	(Description) DCBreaker .....	119
191	3.145	(Description) DCGround .....	119
192	3.146	(Description) DCBusbar .....	120
193	3.147	(Description) DCShunt .....	120
194	3.148	(Description) DCSeriesDevice .....	121
195	3.149	(Description) DCLineSegment .....	121
196	3.150	(Description) DCChopper .....	122
197	3.151	(Description) TieFlow .....	122
198	3.152	(NC) PowerPlantController .....	123
199	3.153	(NC) TCSCController .....	123
200	3.154	(NC) DCCurrentControlFunction .....	124
201	3.155	(NC) DCVoltageControlFunction .....	125
202	3.156	(NC) PhaseControlFunction .....	125
203	3.157	(NC) RampingPrincipleKind enumeration .....	126
204	3.158	(NC) DirectCurrentCircuit .....	126
205	3.159	(NC) OverlappingZone .....	127
206	3.160	(NC) TapChangerController .....	127
207	3.161	(NC) CurrentDroopControlFunction .....	128
208	3.162	(NC) VoltageInjectionControlFunction .....	128
209	3.163	(NC) SSSCController .....	129
210	3.164	(NC) CurrentDroopOverride root class .....	130
211	3.165	CurrentFlow datatype .....	131
212	3.166	Voltage datatype .....	131
213	3.167	PU datatype .....	131
214	3.168	Resistance datatype .....	131
215	3.169	(abstract) SynchronousMachine root class .....	131

216	3.170	ReactiveCapabilityCurve .....	132
217	3.171	Temperature datatype .....	132
218	3.172	Pressure datatype .....	133
219	3.173	(abstract) VsConverter root class .....	133
220	3.174	VsCapabilityCurve .....	133
221	3.175	(Description) EquivalentInjection root class .....	134
222	3.176	(NC) SSSCSimulationSettings root class .....	134
223	3.177	(NC) RotatingMachineController .....	134
224	3.178	(NC) InjectionController .....	135
225	3.179	(abstract) ACDCCConverter .....	135
226	3.180	Reservoir .....	136
227	3.181	(Description) HydroPowerPlant root class .....	136
228	3.182	(NC) InfeedLimit .....	137
229	3.183	(NC) InfeedTerminal root class .....	137
230	3.184	(NC) FuelStorage .....	138
231	3.185	(Description) FossilFuel root class .....	138
232	3.186	(NC) PowerCapacity root class .....	138
233	3.187	(NC) PowerShiftKeyStrategy .....	138
234	3.188	(NC) ShiftMethodKind enumeration .....	139
235	3.189	(NC) PowerShiftKeyKind enumeration .....	139
236	3.190	(NC) PowerBlockKind enumeration .....	140
237	3.191	(NC) EnergyGroup .....	141
238	3.192	(NC) EnergyKind enumeration .....	141
239	3.193	(abstract,NC) EnergySourceReference root class .....	142
240	3.194	(NC) DCHarmonicFilter .....	142
241	3.195	(NC) DCsmoothingReactor .....	143
242	3.196	(NC) DCsmoothingReactorArrester .....	143
243	3.197	(abstract,NC) DCHighSpeedSwitch .....	144
244	3.198	(abstract,NC) DCCommutationSwitch .....	144
245	3.199	(NC) DCConverterParallelingSwitch .....	145
246	3.200	(NC) DCBypassSwitch .....	145
247	3.201	(NC) DCNeutralBusGroundingSwitch .....	146
248	3.202	(NC) DCNeutralBusSwitch .....	147
249	3.203	(NC) DCMetalicReturnSwitch .....	147
250	3.204	(NC) DCEarthReturnTransferSwitch .....	148
251	3.205	(NC) DCLineParallelingSwitch .....	148
252	3.206	(abstract,NC) DirectCurrentEquipmentController .....	149
253	3.207	(NC) ACDCCConverterController .....	149
254	3.208	(NC) DirectCurrentPoleController .....	150
255	3.209	(NC) DirectCurrentBipoleController .....	151
256	3.210	(abstract,NC) DirectCurrentSubstationController .....	151
257	3.211	(NC) DirectCurrentSubstationPoleController .....	152
258	3.212	(NC) DirectCurrentSubstationBipoleController .....	152
259	3.213	(NC) DCSubstation .....	153
260	3.214	(NC) DCSubstationPole .....	154
261	3.215	(NC) DCSubstationBipole .....	154



262	3.216	(abstract,NC) DCSystem .....	155
263	3.217	(NC) BipolarDCSystem .....	155
264	3.218	(NC) MonopolarDCSystem .....	156
265	3.219	(NC) DCBiPole.....	156
266	3.220	(abstract,NC) PointOfCommonCoupling .....	157
267	3.221	(NC) ACPointOfCommonCoupling .....	157
268	3.222	(NC) DCPointOfCommonCoupling .....	158
269	3.223	ConnectivityNode .....	158
270	3.224	DCNode .....	158
271	3.225	(NC) AutomationBlockGroup root class .....	159
272	3.226	(NC) FrequencyControlFuntion .....	159
273	3.227	(abstract,NC) SystemControl .....	160
274	3.228	(NC) AreaInterchangeController.....	160
275	3.229	(NC) PowerFrequencyController .....	161
276	3.230	(NC) PowerFrequencyControlKind enumeration .....	162
277	3.231	(abstract,NC) MonitoringArea.....	162
278	3.232	(NC) FrequencyMonitoringTerminal root class.....	162
279	3.233	(NC) PowerElectronicsUnitController .....	163
280	3.234	(NC) ScheduleResourceController .....	163
281	3.235	(NC) PowerElectronicsConnectionController .....	164
282	3.236	(NC) DCSystemDirectionKind enumeration .....	164
283	3.237	(NC) DCSystemTransmissionKind enumeration .....	165
284	3.238	ReactivePower datatype .....	165
285	3.239	(NC) CoordinatedCapacityCalculator.....	165
286	3.240	(NC) ACEmulationControlFunction .....	166
287	Annex A (informative): Sample data .....		168
288	A.1	General.....	168
289	A.2	Sample instance data.....	168
290			
291	<b>List of figures</b>		
292	Figure 1 – Class diagram EquipmentReliabilityProfile::ControlMain .....		28
293	Figure 2 – Class diagram EquipmentReliabilityProfile::ControlFunctionBlock .....		29
294	Figure 3 – Class diagram EquipmentReliabilityProfile::DirectCurrentControl .....		29
295	Figure 4 – Class diagram EquipmentReliabilityProfile::DirectCurrentEquipment .....		30
296	Figure 5 – Class diagram EquipmentReliabilityProfile::DirectCurrentStructure .....		31
297	Figure 6 – Class diagram EquipmentReliabilityProfile::EnergyType .....		32
298	Figure 7 – Class diagram EquipmentReliabilityProfile::EquipmentController.....		32
299	Figure 8 – Class diagram EquipmentReliabilityProfile::SystemControl.....		33
300	Figure 9 – Class diagram EquipmentReliabilityProfile::Core .....		34
301	Figure 10 – Class diagram EquipmentReliabilityProfile::DirectCurrent.....		35
302	Figure 11 – Class diagram EquipmentReliabilityProfile::EnergyArea .....		36
303	Figure 12 – Class diagram EquipmentReliabilityProfile::ControllersAndFACTS .....		36
304	Figure 13 – Class diagram EquipmentReliabilityProfile::PowerShiftKey .....		37

305	Figure 14 – Class diagram EquipmentReliabilityProfile::PowerSystemOrganizationRole .....	38
306	Figure 15 – Class diagram EquipmentReliabilityProfile::PowerTransferCorridor .....	38
307	Figure 16 – Class diagram EquipmentReliabilityProfile::Production .....	39
308	Figure 17 – Class diagram EquipmentReliabilityProfile::ReactiveCapabilityCurve .....	39
309	Figure 18 – Class diagram EquipmentReliabilityProfile::ReliabilityLimits .....	40
310		
311	<b>List of tables</b>	
312	Table 1 – Attributes of EquipmentReliabilityProfile::ActivePowerControlFunction .....	40
313	Table 2 – Association ends of EquipmentReliabilityProfile::ActivePowerControlFunction	
314	with other classes .....	41
315	Table 3 – Attributes of	
316	EquipmentReliabilityProfile::AmbientTemperatureDependencyCurve .....	41
317	Table 4 – Attributes of EquipmentReliabilityProfile::AreaDispatchableUnit .....	42
318	Table 5 – Association ends of EquipmentReliabilityProfile::AreaDispatchableUnit with	
319	other classes .....	42
320	Table 6 – Attributes of EquipmentReliabilityProfile::AutomationFunction .....	42
321	Table 7 – Association ends of EquipmentReliabilityProfile::AutomationFunction with	
322	other classes .....	43
323	Table 8 – Attributes of EquipmentReliabilityProfile::BaseOverloadLimitCurve .....	43
324	Table 9 – Attributes of EquipmentReliabilityProfile::BiddingZone .....	43
325	Table 10 – Association ends of EquipmentReliabilityProfile::BiddingZone with other	
326	classes .....	44
327	Table 11 – Attributes of EquipmentReliabilityProfile::BiddingZoneBorder .....	44
328	Table 12 – Association ends of EquipmentReliabilityProfile::BiddingZoneBorder with	
329	other classes .....	44
330	Table 13 – Attributes of EquipmentReliabilityProfile::CapacityCalculationRegion .....	45
331	Table 14 – Association ends of EquipmentReliabilityProfile::CapacityCalculationRegion	
332	with other classes .....	45
333	Table 15 – Attributes of EquipmentReliabilityProfile::ChargingUnit .....	45
334	Table 16 – Association ends of EquipmentReliabilityProfile::ChargingUnit with other	
335	classes .....	46
336	Table 17 – Attributes of EquipmentReliabilityProfile::Circuit .....	46
337	Table 18 – Association ends of EquipmentReliabilityProfile::Circuit with other classes .....	46
338	Table 19 – Attributes of EquipmentReliabilityProfile::CircuitShare .....	46
339	Table 20 – Association ends of EquipmentReliabilityProfile::CircuitShare with other	
340	classes .....	47
341	Table 21 – Attributes of EquipmentReliabilityProfile::ClosedDistributionSystemOperator .....	47
342	Table 22 – Association ends of	
343	EquipmentReliabilityProfile::ClosedDistributionSystemOperator with other classes .....	47
344	Table 23 – Attributes of EquipmentReliabilityProfile::CompensatorController .....	48
345	Table 24 – Association ends of EquipmentReliabilityProfile::CompensatorController	
346	with other classes .....	48
347	Table 25 – Attributes of EquipmentReliabilityProfile::ConductingEquipment .....	48

348	Table 26 – Association ends of EquipmentReliabilityProfile::ConductingEquipment with	
349	other classes .....	48
350	Table 27 – Attributes of EquipmentReliabilityProfile::ConnectivityNodeContainer .....	49
351	Table 28 – Attributes of EquipmentReliabilityProfile::ControlArea .....	49
352	Table 29 – Association ends of EquipmentReliabilityProfile::ControlArea with other	
353	classes .....	49
354	Table 30 – Attributes of EquipmentReliabilityProfile::ControlFunctionBlock .....	50
355	Table 31 – Association ends of EquipmentReliabilityProfile::ControlFunctionBlock with	
356	other classes .....	50
357	Table 32 – Attributes of EquipmentReliabilityProfile::Curve .....	50
358	Table 33 – Attributes of EquipmentReliabilityProfile::CurveData .....	51
359	Table 34 – Association ends of EquipmentReliabilityProfile::CurveData with other	
360	classes .....	51
361	Table 35 – Attributes of EquipmentReliabilityProfile::DCConverterUnit.....	51
362	Table 36 – Association ends of EquipmentReliabilityProfile::DCConverterUnit with	
363	other classes .....	52
364	Table 37 – Attributes of EquipmentReliabilityProfile::DCEquipmentContainer .....	52
365	Table 38 – Association ends of EquipmentReliabilityProfile::DCLine with other classes .....	52
366	Table 39 – Attributes of EquipmentReliabilityProfile::DCPole .....	53
367	Table 40 – Association ends of EquipmentReliabilityProfile::DCPole with other classes .....	53
368	Table 41 – Attributes of EquipmentReliabilityProfile::DCTieCorridor.....	53
369	Table 42 – Association ends of EquipmentReliabilityProfile::DCTieCorridor with other	
370	classes .....	54
371	Table 43 – Attributes of EquipmentReliabilityProfile::DirectCurrentMasterController .....	54
372	Table 44 – Association ends of	
373	EquipmentReliabilityProfile::DirectCurrentMasterController with other classes .....	55
374	Table 45 – Attributes of EquipmentReliabilityProfile::DirectCurrentSystemOperator .....	55
375	Table 46 – Association ends of	
376	EquipmentReliabilityProfile::DirectCurrentSystemOperator with other classes .....	55
377	Table 47 – Attributes of EquipmentReliabilityProfile::DistributionSystemOperator .....	55
378	Table 48 – Association ends of	
379	EquipmentReliabilityProfile::DistributionSystemOperator with other classes .....	56
380	Table 49 – Attributes of EquipmentReliabilityProfile::DurationOverloadLimitCurve .....	56
381	Table 50 – Attributes of EquipmentReliabilityProfile::EnergyAlignmentCoordinator .....	56
382	Table 51 – Association ends of	
383	EquipmentReliabilityProfile::EnergyAlignmentCoordinator with other classes .....	57
384	Table 52 – Attributes of EquipmentReliabilityProfile::EnergyBlockComponent .....	57
385	Table 53 – Association ends of EquipmentReliabilityProfile::EnergyBlockComponent	
386	with other classes .....	57
387	Table 54 – Attributes of EquipmentReliabilityProfile::EnergyBlockOrder.....	57
388	Table 55 – Association ends of EquipmentReliabilityProfile::EnergyBlockOrder with	
389	other classes .....	58
390	Table 56 – Attributes of EquipmentReliabilityProfile::EnergyComponent .....	58

391	Table 57 – Association ends of EquipmentReliabilityProfile::EnergyComponent with	
392	other classes .....	58
393	Table 58 – Attributes of EquipmentReliabilityProfile::EnergyConnection .....	59
394	Table 59 – Association ends of EquipmentReliabilityProfile::EnergyConnection with	
395	other classes .....	59
396	Table 60 – Attributes of EquipmentReliabilityProfile::EnergyConsumer .....	59
397	Table 61 – Association ends of EquipmentReliabilityProfile::EnergyConsumer with	
398	other classes .....	60
399	Table 62 – Attributes of EquipmentReliabilityProfile::EnergyCoordinationRegion .....	60
400	Table 63 – Association ends of EquipmentReliabilityProfile::EnergyCoordinationRegion	
401	with other classes .....	60
402	Table 64 – Attributes of EquipmentReliabilityProfile::EnergyType .....	61
403	Table 65 – Association ends of EquipmentReliabilityProfile::EnergyType with other	
404	classes .....	61
405	Table 66 – Attributes of EquipmentReliabilityProfile::Equipment .....	61
406	Table 67 – Association ends of EquipmentReliabilityProfile::Equipment with other	
407	classes .....	61
408	Table 68 – Attributes of EquipmentReliabilityProfile::EquipmentContainer .....	62
409	Table 69 – Attributes of EquipmentReliabilityProfile::EquipmentController .....	62
410	Table 70 – Association ends of EquipmentReliabilityProfile::EquipmentController with	
411	other classes .....	62
412	Table 71 – Attributes of EquipmentReliabilityProfile::ExceptionalPowerTransferCorridor .....	62
413	Table 72 – Attributes of EquipmentReliabilityProfile::FACTSEquipment .....	63
414	Table 73 – Association ends of EquipmentReliabilityProfile::FACTSEquipment with	
415	other classes .....	63
416	Table 74 – Attributes of EquipmentReliabilityProfile::Feeder .....	64
417	Table 75 – Association ends of EquipmentReliabilityProfile::Feeder with other classes .....	64
418	Table 76 – Attributes of EquipmentReliabilityProfile::FlexibleEnergyUnit .....	64
419	Table 77 – Association ends of EquipmentReliabilityProfile::FlexibleEnergyUnit with	
420	other classes .....	65
421	Table 78 – Attributes of EquipmentReliabilityProfile::FunctionBlock .....	65
422	Table 79 – Association ends of EquipmentReliabilityProfile::FunctionBlock with other	
423	classes .....	66
424	Table 80 – Attributes of EquipmentReliabilityProfile::FunctionInputVariable .....	66
425	Table 81 – Association ends of EquipmentReliabilityProfile::FunctionInputVariable with	
426	other classes .....	66
427	Table 82 – Attributes of EquipmentReliabilityProfile::FunctionOutputVariable .....	66
428	Table 83 – Association ends of EquipmentReliabilityProfile::FunctionOutputVariable	
429	with other classes .....	67
430	Table 84 – Attributes of EquipmentReliabilityProfile::GateInputPin .....	67
431	Table 85 – Association ends of EquipmentReliabilityProfile::GateInputPin with other	
432	classes .....	67
433	Table 86 – Attributes of EquipmentReliabilityProfile::GeneratingUnit .....	68

434	Table 87 – Association ends of EquipmentReliabilityProfile::GeneratingUnit with other	
435	classes .....	69
436	Table 88 – Attributes of EquipmentReliabilityProfile::GeothermalGeneratingUnit.....	69
437	Table 89 – Association ends of EquipmentReliabilityProfile::GeothermalGeneratingUnit	
438	with other classes .....	70
439	Table 90 – Attributes of EquipmentReliabilityProfile::HydroPump .....	70
440	Table 91 – Association ends of EquipmentReliabilityProfile::HydroPump with other	
441	classes .....	71
442	Table 92 – Attributes of EquipmentReliabilityProfile::IdentifiedObject.....	71
443	Table 93 – Attributes of EquipmentReliabilityProfile::ImpedanceControlFunction .....	71
444	Table 94 – Association ends of EquipmentReliabilityProfile::ImpedanceControlFunction	
445	with other classes .....	72
446	Table 95 – Attributes of EquipmentReliabilityProfile::LimitDependencyCurve .....	72
447	Table 96 – Attributes of EquipmentReliabilityProfile::Line .....	73
448	Table 97 – Association ends of EquipmentReliabilityProfile::Line with other classes .....	73
449	Table 98 – Attributes of EquipmentReliabilityProfile::LineCircuit .....	73
450	Table 99 – Association ends of EquipmentReliabilityProfile::LineCircuit with other	
451	classes .....	73
452	Table 100 – Attributes of EquipmentReliabilityProfile::LoadFrequencyControlArea.....	74
453	Table 101 – Association ends of	
454	EquipmentReliabilityProfile::LoadFrequencyControlArea with other classes .....	74
455	Table 102 – Attributes of EquipmentReliabilityProfile::LoadFrequencyControlBlock .....	74
456	Table 103 – Association ends of	
457	EquipmentReliabilityProfile::LoadFrequencyControlBlock with other classes .....	75
458	Table 104 – Attributes of EquipmentReliabilityProfile::LoadFrequencyControlOperator .....	75
459	Table 105 – Association ends of	
460	EquipmentReliabilityProfile::LoadFrequencyControlOperator with other classes .....	75
461	Table 106 – Attributes of	
462	EquipmentReliabilityProfile::ModularStaticSynchronousSeriesCompensator .....	75
463	Table 107 – Association ends of	
464	EquipmentReliabilityProfile::ModularStaticSynchronousSeriesCompensator with other	
465	classes .....	76
466	Table 108 – Attributes of EquipmentReliabilityProfile::NuclearGeneratingUnit.....	76
467	Table 109 – Association ends of EquipmentReliabilityProfile::NuclearGeneratingUnit	
468	with other classes .....	77
469	Table 110 – Attributes of EquipmentReliabilityProfile::OperationalLimit.....	77
470	Table 111 – Association ends of EquipmentReliabilityProfile::OperationalLimit with	
471	other classes .....	77
472	Table 112 – Attributes of EquipmentReliabilityProfile::OperationalLimitSet .....	78
473	Table 113 – Association ends of EquipmentReliabilityProfile::OperationalLimitSet with	
474	other classes .....	78
475	Table 114 – Attributes of EquipmentReliabilityProfile::OperationalLimitType .....	78
476	Table 115 – Association ends of EquipmentReliabilityProfile::OperationalLimitType	
477	with other classes .....	79
478	Table 116 – Attributes of EquipmentReliabilityProfile::OrdinaryPowerTransferCorridor .....	79

479	Table 117 – Attributes of EquipmentReliabilityProfile::Organisation .....	79
480	Table 118 – Attributes of EquipmentReliabilityProfile::OrganisationRole .....	80
481	Table 119 – Association ends of EquipmentReliabilityProfile::OrganisationRole with	
482	other classes .....	80
483	Table 120 – Attributes of EquipmentReliabilityProfile::OutageCoordinationRegion .....	80
484	Table 121 – Association ends of	
485	EquipmentReliabilityProfile::OutageCoordinationRegion with other classes .....	81
486	Table 122 – Attributes of EquipmentReliabilityProfile::OutageCoordinator .....	81
487	Table 123 – Association ends of EquipmentReliabilityProfile::OutageCoordinator with	
488	other classes .....	81
489	Table 124 – Attributes of EquipmentReliabilityProfile::OutagePlanningAgent .....	81
490	Table 125 – Association ends of EquipmentReliabilityProfile::OutagePlanningAgent	
491	with other classes .....	82
492	Table 126 – Attributes of EquipmentReliabilityProfile::PinTerminal .....	82
493	Table 127 – Association ends of EquipmentReliabilityProfile::PinTerminal with other	
494	classes .....	82
495	Table 128 – Attributes of EquipmentReliabilityProfile::PowerElectricalChemicalUnit .....	83
496	Table 129 – Association ends of	
497	EquipmentReliabilityProfile::PowerElectricalChemicalUnit with other classes .....	83
498	Table 130 – Attributes of EquipmentReliabilityProfile::PowerElectronicsMarineUnit .....	83
499	Table 131 – Association ends of	
500	EquipmentReliabilityProfile::PowerElectronicsMarineUnit with other classes .....	84
501	Table 132 – Attributes of EquipmentReliabilityProfile::PowerElectronicsUnit .....	84
502	Table 133 – Association ends of EquipmentReliabilityProfile::PowerElectronicsUnit	
503	with other classes .....	84
504	Table 134 – Attributes of EquipmentReliabilityProfile::PowerFactorControlFunction .....	85
505	Table 135 – Association ends of	
506	EquipmentReliabilityProfile::PowerFactorControlFunction with other classes .....	85
507	Table 136 – Attributes of EquipmentReliabilityProfile::PowerSystemOrganisationRole .....	85
508	Table 137 – Association ends of	
509	EquipmentReliabilityProfile::PowerSystemOrganisationRole with other classes .....	86
510	Table 138 – Attributes of EquipmentReliabilityProfile::PowerSystemResource .....	86
511	Table 139 – Attributes of EquipmentReliabilityProfile::PowerTransferCorridor .....	86
512	Table 140 – Attributes of EquipmentReliabilityProfile::PowerTransformerCircuit .....	87
513	Table 141 – Association ends of EquipmentReliabilityProfile::PowerTransformerCircuit	
514	with other classes .....	87
515	Table 142 – Attributes of EquipmentReliabilityProfile::ProportionalEnergyComponent .....	87
516	Table 143 – Association ends of	
517	EquipmentReliabilityProfile::ProportionalEnergyComponent with other classes .....	87
518	Table 144 – Attributes of EquipmentReliabilityProfile::PTCTriggeredEquipment .....	88
519	Table 145 – Association ends of EquipmentReliabilityProfile::PTCTriggeredEquipment	
520	with other classes .....	88
521	Table 146 – Attributes of EquipmentReliabilityProfile::ReactivePowerControlFunction .....	88

522	Table 147 – Association ends of	
523	EquipmentReliabilityProfile::ReactivePowerControlFunction with other classes .....	89
524	Table 148 – Attributes of EquipmentReliabilityProfile::RecoveryOverloadLimitCurve .....	89
525	Table 149 – Attributes of EquipmentReliabilityProfile::Region .....	89
526	Table 150 – Association ends of EquipmentReliabilityProfile::Region with other classes .....	89
527	Table 151 – Attributes of EquipmentReliabilityProfile::RegulatingCondEq .....	90
528	Table 152 – Association ends of EquipmentReliabilityProfile::RegulatingCondEq with	
529	other classes .....	90
530	Table 153 – Attributes of EquipmentReliabilityProfile::ScheduleResource .....	90
531	Table 154 – Association ends of EquipmentReliabilityProfile::ScheduleResource with	
532	other classes .....	91
533	Table 155 – Attributes of EquipmentReliabilityProfile::SchedulingArea.....	91
534	Table 156 – Association ends of EquipmentReliabilityProfile::SchedulingArea with	
535	other classes .....	92
536	Table 157 – Attributes of EquipmentReliabilityProfile::SecurityCoordinator .....	92
537	Table 158 – Association ends of EquipmentReliabilityProfile::SecurityCoordinator with	
538	other classes .....	92
539	Table 159 – Attributes of EquipmentReliabilityProfile::SolarRadiationDependencyCurve .....	93
540	Table 160 – Attributes of EquipmentReliabilityProfile::StaticSynchronousCompensator .....	93
541	Table 161 – Association ends of	
542	EquipmentReliabilityProfile::StaticSynchronousCompensator with other classes .....	94
543	Table 162 – Attributes of	
544	EquipmentReliabilityProfile::StaticSynchronousSeriesCompensator .....	94
545	Table 163 – Association ends of	
546	EquipmentReliabilityProfile::StaticSynchronousSeriesCompensator with other classes .....	95
547	Table 164 – Attributes of EquipmentReliabilityProfile::SubSchedulingArea .....	95
548	Table 165 – Association ends of EquipmentReliabilityProfile::SubSchedulingArea with	
549	other classes .....	95
550	Table 166 – Attributes of EquipmentReliabilityProfile::Substation.....	96
551	Table 167 – Association ends of EquipmentReliabilityProfile::Substation with other	
552	classes .....	96
553	Table 168 – Attributes of EquipmentReliabilityProfile::SubstationController .....	96
554	Table 169 – Association ends of EquipmentReliabilityProfile::SubstationController with	
555	other classes .....	96
556	Table 170 – Attributes of EquipmentReliabilityProfile::SynchronousArea.....	97
557	Table 171 – Attributes of EquipmentReliabilityProfile::SystemOperationCoordinator .....	97
558	Table 172 – Association ends of	
559	EquipmentReliabilityProfile::SystemOperationCoordinator with other classes.....	97
560	Table 173 – Attributes of EquipmentReliabilityProfile::SystemOperator .....	97
561	Table 174 – Association ends of EquipmentReliabilityProfile::SystemOperator with	
562	other classes .....	98
563	Table 175 – Association ends of EquipmentReliabilityProfile::TapChanger with other	
564	classes .....	98
565	Table 176 – Attributes of EquipmentReliabilityProfile::TieCorridor.....	98

566	Table 177 – Association ends of EquipmentReliabilityProfile::TieCorridor with other	
567	classes .....	99
568	Table 178 – Attributes of	
569	EquipmentReliabilityProfile::ThyristorControlledSeriesCompensator .....	99
570	Table 179 – Association ends of	
571	EquipmentReliabilityProfile::ThyristorControlledSeriesCompensator with other classes .....	100
572	Table 180 – Attributes of EquipmentReliabilityProfile::TransmissionSystemOperator .....	100
573	Table 181 – Association ends of	
574	EquipmentReliabilityProfile::TransmissionSystemOperator with other classes .....	100
575	Table 182 – Attributes of EquipmentReliabilityProfile::UnifiedPowerFlowController .....	100
576	Table 183 – Association ends of	
577	EquipmentReliabilityProfile::UnifiedPowerFlowController with other classes .....	101
578	Table 184 – Attributes of EquipmentReliabilityProfile::VoltageAngleLimit .....	101
579	Table 185 – Association ends of EquipmentReliabilityProfile::VoltageAngleLimit with	
580	other classes .....	101
581	Table 186 – Attributes of EquipmentReliabilityProfile::VoltageControlFunction .....	102
582	Table 187 – Association ends of EquipmentReliabilityProfile::VoltageControlFunction	
583	with other classes .....	102
584	Table 188 – Literals of EquipmentReliabilityProfile::Currency .....	102
585	Table 189 – Literals of EquipmentReliabilityProfile::CurveStyle.....	106
586	Table 190 – Literals of EquipmentReliabilityProfile::MarineUnitKind.....	107
587	Table 191 – Literals of EquipmentReliabilityProfile::OperationalLimitDirectionKind .....	107
588	Table 192 – Literals of EquipmentReliabilityProfile::PinTerminalKind .....	107
589	Table 193 – Literals of EquipmentReliabilityProfile::NuclearReactorKind .....	108
590	Table 194 – Literals of EquipmentReliabilityProfile::GeothermalUnitKind .....	108
591	Table 195 – Literals of EquipmentReliabilityProfile::LogicalOperatorsKind .....	108
592	Table 196 – Literals of EquipmentReliabilityProfile::PowerElectricalChemicalUnitKind .....	109
593	Table 197 – Literals of EquipmentReliabilityProfile::UnitMultiplier .....	109
594	Table 198 – Literals of EquipmentReliabilityProfile::UnitSymbol.....	110
595	Table 199 – Attributes of EquipmentReliabilityProfile::ActivePower .....	111
596	Table 200 – Attributes of EquipmentReliabilityProfile::ActivePowerChangeRate .....	111
597	Table 201 – Attributes of EquipmentReliabilityProfile::AngleDegrees .....	111
598	Table 202 – Attributes of EquipmentReliabilityProfile::Frequency .....	112
599	Table 203 – Attributes of EquipmentReliabilityProfile::Impedance .....	112
600	Table 204 – Attributes of EquipmentReliabilityProfile::Money .....	112
601	Table 205 – Attributes of EquipmentReliabilityProfile::PerCent .....	112
602	Table 206 – Attributes of EquipmentReliabilityProfile::Reactance.....	112
603	Table 207 – Attributes of EquipmentReliabilityProfile::Seconds.....	113
604	Table 208 – Attributes of EquipmentReliabilityProfile::VoltagePerReactivePower.....	113
605	Table 209 – Attributes of EquipmentReliabilityProfile::ACTieCorridor .....	114
606	Table 210 – Association ends of EquipmentReliabilityProfile::ACTieCorridor with other	
607	classes .....	114
608	Table 211 – Attributes of EquipmentReliabilityProfile::Conductor .....	114



609	Table 212 – Association ends of EquipmentReliabilityProfile::Conductor with other	
610	classes .....	114
611	Table 213 – Attributes of EquipmentReliabilityProfile::CurrentControlFunction .....	115
612	Table 214 – Association ends of EquipmentReliabilityProfile::CurrentControlFunction	
613	with other classes .....	115
614	Table 215 – Attributes of EquipmentReliabilityProfile::TCSCCompensationPoint .....	115
615	Table 216 – Association ends of EquipmentReliabilityProfile::TCSCCompensationPoint	
616	with other classes .....	116
617	Table 217 – Attributes of EquipmentReliabilityProfile::StaticVarCompensator .....	116
618	Table 218 – Association ends of EquipmentReliabilityProfile::StaticVarCompensator	
619	with other classes .....	116
620	Table 219 – Attributes of EquipmentReliabilityProfile::LossCurve .....	117
621	Table 220 – Association ends of EquipmentReliabilityProfile::LossCurve with other	
622	classes .....	117
623	Table 221 – Attributes of EquipmentReliabilityProfile::DCSwitch .....	117
624	Table 222 – Association ends of EquipmentReliabilityProfile::DCSwitch with other	
625	classes .....	118
626	Table 223 – Attributes of EquipmentReliabilityProfile::DCConductingEquipment .....	118
627	Table 224 – Association ends of EquipmentReliabilityProfile::DCConductingEquipment	
628	with other classes .....	118
629	Table 225 – Attributes of EquipmentReliabilityProfile::DCDisconnecter .....	118
630	Table 226 – Association ends of EquipmentReliabilityProfile::DCDisconnecter with	
631	other classes .....	119
632	Table 227 – Attributes of EquipmentReliabilityProfile::DCBreaker .....	119
633	Table 228 – Association ends of EquipmentReliabilityProfile::DCBreaker with other	
634	classes .....	119
635	Table 229 – Attributes of EquipmentReliabilityProfile::DCGround .....	119
636	Table 230 – Association ends of EquipmentReliabilityProfile::DCGround with other	
637	classes .....	120
638	Table 231 – Attributes of EquipmentReliabilityProfile::DCBusbar .....	120
639	Table 232 – Association ends of EquipmentReliabilityProfile::DCBusbar with other	
640	classes .....	120
641	Table 233 – Attributes of EquipmentReliabilityProfile::DCShunt .....	120
642	Table 234 – Association ends of EquipmentReliabilityProfile::DCShunt with other	
643	classes .....	121
644	Table 235 – Attributes of EquipmentReliabilityProfile::DCSeriesDevice .....	121
645	Table 236 – Association ends of EquipmentReliabilityProfile::DCSeriesDevice with	
646	other classes .....	121
647	Table 237 – Attributes of EquipmentReliabilityProfile::DCLineSegment .....	121
648	Table 238 – Association ends of EquipmentReliabilityProfile::DCLineSegment with	
649	other classes .....	122
650	Table 239 – Attributes of EquipmentReliabilityProfile::DCChopper .....	122
651	Table 240 – Association ends of EquipmentReliabilityProfile::DCChopper with other	
652	classes .....	122
653	Table 241 – Attributes of EquipmentReliabilityProfile::TieFlow .....	123

654	Table 242 – Association ends of EquipmentReliabilityProfile::TieFlow with other	
655	classes .....	123
656	Table 243 – Attributes of EquipmentReliabilityProfile::PowerPlantController .....	123
657	Table 244 – Association ends of EquipmentReliabilityProfile::PowerPlantController with	
658	other classes .....	123
659	Table 245 – Attributes of EquipmentReliabilityProfile::TCSCController .....	123
660	Table 246 – Association ends of EquipmentReliabilityProfile::TCSCController with	
661	other classes .....	124
662	Table 247 – Attributes of EquipmentReliabilityProfile::DCCurrentControlFunction .....	124
663	Table 248 – Association ends of	
664	EquipmentReliabilityProfile::DCCurrentControlFunction with other classes .....	124
665	Table 249 – Attributes of EquipmentReliabilityProfile::DCVoltageControlFunction .....	125
666	Table 250 – Association ends of	
667	EquipmentReliabilityProfile::DCVoltageControlFunction with other classes .....	125
668	Table 251 – Attributes of EquipmentReliabilityProfile::PhaseControlFunction .....	125
669	Table 252 – Association ends of EquipmentReliabilityProfile::PhaseControlFunction	
670	with other classes .....	126
671	Table 253 – Literals of EquipmentReliabilityProfile::RampingPrincipleKind .....	126
672	Table 254 – Attributes of EquipmentReliabilityProfile::DirectCurrentCircuit .....	127
673	Table 255 – Association ends of EquipmentReliabilityProfile::DirectCurrentCircuit with	
674	other classes .....	127
675	Table 256 – Attributes of EquipmentReliabilityProfile::OverlappingZone .....	127
676	Table 257 – Attributes of EquipmentReliabilityProfile::TapChangerController .....	127
677	Table 258 – Association ends of EquipmentReliabilityProfile::TapChangerController	
678	with other classes .....	128
679	Table 259 – Attributes of EquipmentReliabilityProfile::CurrentDroopControlFunction .....	128
680	Table 260 – Association ends of	
681	EquipmentReliabilityProfile::CurrentDroopControlFunction with other classes .....	128
682	Table 261 – Attributes of EquipmentReliabilityProfile::VoltageInjectionControlFunction .....	129
683	Table 262 – Association ends of	
684	EquipmentReliabilityProfile::VoltageInjectionControlFunction with other classes .....	129
685	Table 263 – Attributes of EquipmentReliabilityProfile::SSSCController .....	129
686	Table 264 – Association ends of EquipmentReliabilityProfile::SSSCController with	
687	other classes .....	130
688	Table 265 – Attributes of EquipmentReliabilityProfile::CurrentDroopOverride .....	130
689	Table 266 – Association ends of EquipmentReliabilityProfile::CurrentDroopOverride	
690	with other classes .....	130
691	Table 267 – Attributes of EquipmentReliabilityProfile::CurrentFlow .....	131
692	Table 268 – Attributes of EquipmentReliabilityProfile::Voltage .....	131
693	Table 269 – Attributes of EquipmentReliabilityProfile::PU .....	131
694	Table 270 – Attributes of EquipmentReliabilityProfile::Resistance .....	131
695	Table 271 – Attributes of EquipmentReliabilityProfile::ReactiveCapabilityCurve .....	132
696	Table 272 – Association ends of EquipmentReliabilityProfile::ReactiveCapabilityCurve	
697	with other classes .....	132

698	Table 273 – Attributes of EquipmentReliabilityProfile::Temperature .....	132
699	Table 274 – Attributes of EquipmentReliabilityProfile::Pressure .....	133
700	Table 275 – Attributes of EquipmentReliabilityProfile::VsCapabilityCurve .....	133
701	Table 276 – Association ends of EquipmentReliabilityProfile::VsCapabilityCurve with	
702	other classes .....	133
703	Table 277 – Association ends of EquipmentReliabilityProfile::EquivalentInjection with	
704	other classes .....	134
705	Table 278 – Attributes of EquipmentReliabilityProfile::SSCSimulationSettings .....	134
706	Table 279 – Attributes of EquipmentReliabilityProfile::RotatingMachineController .....	135
707	Table 280 – Association ends of	
708	EquipmentReliabilityProfile::RotatingMachineController with other classes .....	135
709	Table 281 – Attributes of EquipmentReliabilityProfile::InjectionController .....	135
710	Table 282 – Association ends of EquipmentReliabilityProfile::InjectionController with	
711	other classes .....	135
712	Table 283 – Attributes of EquipmentReliabilityProfile::ACDCConverter .....	136
713	Table 284 – Association ends of EquipmentReliabilityProfile::ACDCConverter with	
714	other classes .....	136
715	Table 285 – Attributes of EquipmentReliabilityProfile::Reservoir .....	136
716	Table 286 – Association ends of EquipmentReliabilityProfile::HydroPowerPlant with	
717	other classes .....	136
718	Table 287 – Attributes of EquipmentReliabilityProfile::InfeedLimit .....	137
719	Table 288 – Association ends of EquipmentReliabilityProfile::InfeedLimit with other	
720	classes .....	137
721	Table 289 – Attributes of EquipmentReliabilityProfile::InfeedTerminal .....	137
722	Table 290 – Association ends of EquipmentReliabilityProfile::InfeedTerminal with other	
723	classes .....	137
724	Table 291 – Attributes of EquipmentReliabilityProfile::FuelStorage .....	138
725	Table 292 – Association ends of EquipmentReliabilityProfile::FossilFuel with other	
726	classes .....	138
727	Table 293 – Attributes of EquipmentReliabilityProfile::PowerShiftKeyStrategy .....	138
728	Table 294 – Association ends of EquipmentReliabilityProfile::PowerShiftKeyStrategy	
729	with other classes .....	139
730	Table 295 – Literals of EquipmentReliabilityProfile::ShiftMethodKind .....	139
731	Table 296 – Literals of EquipmentReliabilityProfile::PowerShiftKeyKind .....	140
732	Table 297 – Literals of EquipmentReliabilityProfile::PowerBlockKind .....	140
733	Table 298 – Attributes of EquipmentReliabilityProfile::EnergyGroup .....	141
734	Table 299 – Association ends of EquipmentReliabilityProfile::EnergyGroup with other	
735	classes .....	141
736	Table 300 – Literals of EquipmentReliabilityProfile::EnergyKind .....	141
737	Table 301 – Attributes of EquipmentReliabilityProfile::DCHarmonicFilter .....	142
738	Table 302 – Association ends of EquipmentReliabilityProfile::DCHarmonicFilter with	
739	other classes .....	142
740	Table 303 – Attributes of EquipmentReliabilityProfile::DCSmoothingReactor .....	143

741	Table 304 – Association ends of EquipmentReliabilityProfile::DCSmoothingReactor	
742	with other classes .....	143
743	Table 305 – Attributes of EquipmentReliabilityProfile::DCSmoothingReactorArrester .....	143
744	Table 306 – Association ends of	
745	EquipmentReliabilityProfile::DCSmoothingReactorArrester with other classes .....	144
746	Table 307 – Attributes of EquipmentReliabilityProfile::DCHighSpeedSwitch .....	144
747	Table 308 – Association ends of EquipmentReliabilityProfile::DCHighSpeedSwitch with	
748	other classes .....	144
749	Table 309 – Attributes of EquipmentReliabilityProfile::DCCommutationSwitch .....	144
750	Table 310 – Association ends of EquipmentReliabilityProfile::DCCommutationSwitch	
751	with other classes .....	145
752	Table 311 – Attributes of EquipmentReliabilityProfile::DCConverterParallelingSwitch .....	145
753	Table 312 – Association ends of	
754	EquipmentReliabilityProfile::DCConverterParallelingSwitch with other classes .....	145
755	Table 313 – Attributes of EquipmentReliabilityProfile::DCBypassSwitch .....	146
756	Table 314 – Association ends of EquipmentReliabilityProfile::DCBypassSwitch with	
757	other classes .....	146
758	Table 315 – Attributes of EquipmentReliabilityProfile::DCNeutralBusGroundingSwitch .....	146
759	Table 316 – Association ends of	
760	EquipmentReliabilityProfile::DCNeutralBusGroundingSwitch with other classes .....	146
761	Table 317 – Attributes of EquipmentReliabilityProfile::DCNeutralBusSwitch .....	147
762	Table 318 – Association ends of EquipmentReliabilityProfile::DCNeutralBusSwitch with	
763	other classes .....	147
764	Table 319 – Attributes of EquipmentReliabilityProfile::DCMetalicReturnSwitch .....	147
765	Table 320 – Association ends of EquipmentReliabilityProfile::DCMetalicReturnSwitch	
766	with other classes .....	148
767	Table 321 – Attributes of EquipmentReliabilityProfile::DCEarthReturnTransferSwitch .....	148
768	Table 322 – Association ends of	
769	EquipmentReliabilityProfile::DCEarthReturnTransferSwitch with other classes .....	148
770	Table 323 – Attributes of EquipmentReliabilityProfile::DCLineParallelingSwitch .....	148
771	Table 324 – Association ends of EquipmentReliabilityProfile::DCLineParallelingSwitch	
772	with other classes .....	149
773	Table 325 – Attributes of	
774	EquipmentReliabilityProfile::DirectCurrentEquipmentController .....	149
775	Table 326 – Association ends of	
776	EquipmentReliabilityProfile::DirectCurrentEquipmentController with other classes .....	149
777	Table 327 – Attributes of EquipmentReliabilityProfile::ACDCConverterController .....	149
778	Table 328 – Association ends of EquipmentReliabilityProfile::ACDCConverterController	
779	with other classes .....	150
780	Table 329 – Attributes of EquipmentReliabilityProfile::DirectCurrentPoleController .....	150
781	Table 330 – Association ends of	
782	EquipmentReliabilityProfile::DirectCurrentPoleController with other classes .....	150
783	Table 331 – Attributes of EquipmentReliabilityProfile::DirectCurrentBipoleController .....	151
784	Table 332 – Association ends of	
785	EquipmentReliabilityProfile::DirectCurrentBipoleController with other classes .....	151

786	Table 333 – Attributes of	
787	EquipmentReliabilityProfile::DirectCurrentSubstationController .....	151
788	Table 334 – Association ends of	
789	EquipmentReliabilityProfile::DirectCurrentSubstationController with other classes .....	152
790	Table 335 – Attributes of	
791	EquipmentReliabilityProfile::DirectCurrentSubstationPoleController .....	152
792	Table 336 – Association ends of	
793	EquipmentReliabilityProfile::DirectCurrentSubstationPoleController with other classes .....	152
794	Table 337 – Attributes of	
795	EquipmentReliabilityProfile::DirectCurrentSubstationBipoleController .....	152
796	Table 338 – Association ends of	
797	EquipmentReliabilityProfile::DirectCurrentSubstationBipoleController with other classes ....	153
798	Table 339 – Attributes of EquipmentReliabilityProfile::DCSubstation .....	153
799	Table 340 – Association ends of EquipmentReliabilityProfile::DCSubstation with other	
800	classes .....	154
801	Table 341 – Attributes of EquipmentReliabilityProfile::DCSubstationPole .....	154
802	Table 342 – Association ends of EquipmentReliabilityProfile::DCSubstationPole with	
803	other classes .....	154
804	Table 343 – Attributes of EquipmentReliabilityProfile::DCSubstationBipole .....	154
805	Table 344 – Association ends of EquipmentReliabilityProfile::DCSubstationBipole with	
806	other classes .....	155
807	Table 345 – Attributes of EquipmentReliabilityProfile::DCSystem .....	155
808	Table 346 – Attributes of EquipmentReliabilityProfile::BipolarDCSystem .....	155
809	Table 347 – Attributes of EquipmentReliabilityProfile::MonopolarDCSystem .....	156
810	Table 348 – Attributes of EquipmentReliabilityProfile::DCBiPole .....	156
811	Table 349 – Association ends of EquipmentReliabilityProfile::DCBiPole with other	
812	classes .....	157
813	Table 350 – Attributes of EquipmentReliabilityProfile::PointOfCommonCoupling .....	157
814	Table 351 – Attributes of EquipmentReliabilityProfile::ACPointOfCommonCoupling .....	157
815	Table 352 – Association ends of	
816	EquipmentReliabilityProfile::ACPointOfCommonCoupling with other classes .....	157
817	Table 353 – Attributes of EquipmentReliabilityProfile::DCPointOfCommonCoupling .....	158
818	Table 354 – Association ends of	
819	EquipmentReliabilityProfile::DCPointOfCommonCoupling with other classes .....	158
820	Table 355 – Attributes of EquipmentReliabilityProfile::ConnectivityNode .....	158
821	Table 356 – Attributes of EquipmentReliabilityProfile::DCNode .....	158
822	Table 357 – Attributes of EquipmentReliabilityProfile::AutomationBlockGroup .....	159
823	Table 358 – Association ends of EquipmentReliabilityProfile::AutomationBlockGroup	
824	with other classes .....	159
825	Table 359 – Attributes of EquipmentReliabilityProfile::FrequencyControlFuntion .....	159
826	Table 360 – Association ends of EquipmentReliabilityProfile::FrequencyControlFuntion	
827	with other classes .....	159
828	Table 361 – Attributes of EquipmentReliabilityProfile::SystemControl .....	160
829	Table 362 – Association ends of EquipmentReliabilityProfile::SystemControl with other	
830	classes .....	160

831	Table 363 – Attributes of EquipmentReliabilityProfile::AreaInterchangeController .....	160
832	Table 364 – Association ends of	
833	EquipmentReliabilityProfile::AreaInterchangeController with other classes .....	161
834	Table 365 – Attributes of EquipmentReliabilityProfile::PowerFrequencyController .....	161
835	Table 366 – Association ends of	
836	EquipmentReliabilityProfile::PowerFrequencyController with other classes .....	161
837	Table 367 – Literals of EquipmentReliabilityProfile::PowerFrequencyControlKind .....	162
838	Table 368 – Attributes of EquipmentReliabilityProfile::MonitoringArea .....	162
839	Table 369 – Attributes of EquipmentReliabilityProfile::FrequencyMonitoringTerminal .....	162
840	Table 370 – Association ends of	
841	EquipmentReliabilityProfile::FrequencyMonitoringTerminal with other classes .....	163
842	Table 371 – Attributes of EquipmentReliabilityProfile::PowerElectronicsUnitController .....	163
843	Table 372 – Association ends of	
844	EquipmentReliabilityProfile::PowerElectronicsUnitController with other classes .....	163
845	Table 373 – Attributes of EquipmentReliabilityProfile::ScheduleResourceController .....	163
846	Table 374 – Association ends of	
847	EquipmentReliabilityProfile::ScheduleResourceController with other classes .....	164
848	Table 375 – Attributes of	
849	EquipmentReliabilityProfile::PowerElectronicsConnectionController .....	164
850	Table 376 – Association ends of	
851	EquipmentReliabilityProfile::PowerElectronicsConnectionController with other classes .....	164
852	Table 377 – Literals of EquipmentReliabilityProfile::DCSystemDirectionKind .....	165
853	Table 378 – Literals of EquipmentReliabilityProfile::DCSystemTransmissionKind .....	165
854	Table 379 – Attributes of EquipmentReliabilityProfile::ReactivePower .....	165
855	Table 380 – Attributes of EquipmentReliabilityProfile::CoordinatedCapacityCalculator .....	165
856	Table 381 – Association ends of	
857	EquipmentReliabilityProfile::CoordinatedCapacityCalculator with other classes .....	166
858	Table 382 – Attributes of EquipmentReliabilityProfile::ACEmulationControlFunction .....	166
859	Table 383 – Association ends of	
860	EquipmentReliabilityProfile::ACEmulationControlFunction with other classes .....	167
861		

## 862 1 Introduction

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

## 865 2 Application profile specification

### 866 2.1 Version information

867 The content is generated from UML model file CIM17-2\_CGMES31v01\_PROF-  
868 20v02\_NC23v66\_MS10v01\_DES10v01.eap.

869 This edition is based on the IEC 61970 UML version 'IEC61970CIM17v40', dated '2020-08-24'.

- 870 - Title: Equipment Reliability Vocabulary
- 871 - Keyword: ER
- 872 - Description: This vocabulary is describing the equipment reliability profile.
- 873 - Version IRI: <https://ap-voc.cim4.eu/EquipmentReliability/2.3>
- 874 - Version info: 2.3.1
- 875 - Prior version: <http://entsoe.eu/ns/CIM/EquipmentReliability-EU/2.2>
- 876 - Conforms to: urn:iso:std:iec:61970-600-2:ed-1|urn:iso:std:iec:61970-301:ed-  
877 7:amd1|file:///iec61970cim17v40\_iec61968cim13v13a\_iec62325cim03v17a.eap|urn:iso:  
878 std:iec:61970-401:draft:ed-1|urn:iso:std:iec:61970-501:draft:ed-  
879 2|file:///CIM100\_CGMES31v01\_501-20v02\_NC23v62\_MM10v01.eap
- 880 - Identifier: urn:uuid:5f727c5c-b49f-47be-b750-a00fefb7e806

881

### 882 2.2 Constraints naming convention

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

885 "{rule.Type}:{rule.Standard}:{rule.Profile}:{rule.Property}:{rule.Name}"

886 where

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

888 rule.Standard: the number of the standard e.g. 301 for 61970-301, 456 for 61970-456, 13 for  
889 61968-13. 61970-600 specific constraints refer to 600 although they are related to one or  
890 combination of the 61970-450 series profiles. For NC profiles, NC is used.

891 rule.Profile: the abbreviation of the profile, e.g. TP for Topology profile. If set to "ALL" the  
892 constraint is applicable to all IEC 61970-600 profiles.

893 rule.Property: for UML classes, the name of the class, for attributes and associations, the name  
894 of the class and attribute or association end, e.g. EnergyConsumer, IdentifiedObject.name, etc.  
895 If set to "NA" the property is not applicable to a specific UML element.

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

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

## 898 2.3 Profile constraints

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

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

- 904 • C:452:ALL:NA:datatypes

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

- 907 • R:452:ALL:NA:exchange

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

- 910 • R:452:ALL:NA:exchange1

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

- 916 • R:452:ALL:NA:exchange2

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

- 925 • R:452:ALL:NA:exchange3

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

- 929 • R:452:ALL:NA:exchange4

930 From the standpoint of the model import used by a data recipient, the document  
931 describes a subset of the CIM that importing software shall be able to interpret in order  
932 to import exported models. Data providers are free to exceed the minimum requirements  
933 described herein as long as their resulting data files are compliant with the CIM Schema  
934 and the conventions established in Clause 5. The document, therefore, describes  
935 additional classes and class data that, although not required, exporters will, in all  
936 likelihood, choose to include in their data files. The additional classes and data are  
937 labelled as required (cardinality 1..1) or as optional (cardinality 0..1) to distinguish them  
938 from their required counterparts. Please note, however, that data importers could  
939 potentially receive data containing instances of any and all classes described by the  
940 CIM Schema.

- 941 • R:452:ALL:NA:cardinality



- 942 The cardinality defined in the CIM model shall be followed, unless a more restrictive  
943 cardinality is explicitly defined in this document. For instance, the cardinality on the  
944 association between VoltageLevel and BaseVoltage indicates that a VoltageLevel shall  
945 be associated with one and only one BaseVoltage, but a BaseVoltage can be associated  
946 with zero to many VoltageLevels.
- 947 • R:452:ALL:NA:associations
- 948 Associations between classes referenced in this document and classes not referenced  
949 here are not required regardless of cardinality.
- 950 • R:452:ALL:IdentifiedObject.name:rule
- 951 The attribute “name” inherited by many classes from the abstract class IdentifiedObject  
952 is not required to be unique. It must be a human readable identifier without additional  
953 embedded information that would need to be parsed. The attribute is used for purposes  
954 such as User Interface and data exchange debugging. The MRID defined in the data  
955 exchange format is the only unique and persistent identifier used for this data exchange.  
956 The attribute IdentifiedObject.name is, however, always required for CoreEquipment  
957 profile and Short Circuit profile.
- 958 • R:452:ALL:IdentifiedObject.description:rule
- 959 The attribute “description” inherited by many classes from the abstract class  
960 IdentifiedObject must contain human readable text without additional embedded  
961 information that would need to be parsed.
- 962 • R:452:ALL:NA:uniqueIdentifier
- 963 All IdentifiedObject-s shall have a persistent and globally unique identifier (Master  
964 Resource Identifier - mRID).
- 965 • R:452:ALL:NA:unitMultiplier
- 966 For exchange of attributes defined using CIM Data Types (ActivePower, Susceptance,  
967 etc.) a unit multiplier of 1 is used if the UnitMultiplier specified in this document is “none”.
- 968 • C:452:ALL:IdentifiedObject.name:stringLength
- 969 The string IdentifiedObject.name has a maximum of 128 characters.
- 970 • C:452:ALL:IdentifiedObject.description:stringLength
- 971 The string IdentifiedObject.description is maximum 256 characters.
- 972 • C:452:ALL:NA:float
- 973 An attribute that is defined as float (e.g. has a type Float or a type which is a Datatype  
974 with .value attribute of type Float) shall support ISO/IEC 60559:2020 for floating-point  
975 arithmetic using single precision floating point. A single precision float supports 7  
976 significant digits where the significant digits are described as an integer, or a decimal  
977 number with 6 decimal digits. Two float values are equal when the significant with 7  
978 digits are identical, e.g. 1234567 is equal 1.234567E6 and so are 1.2345678 and  
979 1.234567E0.
- 980 • R:NC:ER:AreaDispatchableUnit:interconnection

981 In cases where the AreaDispatchingUnit is providing dispatch support for a control area  
982 outside its location it shall refer to TieCorridor that refers to ControlArea. Otherwise, the  
983 AreaDispatchingUnit shall refer to SchedulingArea.

984 • C:NC:ER:AreaDispatchableUnit:associations

985 The AreaDispatchableUnit shall be associated with either GeneratingUnit,  
986 PowerElectronicsUnit, EnergyConsumer, ScheduleResource or HydroPump.

987 • C:NC:ER:EnergyComponent:associations

988 The EnergyComponent shall be associated with either GeneratingUnit,  
989 PowerElectronicsUnit, EnergyConsumer or HydroPump.

990 • R:NC:ER:VoltageAngleLimit:AngleReferenceTerminal

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

995 • R:NC:ALL:NA:serialization

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

- 998 1) the EAP file (EnterpriseArchitect project file),
- 999 2) the profiles' specification document and
- 1000 3) the application profiles (RDFS and SHACL).

1001 Due to the complexity of the profiles, there are various cross profile associations that,  
1002 from profiling and profile maintenance point of view, it is not practical to include the  
1003 complete inheritance structure in all profiles. If this is done the documentation provided  
1004 for all profiles would also include duplicated information on the description of classes  
1005 defined in other profiles. The following cases are often observed in profiles:

- 1006 ○ Case 1: An association end refers to an abstract class
- 1007 ○ Case 2: An abstract class (stereotyped with "Description") has an association  
1008 (direction to another class)
- 1009 ○ Case 3: An abstract class (not stereotyped with "Description") has an  
1010 association (direction to another class)
- 1011 ○ Case 4: An abstract class has attributes and subclasses are not in the profile

1012 In all cases, the datasets shall only include the subtypes of the abstract classes with  
1013 the related properties (i.e. association or attributes) defined in the profile. The  
1014 information is taken from either canonical model or the profiles where complete  
1015 (expected) inheritance structure for the related abstract class is described. SHACL  
1016 based constraints include constraints only for the concrete classes that are subtypes of  
1017 the abstract class in the profile, and this can be used to inform which are the concrete  
1018 classes expected in a dataset that conforms to this profile.

1019 It should be taken into account that this approach deviates from MVAL5 (IEC 61970-  
1020 600-1:2021), which creates multiple inheritance at serialization. For instance, with this  
1021 more explicit exchange the serialization of the association between abstract class  
1022 Equipment and abstract class Circuit for a PowerTransformer will be serialized as  
1023 follows:

- 1024 ○ for association

1025 <cim:PowerTransformer rdf:about="\_c328f787-bc17-47ad-a59f-6ba7133340d0">

1026 <nc:Equipment.Circuit rdf:resource="#\_9ced16ac-d076-4ef9-a241-a998a579e77b"/>

1027 </cim:PowerTransformer>

1028 ○ for attribute

1029 <cim:ACLineSegment rdf:about="\_04f681aa-6999-4fb3-9775-aca5eb7ceff">

1030 <cim:Equipment.inService>true</cim:Equipment.inService>

1031 </cim:ACLineSegment>

1032 The usage of rdf:ID or rdf:about depends on the stereotype of the class. rdf:about is  
1033 used if the class has the stereotype "Description".

1034 An example of not allowed serialization, as the Equipment is an abstract class

1035 <cim:Equipment rdf:about="\_c328f787-bc17-47ad-a59f-6ba7133340d0">

1036 <nc:Equipment.Circuit rdf:resource="#\_9ced16ac-d076-4ef9-a241-a998a579e77b"/>

1037 </cim:Equipment>

1038 ● C:NC:ER:HydroPowerPlant:operatingMode

1039 The SynchronousMachine.operatingMode of all SynchronousMachine objects part of a  
1040 HydroPowerPlant shall be consistent.

1041 ● C:NC:ER:Circuit:associations

1042 The Circuit shall be associated with either Equipment or Terminal.

## 1043 2.4 Metadata

1044 ENTSO-E agreed to extend the header and metadata definitions by IEC 61970-552 Ed2. This  
1045 new header definitions rely on W3C recommendations which are used worldwide and are  
1046 positively recognised by the European Commission. The new definitions of the header mainly  
1047 use Provenance ontology (PROV-O), Time Ontology and Data Catalog Vocabulary (DCAT). The  
1048 global new header applicable for this profile is included in the metadata and document header  
1049 specification document.

1050 The header vocabulary contains all attributes defined in IEC 61970-552. This is done only for  
1051 the purpose of having one vocabulary for header and to ensure transition for data exchanges  
1052 that are using IEC 61970-552:2016 header. This profile does not use IEC 61970-552:2016  
1053 header attributes and relies only on the extended attributes.

### 1054 2.4.1 Constraints

1055 The identification of the constraints related to the metadata follows the same convention for  
1056 naming of the constraints as for profile constraints.

1057 ● R:NC:ALL:wasAttributedTo:usage

1058 The prov:wasAttributedTo should normally be the "X" EIC code of the actor or their URI  
1059 (prov:Agent).

1060

### 1061 2.4.2 Reference metadata

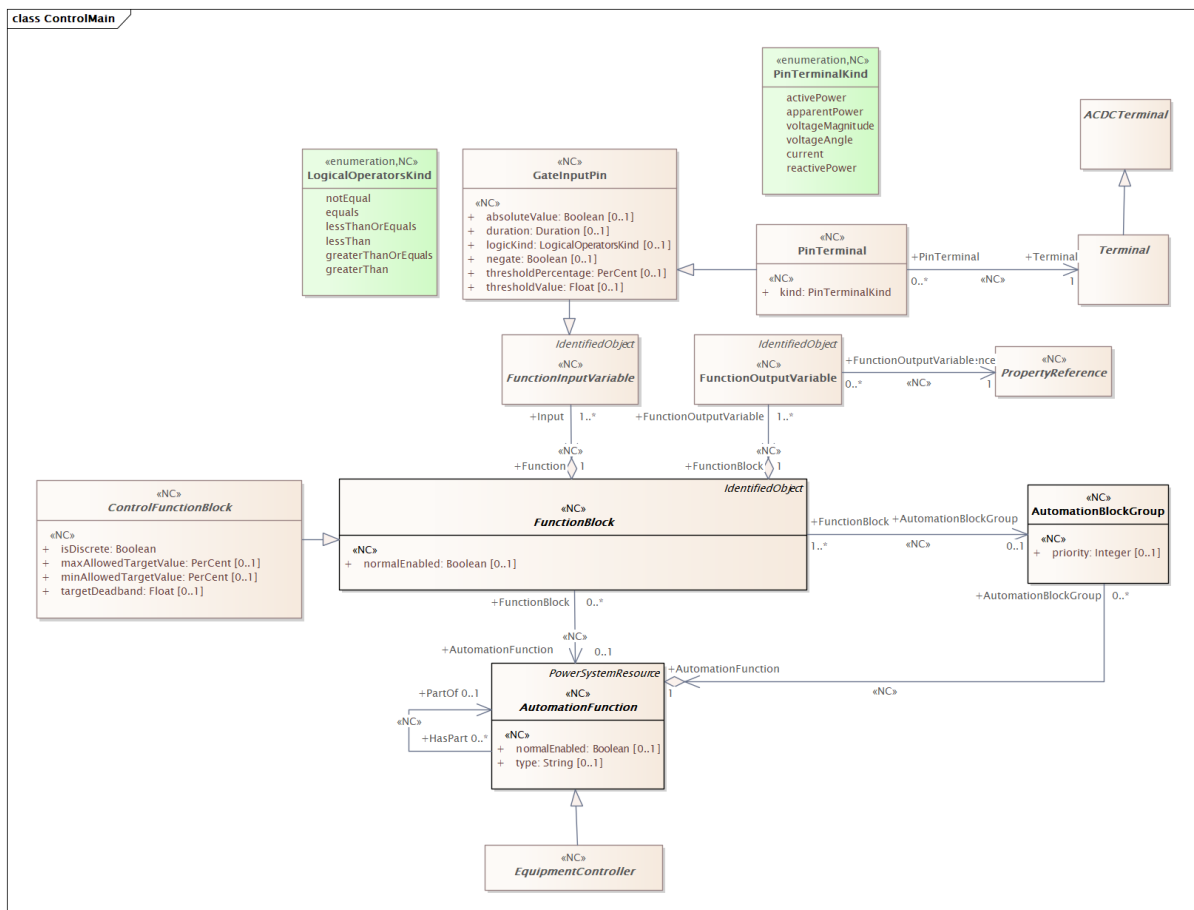
1062 The header defined for this profile requires availability of a set of reference metadata. For  
1063 instance, the attribute prov:wasGeneratedBy requires a reference to an activity which produced

1064 the model or the related process. The activities are defined as reference metadata and their  
1065 identifiers are referenced from the header to enable the receiving entity to retrieve the “static”  
1066 (reference) information that it is not modified frequently. This approach imposes a requirement  
1067 that both the sending entity and the receiving entity have access to a unique version of the  
1068 reference metadata. Therefore, each business process shall define which reference metadata  
1069 is used and where it is located.

### 1070 3 Detailed Profile Specification

#### 1071 3.1 General

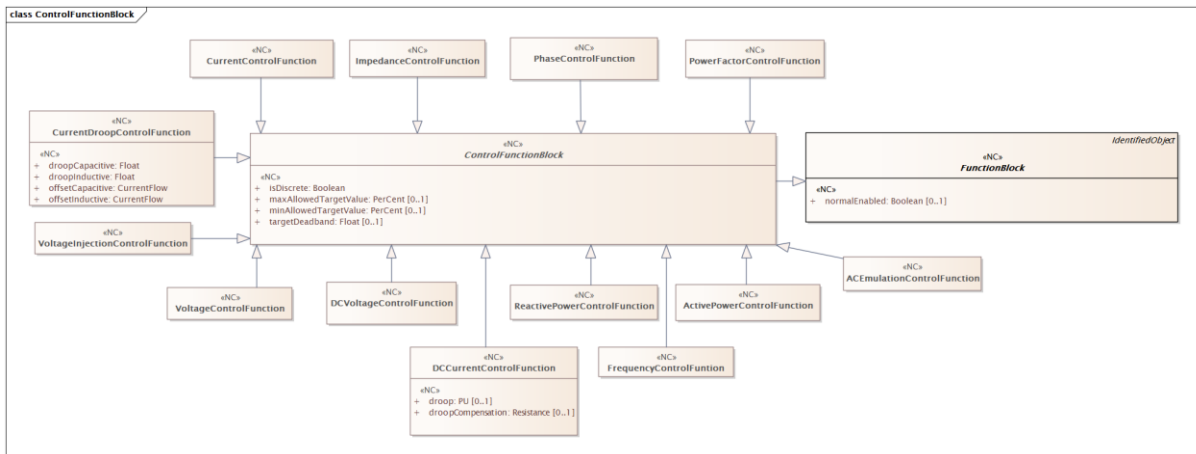
1072 This package contains equipment reliability profile.



1073

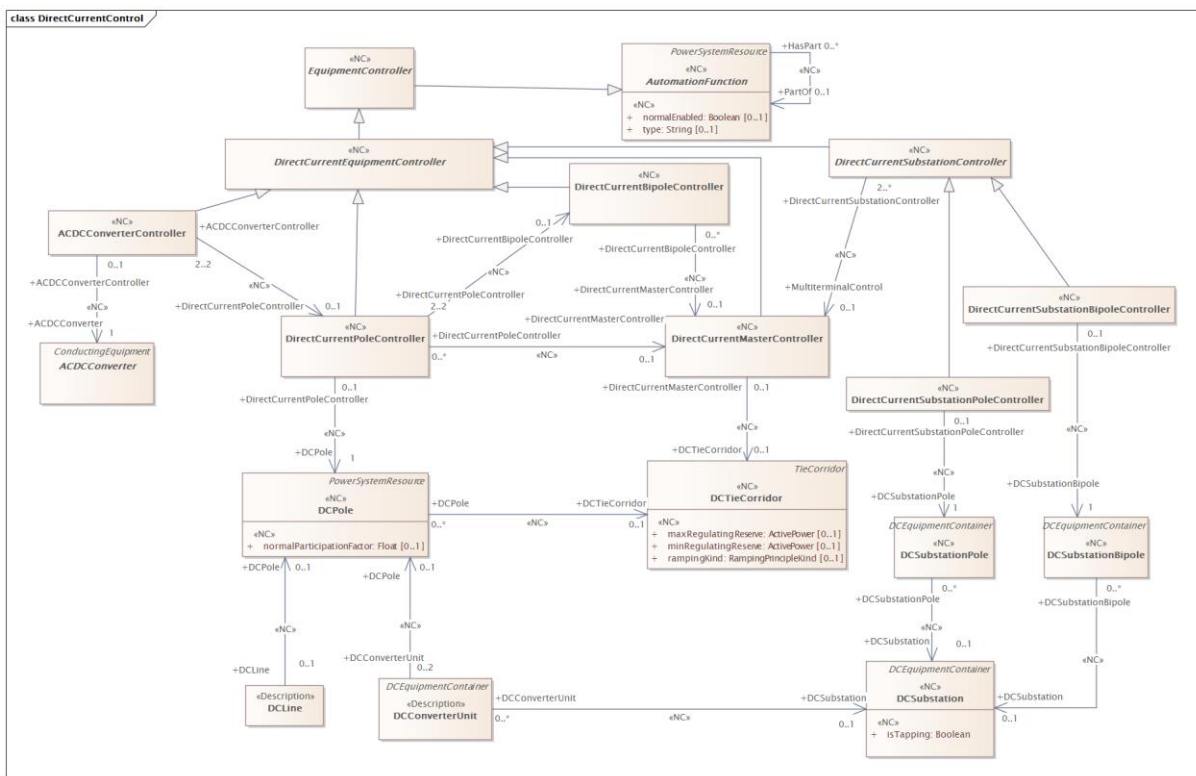
1074 **Figure 1 – Class diagram EquipmentReliabilityProfile::ControlMain**

1075 Figure 1: The diagram shows main structure of the control related classes.



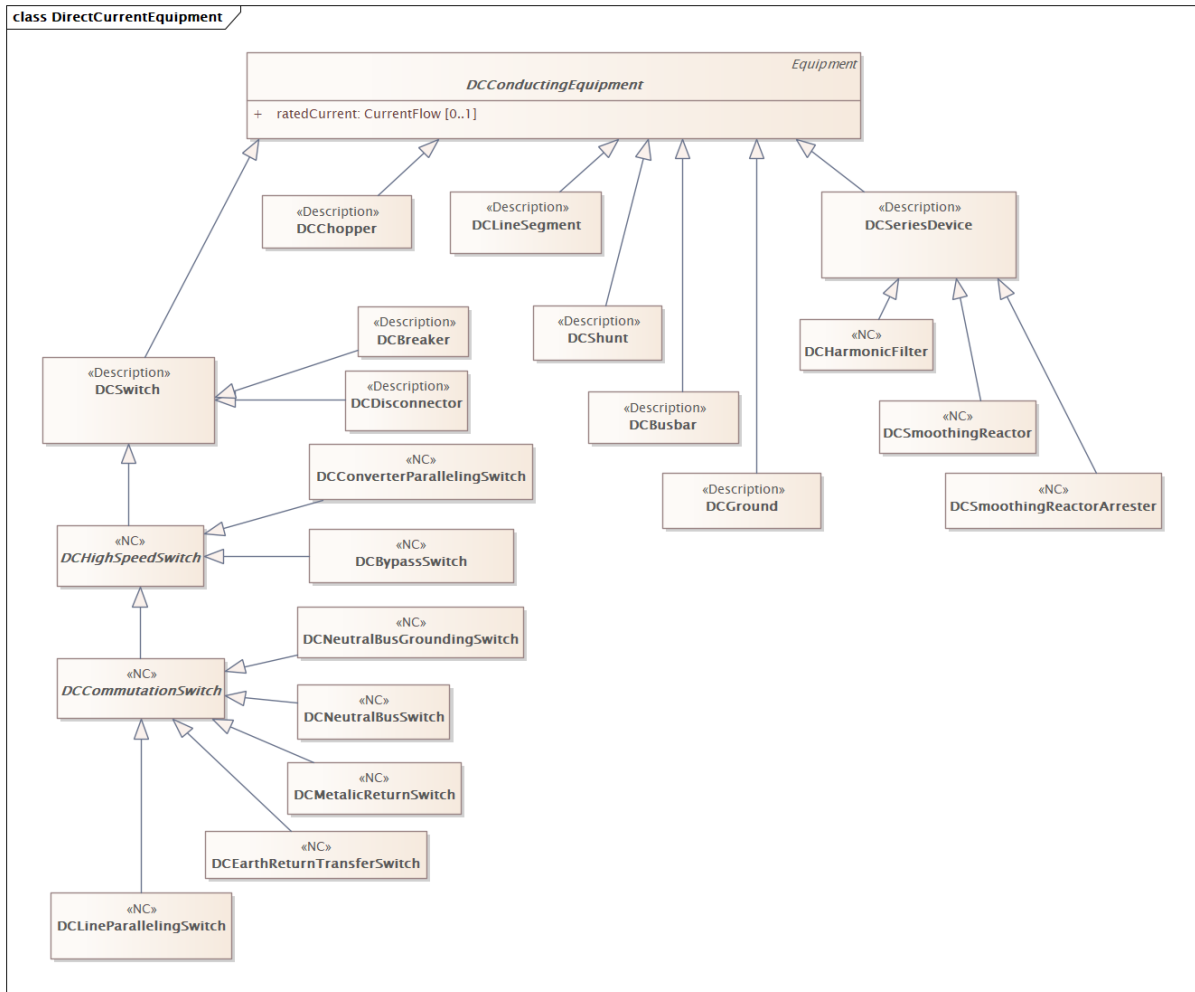
1076  
1077 **Figure 2 – Class diagram EquipmentReliabilityProfile::ControlFunctionBlock**

1078 Figure 2: The diagram shows control function block related classes.



1079  
1080 **Figure 3 – Class diagram EquipmentReliabilityProfile::DirectCurrentControl**

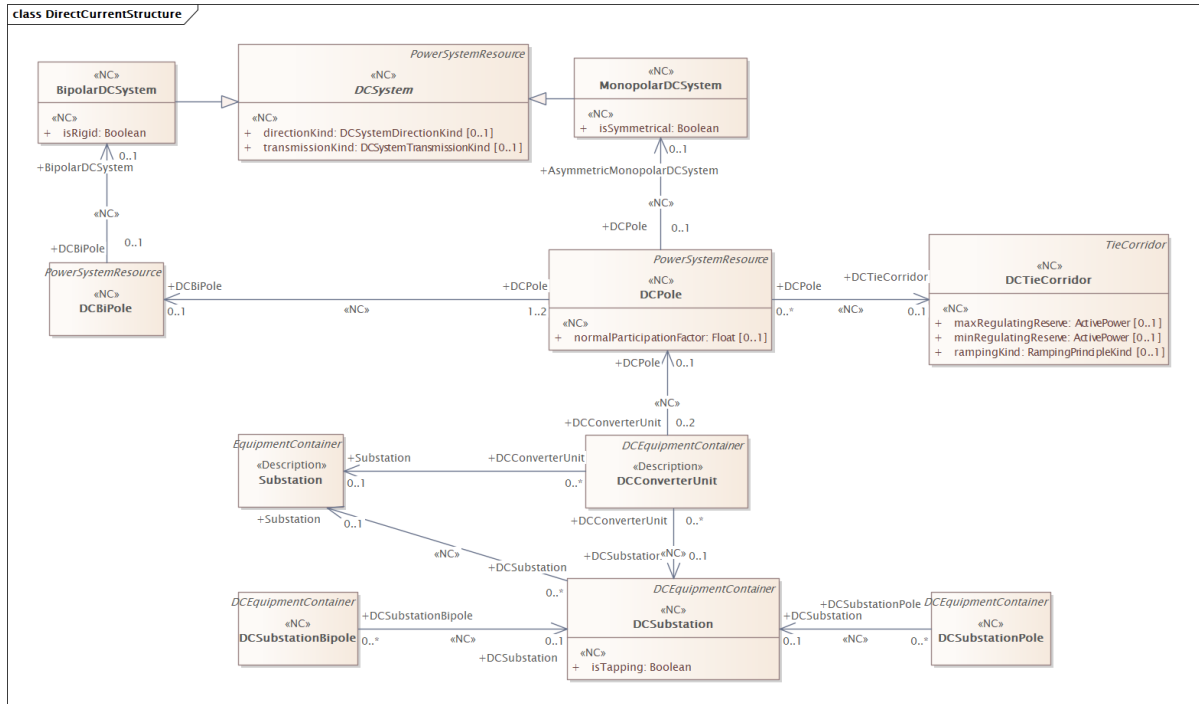
1081 Figure 3: The diagram contains classes related to direct current control.



1082

1083 **Figure 4 – Class diagram EquipmentReliabilityProfile::DirectCurrentEquipment**

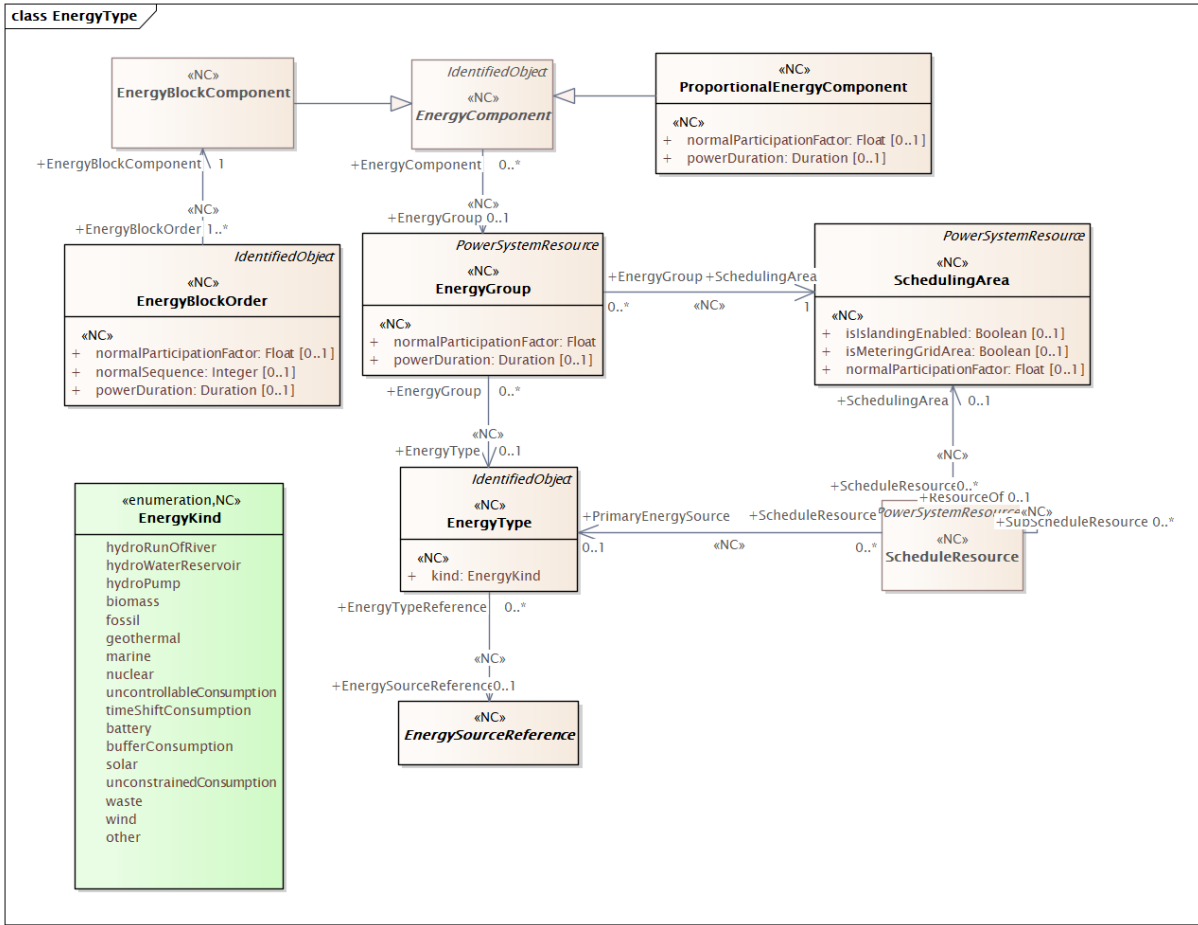
1084 Figure 4: The diagram shows the DC equipment model.



1085

1086 **Figure 5 – Class diagram EquipmentReliabilityProfile::DirectCurrentStructure**

1087 Figure 5: The diagram contains classes related to direct current structure.

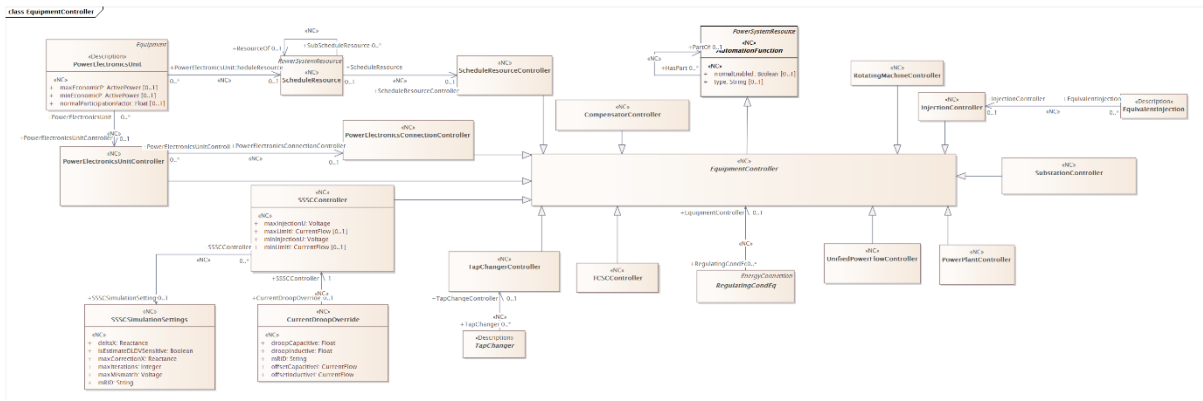


1088

1089

Figure 6 – Class diagram EquipmentReliabilityProfile::EnergyType

1090 Figure 6:



1091

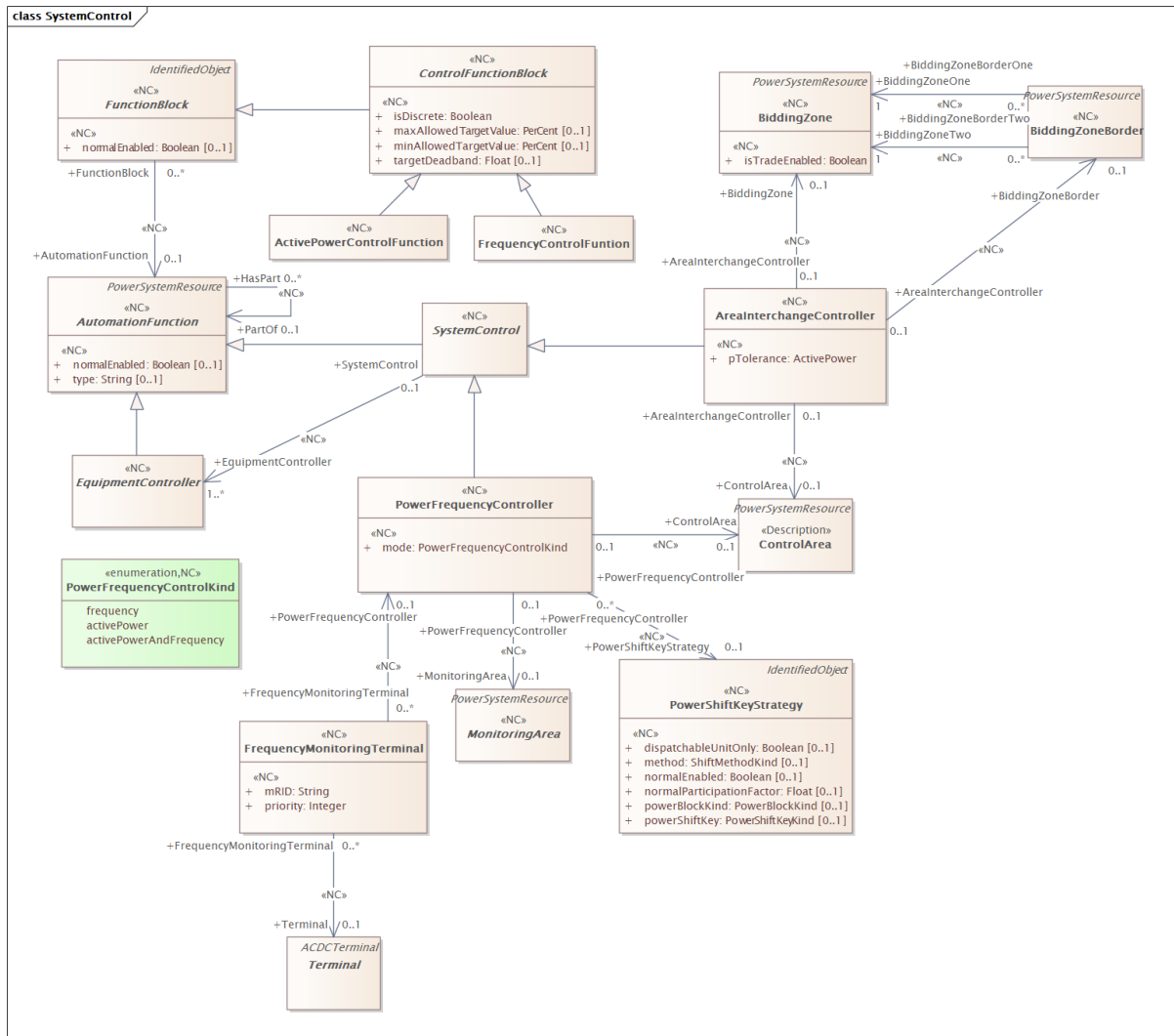
1092

Figure 7 – Class diagram EquipmentReliabilityProfile::EquipmentController

1093

Figure 7: The diagram shows equipment controller related classes.





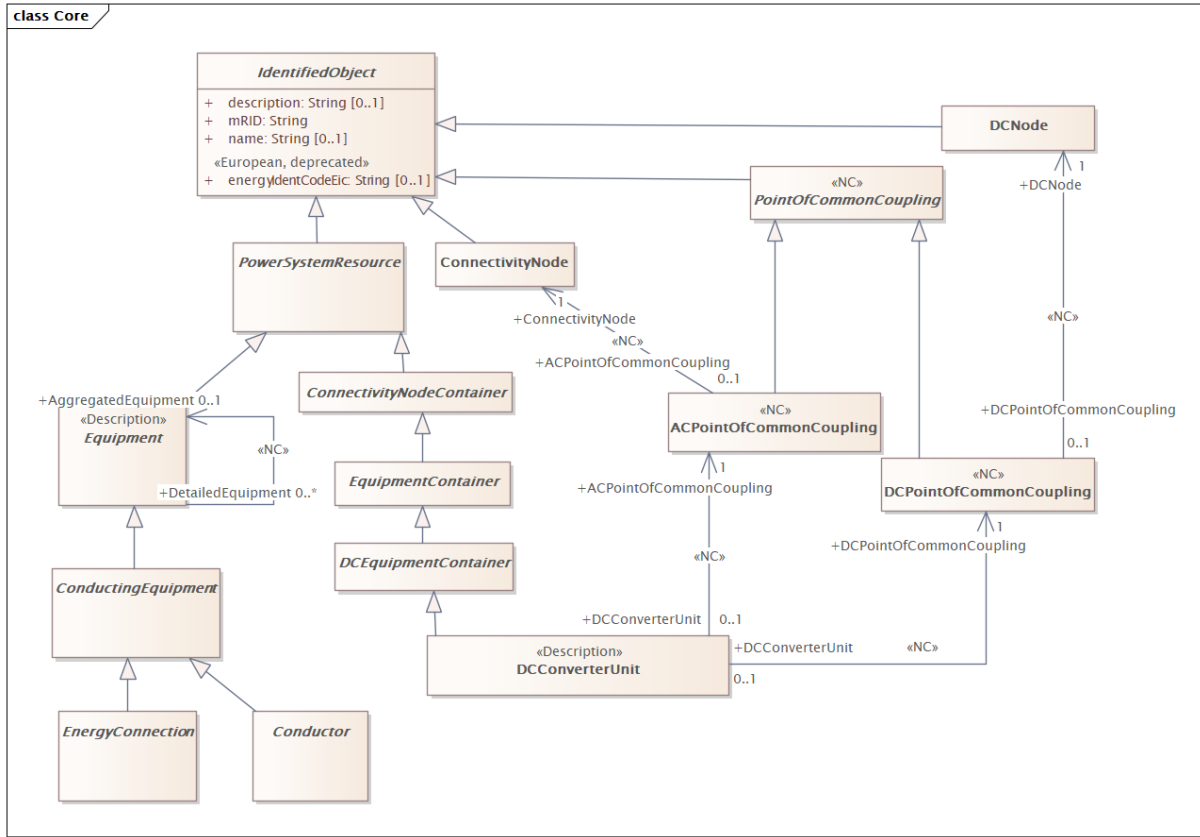
1094

1095

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

1096

Figure 8: The diagram contains classes related to system control.



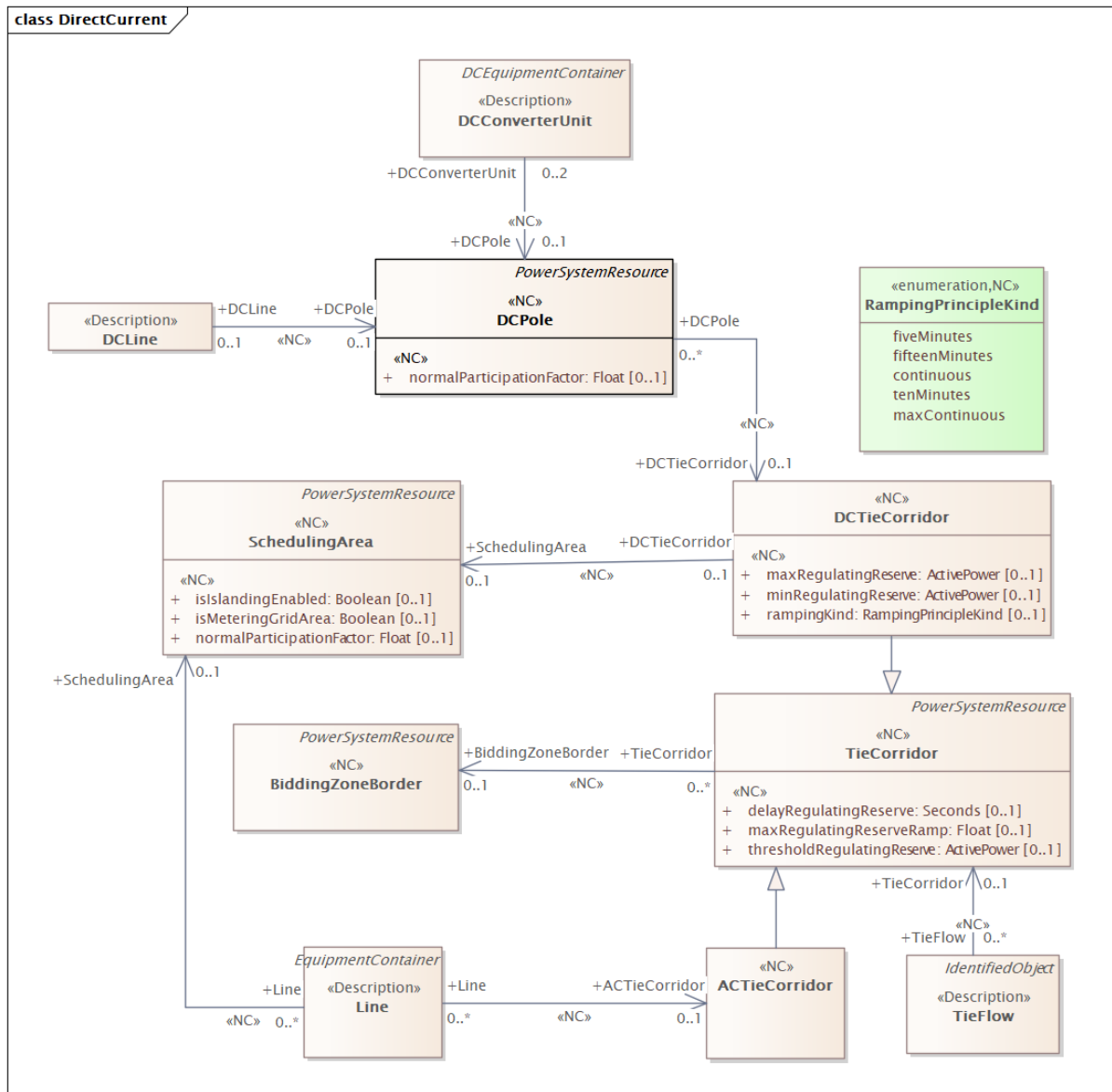
1097

1098

**Figure 9 – Class diagram EquipmentReliabilityProfile::Core**

1099

Figure 9: The diagram shows classes from Base CIM used in the profile.



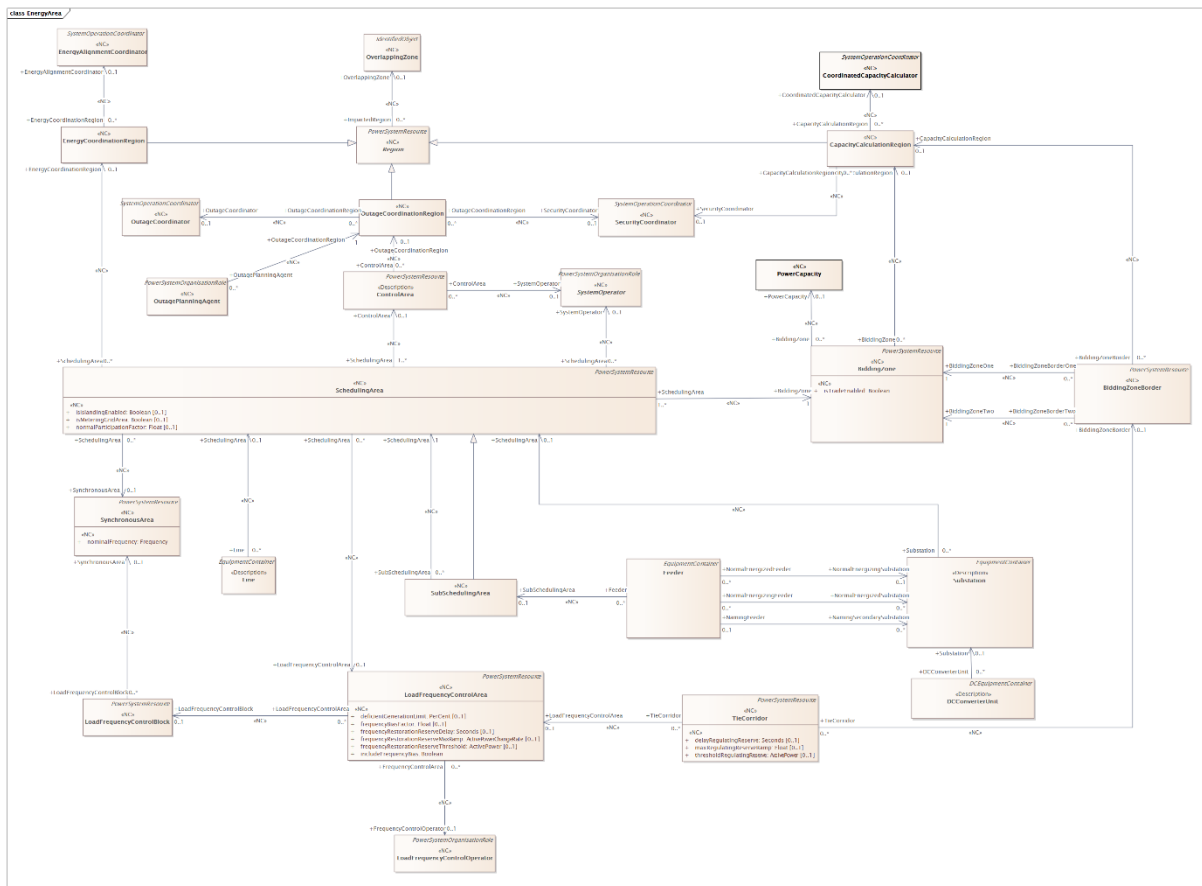
1100

1101

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

1102

Figure 10: The diagram shows direct current related classes.



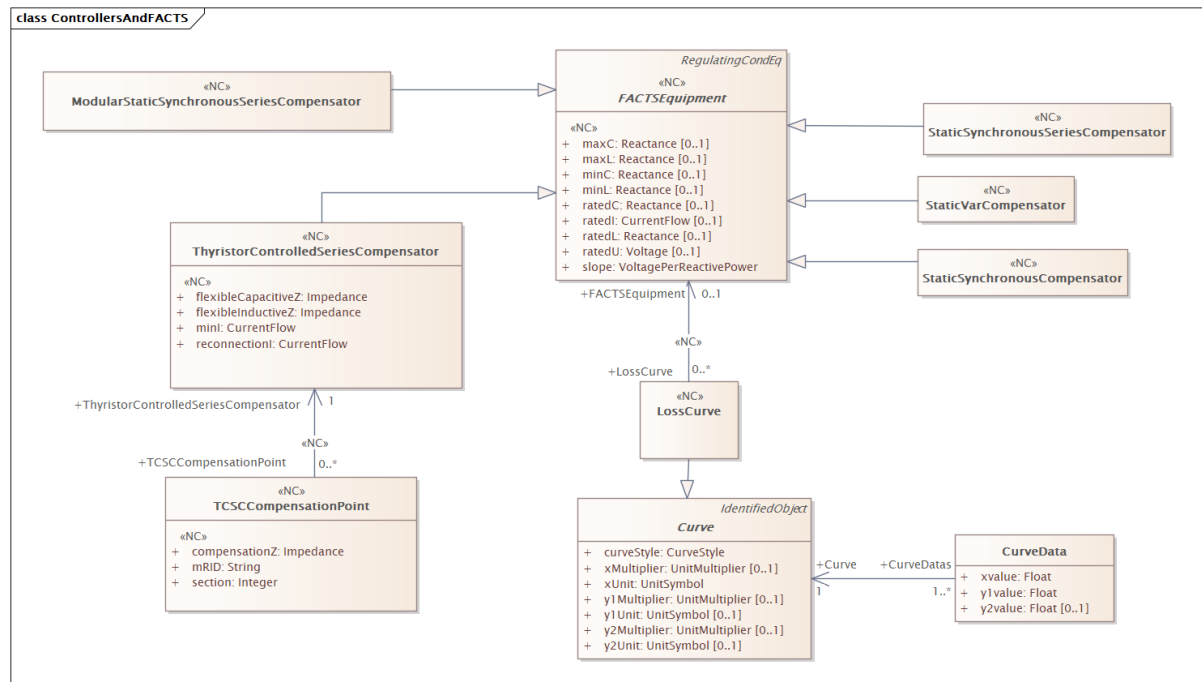
1103

1104

**Figure 11 – Class diagram EquipmentReliabilityProfile::EnergyArea**

1105

Figure 11:

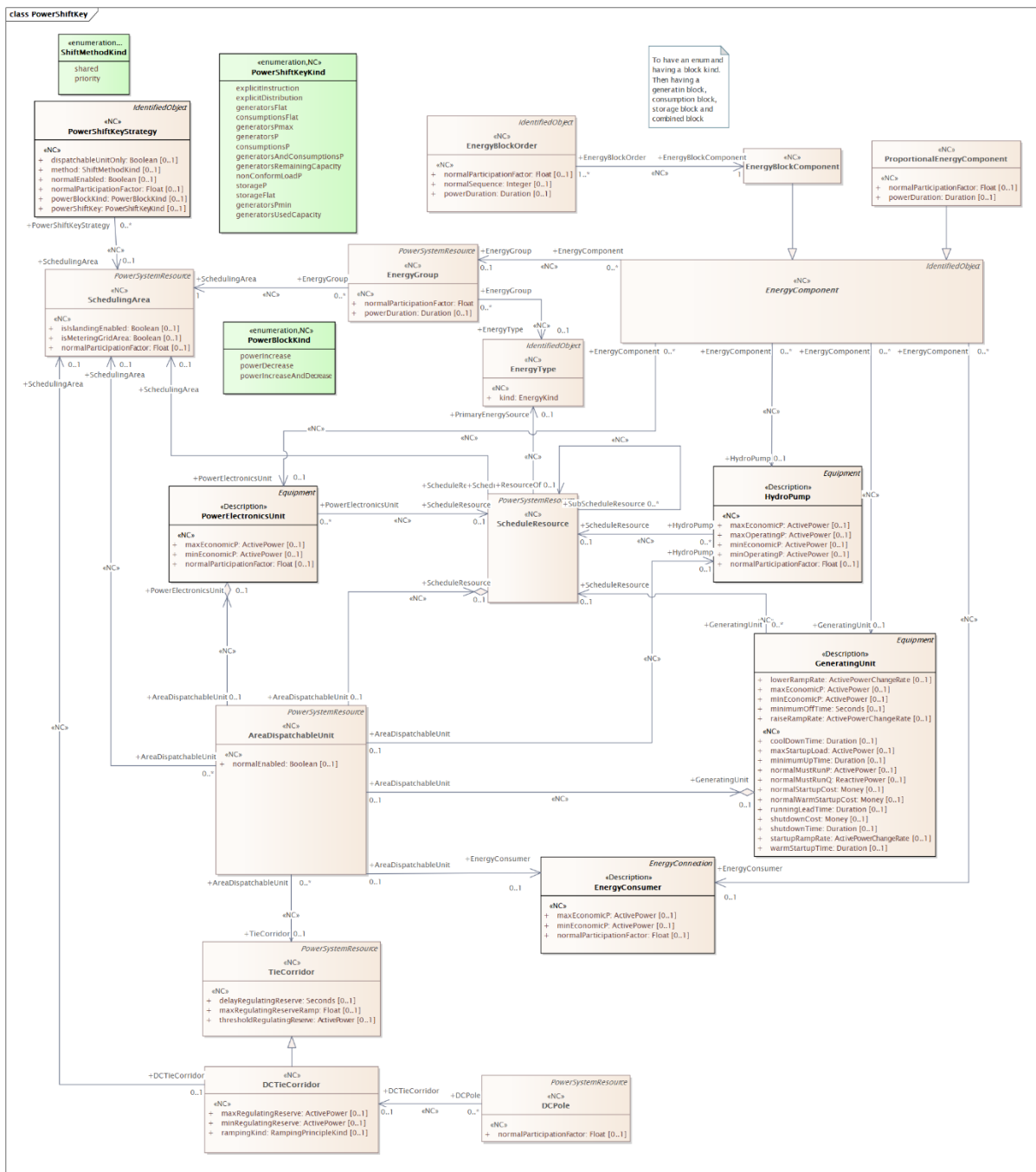


1106

1107

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

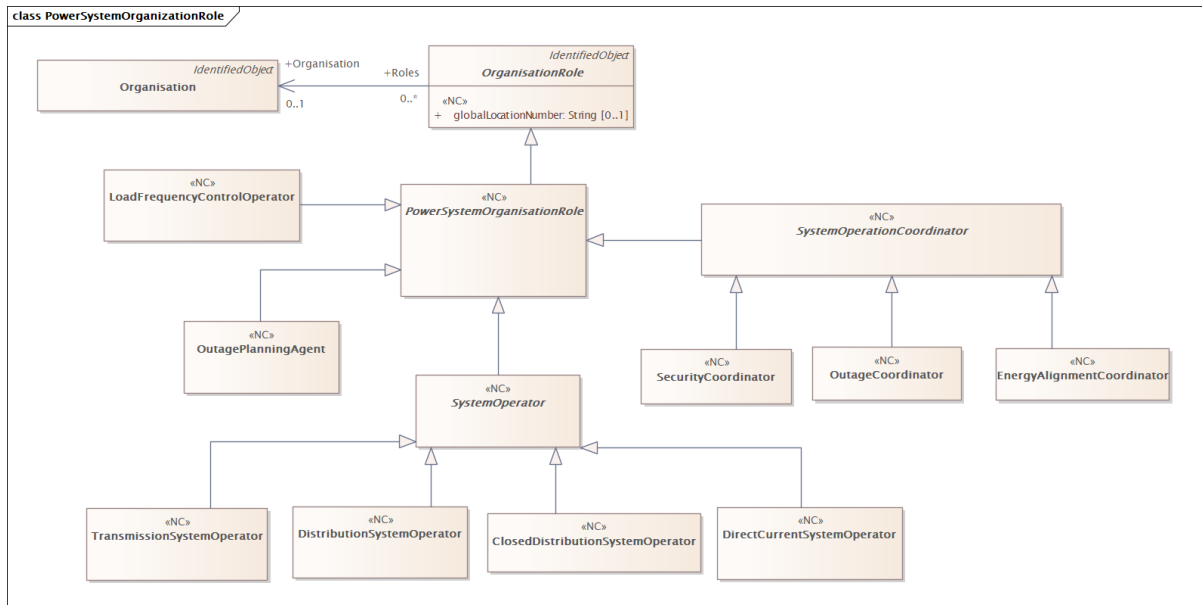
1108 Figure 12: The diagram shows Controllers and FACTS related classes.



1109

1110 Figure 13 – Class diagram EquipmentReliabilityProfile::PowerShiftKey

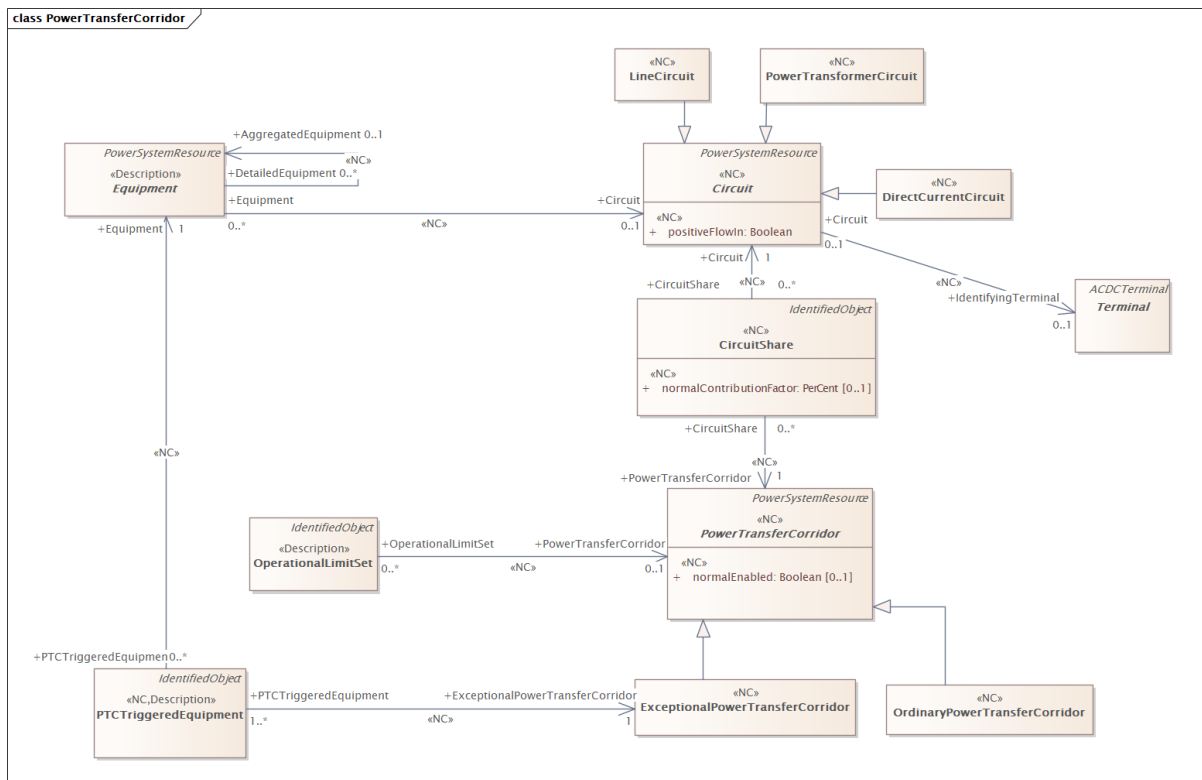
1111 Figure 13: The diagram shows generation and load shift keys related classes.



1112

1113 **Figure 14 – Class diagram EquipmentReliabilityProfile::PowerSystemOrganizationRole**

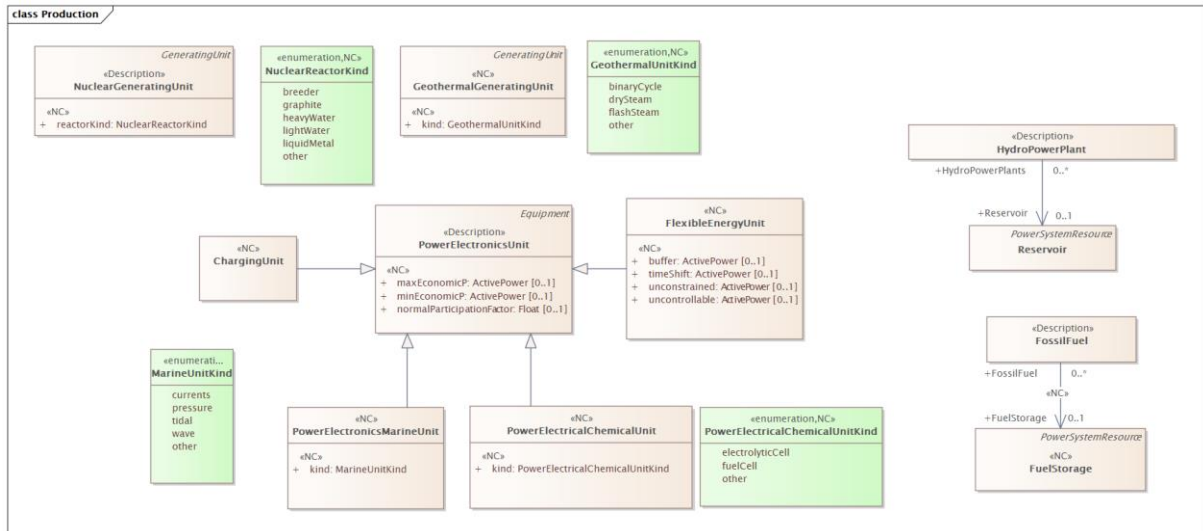
1114 Figure 14: The diagram shows power system organisation role related classes.



1115

1116 **Figure 15 – Class diagram EquipmentReliabilityProfile::PowerTransferCorridor**

1117 Figure 15: The diagram shows power transfer corridor related classes.



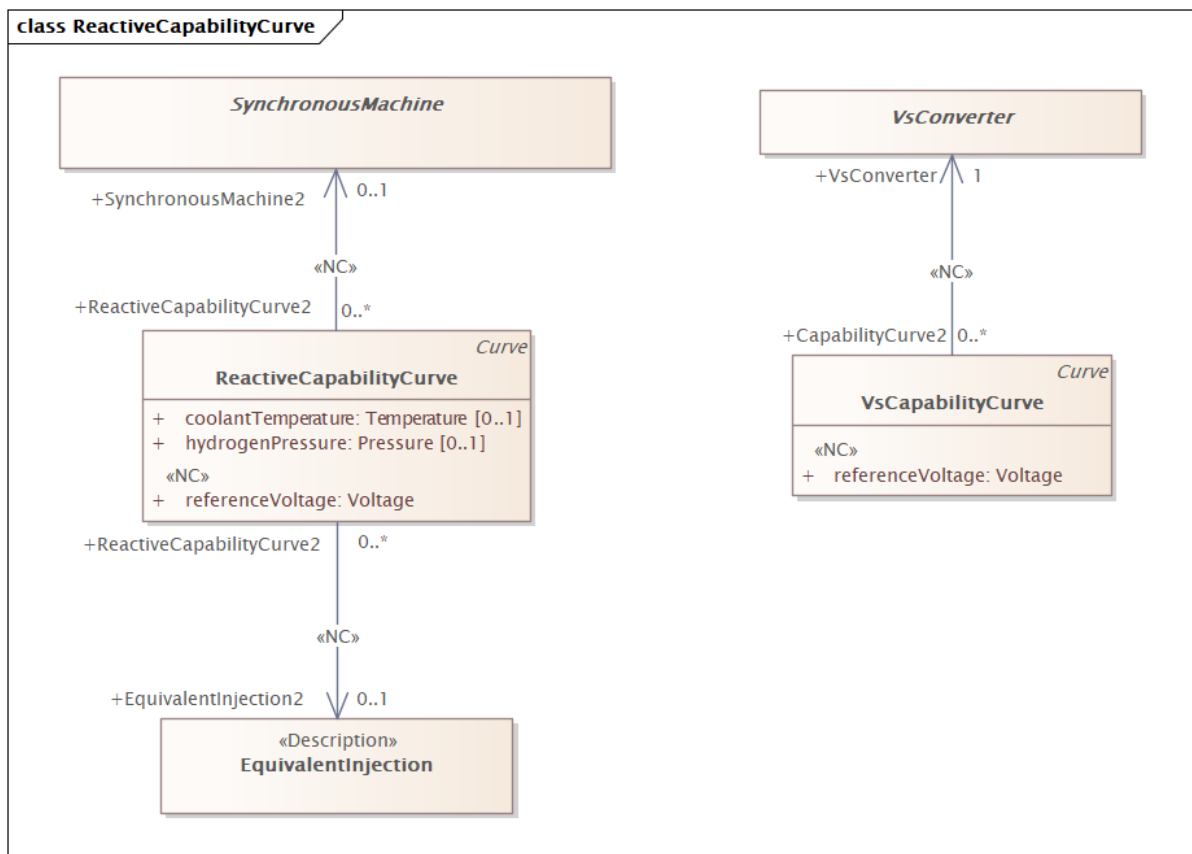
1118

1119

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

1120

Figure 16: The diagram shows production related classes.



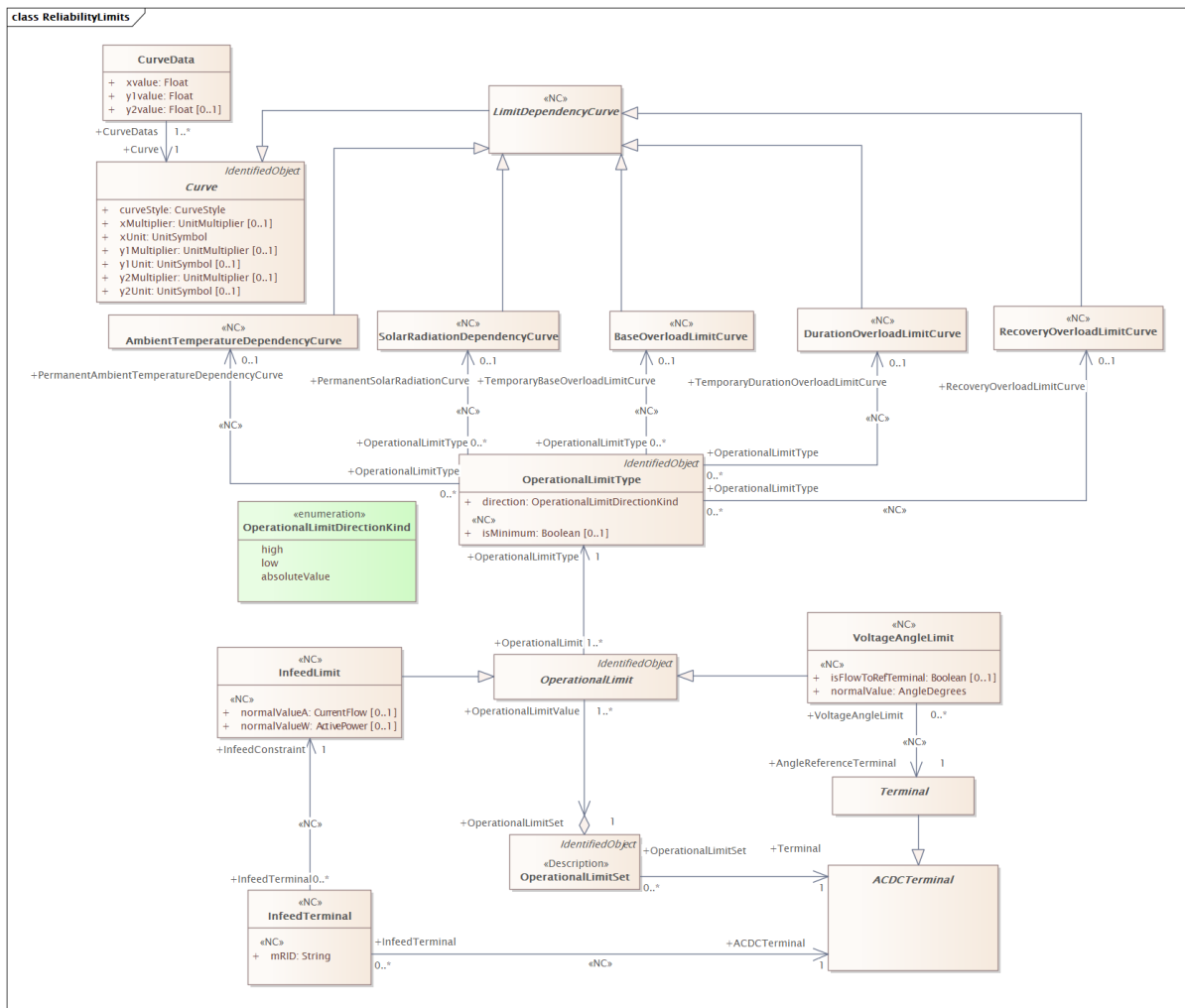
1121

1122

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

1123

Figure 17: The diagram shows classes related to reactive capability curve.



1124  
1125 **Figure 18 – Class diagram EquipmentReliabilityProfile::ReliabilityLimits**

1126 Figure 18: The diagram contains main classes related to the reliability limits.

1127 **3.2 (abstract) ACDCTerminal root class**

1128 An electrical connection point (AC or DC) to a piece of conducting equipment. Terminals are  
1129 connected at physical connection points called connectivity nodes.

1130 **3.3 (NC) ActivePowerControlFunction**

1131 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

1132 Active power control function is a function block that calculates operating point of the controlled  
1133 equipment to achieve the target active power.

1134 Table 1 shows all attributes of ActivePowerControlFunction.

1135 **Table 1 – Attributes of EquipmentReliabilityProfile::ActivePowerControlFunction**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

1136

1137 Table 2 shows all association ends of ActivePowerControlFunction with other classes.

1138 **Table 2 – Association ends of EquipmentReliabilityProfile::ActivePowerControlFunction**  
1139 **with other classes**

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

1140

### 1141 3.4 (NC) AmbientTemperatureDependencyCurve

1142 Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

1143 A curve or functional relationship between the ambient temperature independent variable (X-axis) and relative temperature dependent (Y-axis) variables.

1145 Table 3 shows all attributes of AmbientTemperatureDependencyCurve.

1146

1147

**Table 3 – 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>

1148

### 1149 3.5 (NC) AreaDispatchableUnit

1150 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

1151 Allocates a given producing or consuming unit, including direct current corridor and collection  
1152 of units, to a given control area (through the scheduling area) for supporting the control of the  
1153 given area through dispatch instruction.

1154 Table 4 shows all attributes of AreaDispatchableUnit.

1155

**Table 4 – Attributes of EquipmentReliabilityProfile::AreaDispatchableUnit**

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>

1156

1157

Table 5 shows all association ends of AreaDispatchableUnit with other classes.

1158

**Table 5 – Association ends of EquipmentReliabilityProfile::AreaDispatchableUnit with other classes**

1159

mult from	name	mult to	type	description
0..1	PowerElectronicsUnit	0..1	<a href="#">PowerElectronicsUnit</a>	(NC) The power electronics unit that belongs to this area dispatchable unit.
0..1	ScheduleResource	0..1	<a href="#">ScheduleResource</a>	(NC) The resource which is mFRR for the EnergySchedulingArea to which the AreaDispatchableUnit is connected. Note that this can be different than the area for the energy schedule.
0..*	SchedulingArea	0..1	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has this area dispatchable unit.
0..1	GeneratingUnit	0..1	<a href="#">GeneratingUnit</a>	(NC) The generating unit that belongs to area dispatchable unit.
0..1	EnergyConsumer	0..1	<a href="#">EnergyConsumer</a>	Energy consumer for this area dispatchable unit.
0..1	HydroPump	0..1	<a href="#">HydroPump</a>	(NC) Hydro Pump which is associated with the area dispatchable unit.
0..*	TieCorridor	0..1	<a href="#">TieCorridor</a>	(NC) Tie Corridor which belongs to the Area Dispatchable Unit.

1160

1161

**3.6 (abstract,NC) AutomationFunction**

1162

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

1163

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.

1164

1165

Table 6 shows all attributes of AutomationFunction.

1166

**Table 6 – 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>

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>

1167

1168

Table 7 shows all association ends of AutomationFunction with other classes.

1169

**Table 7 – Association ends of EquipmentReliabilityProfile::AutomationFunction with other classes**

1170

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

1171

### 1172 3.7 (NC) BaseOverloadLimitCurve

1173 Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

1174 A curve or functional relationship between

1175 - the relative loading - current loading over permanent loading (PATL) independent variable (X-axis), and

1176 - temporary overloading (TATL) limiting dependent (Y-axis) variables.

1177 Table 8 shows all attributes of BaseOverloadLimitCurve.

1178

**Table 8 – 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>

1180

### 1181 3.8 (NC) BiddingZone

1182 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

1183 A bidding zone is a market-based method for handling power transmission congestion. It consists of scheduling areas that include the relevant production (supply) and consumption (demand) to form an electrical area with the same market price without capacity allocation.

1184 Table 9 shows all attributes of BiddingZone.

1185

**Table 9 – 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

name	mult	type	description
			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>

1188  
1189 Table 10 shows all association ends of BiddingZone with other classes.

1190 **Table 10 – Association ends of EquipmentReliabilityProfile::BiddingZone with other**  
1191 **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..*	PowerCapacity	0..1	<a href="#">PowerCapacity</a>	(NC) Power capacity which is associated to the bidding zone.

1192  
1193 **3.9 (NC) BiddingZoneBorder**

1194 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)  
1195 Defines the aggregated connection capacity between two Bidding Zones.  
1196 Table 11 shows all attributes of BiddingZoneBorder.

1197 **Table 11 – 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>

1198  
1199 Table 12 shows all association ends of BiddingZoneBorder with other classes.

1200 **Table 12 – Association ends of EquipmentReliabilityProfile::BiddingZoneBorder with**  
1201 **other classes**

mult from	name	mult to	type	description
0..*	BiddingZoneTwo	1..1	<a href="#">BiddingZone</a>	(NC) The bidding zone for the secondary side.
0..*	BiddingZoneOne	1..1	<a href="#">BiddingZone</a>	(NC) The bidding zone for the primary side.
0..*	CapacityCalculationRegion	0..1	<a href="#">CapacityCalculationRegion</a>	(NC) The capacity calculation region for which the capacity is derived from.

1202  
1203 **3.10 (NC) CapacityCalculationRegion**

1204 Inheritance path = [Region](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1205 Capacity calculation region is a coherent part of the interconnected system that is used for  
1206 calculating the transmission capacity for a bidding zone or between bidding zones.  
1207 Table 13 shows all attributes of CapacityCalculationRegion.

1208 **Table 13 – 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>

1209  
1210 Table 14 shows all association ends of CapacityCalculationRegion with other classes.

1211 **Table 14 – Association ends of EquipmentReliabilityProfile::CapacityCalculationRegion**  
1212 **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>

1213

### 1214 3.11 (NC) ChargingUnit

1215 Inheritance path = [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) :  
1216 [IdentifiedObject](#)

1217 A unit that supplies electrical power for charging electrical non-stationary entities, e.g. electrical  
1218 vehicle, trucks, buses, ferries, boats and airplanes. The characteristic is that the energy  
1219 consumption is highly schedule dependent.

1220 Table 15 shows all attributes of ChargingUnit.

1221 **Table 15 – Attributes of EquipmentReliabilityProfile::ChargingUnit**

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>

1222

1223 Table 16 shows all association ends of ChargingUnit with other classes.

1224 **Table 16 – Association ends of EquipmentReliabilityProfile::ChargingUnit with other**  
1225 **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>

1226

### 1227 3.12 (abstract,NC) Circuit

1228 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

1229 A circuit is a collection of equipment in a network graph that provide common stability limits.  
1230 The relevant equipment is in general given by the identifying terminal. A software application  
1231 that can do topology processing shall calculate the equipment belonging to the circuit, if there  
1232 are no stability limits associated to it. In case of stability limits, the containment reflects the  
1233 equipments that were used in the calculation/analysis.

1234 Table 17 shows all attributes of Circuit.

1235 **Table 17 – 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>

1236

1237 Table 18 shows all association ends of Circuit with other classes.

1238 **Table 18 – 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.

1239

### 1240 3.13 (NC) CircuitShare

1241 Inheritance path = [IdentifiedObject](#)

1242 Defines the share of the circuit which is part of an associated power transfer corridor.

1243 Table 19 shows all attributes of CircuitShare.

1244 **Table 19 – 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].

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>

1245

1246

Table 20 shows all association ends of CircuitShare with other classes.

1247

**Table 20 – Association ends of EquipmentReliabilityProfile::CircuitShare with other classes**

1248

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.

1249

1250

### 3.14 (NC) ClosedDistributionSystemOperator

1251

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

1252

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

1253

Table 21 shows all attributes of ClosedDistributionSystemOperator.

1254

1255

**Table 21 – 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>

1256

1257

Table 22 shows all association ends of ClosedDistributionSystemOperator with other classes.

1258

**Table 22 – Association ends of EquipmentReliabilityProfile::ClosedDistributionSystemOperator with other classes**

1259

1260

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

1261

1262

### 3.15 (NC) CompensatorController

1263

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

1264

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

1265

Table 23 shows all attributes of CompensatorController.

1266

1267 **Table 23 – 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>

1268

1269 Table 24 shows all association ends of CompensatorController with other classes.

1270 **Table 24 – Association ends of EquipmentReliabilityProfile::CompensatorController**  
1271 **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>

1272

1273 **3.16 (abstract) ConductingEquipment**1274 Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)1275 The parts of the AC power system that are designed to carry current or that are conductively  
1276 connected through terminals.

1277 Table 25 shows all attributes of ConductingEquipment.

1278 **Table 25 – 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>

1279

1280 Table 26 shows all association ends of ConductingEquipment with other classes.

1281 **Table 26 – Association ends of EquipmentReliabilityProfile::ConductingEquipment with**  
1282 **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>

1283

1284 **3.17 (abstract) ConnectivityNodeContainer**1285 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

1286 A base class for all objects that may contain connectivity nodes or topological nodes.

1287 Table 27 shows all attributes of ConnectivityNodeContainer.



1288 **Table 27 – 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>

1289

1290 **3.18 (Description) ControlArea**1291 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

1292 A control area is a grouping of generating units and/or loads and a subset of tie lines (as  
1293 terminals) which may be used for a variety of purposes including automatic generation control,  
1294 power flow solution area interchange control specification, and input to load forecasting. All  
1295 generation and load within the area defined by the terminals on the border are considered in  
1296 the area interchange control. Note that any number of overlapping control area specifications  
1297 can be superimposed on the physical model. The following general principles apply to  
1298 ControlArea:

- 1299 1. The control area orientation for net interchange is positive for an import, negative for an  
1300 export.
- 1301 2. The control area net interchange is determined by summing flows in Terminals. The  
1302 Terminals are identified by creating a set of TieFlow objects associated with a ControlArea  
1303 object. Each TieFlow object identifies one Terminal.
- 1304 3. In a single network model, a tie between two control areas must be modelled in both control  
1305 area specifications, such that the two representations of the tie flow sum to zero.
- 1306 4. The normal orientation of Terminal flow is positive for flow into the conducting equipment  
1307 that owns the Terminal. (i.e. flow from a bus into a device is positive.) However, the orientation  
1308 of each flow in the control area specification must align with the control area convention, i.e.  
1309 import is positive. If the orientation of the Terminal flow referenced by a TieFlow is positive into  
1310 the control area, then this is confirmed by setting TieFlow.positiveFlowIn flag TRUE. If not, the  
1311 orientation must be reversed by setting the TieFlow.positiveFlowIn flag FALSE.

1312 Table 28 shows all attributes of ControlArea.

1313 **Table 28 – Attributes of EquipmentReliabilityProfile::ControlArea**

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>

1314

1315 Table 29 shows all association ends of ControlArea with other classes.

1316 **Table 29 – Association ends of EquipmentReliabilityProfile::ControlArea with other  
1317 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.

1318

1319 **3.19 (abstract,NC) ControlFunctionBlock**1320 Inheritance path = [FunctionBlock](#) : [IdentifiedObject](#)

1321 Control function block is a function block that contains an algorithm for controlling the equipment.

1322 Table 30 shows all attributes of ControlFunctionBlock.

1324 **Table 30 – 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.
targetDeadband	0..1	<a href="#">Float</a>	(NC) Target deadband 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. Note that for instance, if the targetValue is 100 kV and the targetDeadband is 2 kV 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. 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. 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>

1325

1326 Table 31 shows all association ends of ControlFunctionBlock with other classes.

1327 **Table 31 – Association ends of EquipmentReliabilityProfile::ControlFunctionBlock with other classes**

1328

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

1329

1330 **3.20 (abstract) Curve**1331 Inheritance path = [IdentifiedObject](#)

1332 A multi-purpose curve or functional relationship between an independent variable (X-axis) and dependent (Y-axis) variables.

1333 Table 32 shows all attributes of Curve.

1335 **Table 32 – 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.

name	mult	type	description
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>

1336

1337 **3.21 CurveData root class**

1338 Multi-purpose data points for defining a curve. The use of this generic class is discouraged if  
1339 a more specific class can be used to specify the X and Y axis values along with their specific  
1340 data types.

1341 Table 33 shows all attributes of CurveData.

1342

**Table 33 – 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.
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.

1343

1344 Table 34 shows all association ends of CurveData with other classes.

1345 **Table 34 – Association ends of EquipmentReliabilityProfile::CurveData with other**  
1346 **classes**

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

1347

1348 **3.22 (Description) DCConverterUnit**

1349 Inheritance path = [DCEquipmentContainer](#) : [EquipmentContainer](#) : [ConnectivityNodeContainer](#) :  
1350 [PowerSystemResource](#) : [IdentifiedObject](#)

1351 Indivisible operative unit comprising all equipment between the point of common coupling on  
1352 the AC side and the point of common coupling – DC side, essentially one or more converters,  
1353 together with one or more converter transformers, converter control equipment, essential  
1354 protective and switching devices and auxiliaries, if any, used for conversion.

1355 Table 35 shows all attributes of DCConverterUnit.

1356

**Table 35 – 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>

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>

1357

1358

Table 36 shows all association ends of DCConverterUnit with other classes.

1359

1360

**Table 36 – 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..*	DCSubstation	0..1	<a href="#">DCSubstation</a>	(NC) DC substation that has one or more DC converter units.
0..1	ACPointOfCommonCoupling	1..1	<a href="#">ACPointOfCommonCoupling</a>	(NC) AC point of common coupling for this DC converter unit.
0..1	DCPointOfCommonCoupling	1..1	<a href="#">DCPointOfCommonCoupling</a>	(NC) DCNode that is the point of common coupling at DC side of this DCConverterUnit.

1361

1362

### 3.23 (abstract) DCEquipmentContainer

1363

1364

1365

1366

1367

1368

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 37 shows all attributes of DCEquipmentContainer.

1369

**Table 37 – 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>

1370

1371

### 3.24 (Description) DCLine root class

1372

1373

1374

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

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

**Table 38 – 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.

1375

1376

### 3.25 (NC) DCPole

1377

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

1378 The direct current (DC) system pole (IEC 60633) is part of a DC system consisting of all the  
1379 equipment in the DC substations and the interconnecting transmission lines, if any, which during  
1380 normal operation exhibit a common direct voltage polarity with respect to earth.  
1381 Table 39 shows all attributes of DCPole.

1382 **Table 39 – 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. 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. $V=T/\text{sum}(\text{PF})$ . 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>

1383  
1384 Table 40 shows all association ends of DCPole with other classes.

1385 **Table 40 – 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.

1386  
1387 **3.26 (NC) DCTieCorridor**

1388 Inheritance path = [TieCorridor](#) : [PowerSystemResource](#) : [IdentifiedObject](#)  
1389 A collection of one or more direct current poles that connect two different control areas.  
1390 Table 41 shows all attributes of DCTieCorridor.

1391 **Table 41 – 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>

name	mult	type	description
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>

1392  
1393

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

1394  
1395

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

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

1396

### 1397 3.27 (NC) DirectCurrentMasterController

1398 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :  
1399 [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1400 Direct current system control is a control system which governs the operation of an entire DC  
1401 system consisting of more than one DC substation and performs those functions of controlling,  
1402 monitoring and protection which require information from more than one substation. This can  
1403 also be a multiterminal control which is a DC system control for more that two DC substations  
1404 or a DC master control, which is a general concept for control coordination of a DC system. The  
1405 DC master control may be implemented at the bipole and/or pole level as defined in IEC 60633.  
1406 The DC system control/multiterminal control/master control is part of the hierarchical structure  
1407 of an HVDC control system that has an integrated AC/DC system control as the highest level  
1408 of control which governs the integrated operation of AC and DC systems of a power system.  
1409 This control system is under the responsibility of the system operator.

1410 Table 43 shows all attributes of DirectCurrentMasterController.

1411 **Table 43 – 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>

1412

1413 Table 44 shows all association ends of DirectCurrentMasterController with other classes.

1414  
1415**Table 44 – 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>

1416

**3.28 (NC) DirectCurrentSystemOperator**

1418 Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : [OrganisationRole](#) :  
1419 [IdentifiedObject](#)

1420 System operator of the direct current pole. There are typically one or two system operators that  
1421 are operating either the control area at one side or the control areas at both sides of the direct  
1422 current pole. In some cases it is operated by an operator from the connected control areas.

1423 Table 45 shows all attributes of DirectCurrentSystemOperator.

**Table 45 – 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>

1425

1426 Table 46 shows all association ends of DirectCurrentSystemOperator with other classes.

**Table 46 – 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>

1429

**3.29 (NC) DistributionSystemOperator**

1431 Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : [OrganisationRole](#) :  
1432 [IdentifiedObject](#)

1433 A system operator that is responsible for operating of energy distribution network from  
1434 transmission level down to low voltage levels including the connection to household.

1435 Table 47 shows all attributes of DistributionSystemOperator.

**Table 47 – 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>

1436

1437  
1438 Table 48 shows all association ends of DistributionSystemOperator with other classes.

1439 **Table 48 – Association ends of**  
1440 **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>

1441

### 1442 3.30 (NC) DurationOverloadLimitCurve

1443 Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

1444 A curve or functional relationship between

1445 - the overload duration independent variable (X-axis), and

1446 - temporary overloading (TATL) limiting dependent (Y-axis) variables.

1447 Table 49 shows all attributes of DurationOverloadLimitCurve.

1448 **Table 49 – 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>

1449

### 1450 3.31 (NC) EnergyAlignmentCoordinator

1451 Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) :  
1452 [OrganisationRole](#) : [IdentifiedObject](#)

1453 A role that is responsible for alignment of forecast and schedule energy to a given energy  
1454 coordination region.

1455 Table 50 shows all attributes of EnergyAlignmentCoordinator.

1456 **Table 50 – 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>

1457

1458 Table 51 shows all association ends of EnergyAlignmentCoordinator with other classes.



1459  
1460**Table 51 – 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>

1461

**3.32 (NC) EnergyBlockComponent**1463 Inheritance path = [EnergyComponent](#) : [IdentifiedObject](#)

1464 Energy block component where the energy group is distributed according to the energy block order of each energy component in an energy group.

1465 Table 52 shows all attributes of EnergyBlockComponent.

**Table 52 – 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>

1468

1469 Table 53 shows all association ends of EnergyBlockComponent with other classes.

**Table 53 – 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..*	EnergyGroup	0..1	<a href="#">EnergyGroup</a>	(NC) inherited from: <a href="#">EnergyComponent</a>

1472

**3.33 (NC) EnergyBlockOrder**1474 Inheritance path = [IdentifiedObject](#)

1475 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.

1476 Table 54 shows all attributes of EnergyBlockOrder.

**Table 54 – 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. 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.

1478

name	mult	type	description
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>

1479

1480

Table 55 shows all association ends of EnergyBlockOrder with other classes.

1481

**Table 55 – Association ends of EquipmentReliabilityProfile::EnergyBlockOrder with other classes**

1482

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.

1483

1484

### 3.34 (abstract,NC) EnergyComponent

1485

Inheritance path = [IdentifiedObject](#)

1486

The energy component for a producer or a consumer that has the same energy characteristic, e.g. fuel type and technology.

1487

1488

Table 56 shows all attributes of EnergyComponent.

1489

**Table 56 – 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>

1490

1491

Table 57 shows all association ends of EnergyComponent with other classes.

1492

**Table 57 – Association ends of EquipmentReliabilityProfile::EnergyComponent with other classes**

1493

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..*	EnergyGroup	0..1	<a href="#">EnergyGroup</a>	(NC) The energy group that has this energy component.

1494

1495 **3.35 (abstract) EnergyConnection**1496 Inheritance path = [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
1497 [IdentifiedObject](#)

1498 A connection of energy generation or consumption on the power system model.

1499 Table 58 shows all attributes of EnergyConnection.

1500 **Table 58 – Attributes of EquipmentReliabilityProfile::EnergyConnection**

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>

1501

1502 Table 59 shows all association ends of EnergyConnection with other classes.

1503 **Table 59 – Association ends of EquipmentReliabilityProfile::EnergyConnection with**  
1504 **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>

1505

1506 **3.36 (Description) EnergyConsumer**1507 Inheritance path = [EnergyConnection](#) : [ConductingEquipment](#) : [Equipment](#) :  
1508 [PowerSystemResource](#) : [IdentifiedObject](#)

1509 Generic user of energy - a point of consumption on the power system model.

1510 EnergyConsumer.pfixed, .qfixed, .pfixedPct and .qfixedPct have meaning only if there is no

1511 LoadResponseCharacteristic associated with EnergyConsumer or if

1512 LoadResponseCharacteristic.exponentModel is set to False.

1513 Table 60 shows all attributes of EnergyConsumer.

1514 **Table 60 – Attributes of EquipmentReliabilityProfile::EnergyConsumer**

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.  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. $V=T/\text{sum}(PF)$ .  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.

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>

1515

1516

Table 61 shows all association ends of EnergyConsumer with other classes.

1517

**Table 61 – Association ends of EquipmentReliabilityProfile::EnergyConsumer with other classes**

1518

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>

1519

1520

### 3.37 (NC) EnergyCoordinationRegion

1521

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

1522

A region that has a common organisation or a service that is responsible for alignment of forecast and scheduling of energy.

1523

1524

Table 62 shows all attributes of EnergyCoordinationRegion.

1525

**Table 62 – 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>

1526

1527

Table 63 shows all association ends of EnergyCoordinationRegion with other classes.

1528

**Table 63 – Association ends of EquipmentReliabilityProfile::EnergyCoordinationRegion with other classes**

1529

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>

1530

1531

### 3.38 (NC) EnergyType

1532

Inheritance path = [IdentifiedObject](#)

1533

A source of the energy.

1534

An energy type reference refers to an energy characteristic that is needed for reporting, e.g. European Energy Certificate System (EECS). The kind of energy should be possible to be linked with different type of energy forecast, e.g. wind production for a given area based on wind forecast.

1535

1536

1537

1538

Table 64 shows all attributes of EnergyType.

1539

**Table 64 – Attributes of EquipmentReliabilityProfile::EnergyType**

name	mult	type	description
kind	1..1	<a href="#">EnergyKind</a>	(NC) The kind of energy type.
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>

1540

1541

Table 65 shows all association ends of EnergyType with other classes.

1542

**Table 65 – Association ends of EquipmentReliabilityProfile::EnergyType with other classes**

1543

mult from	name	mult to	type	description
0..*	EnergySourceReference	0..1	<a href="#">EnergySourceReference</a>	(NC) Energy source reference which has energy type references.

1544

**3.39 (abstract,Description) Equipment**

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

The parts of a power system that are physical devices, electronic or mechanical.

Table 66 shows all attributes of Equipment.

1549

**Table 66 – 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>

1550

1551

Table 67 shows all association ends of Equipment with other classes.

1552

**Table 67 – Association ends of EquipmentReliabilityProfile::Equipment with other classes**

1553

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.

1554

**3.40 (abstract) EquipmentContainer**

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

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

Table 68 shows all attributes of EquipmentContainer.

1558

1559 **Table 68 – Attributes of EquipmentReliabilityProfile::EquipmentContainer**

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>

1560

1561 **3.41 (abstract,NC) EquipmentController**1562 Inheritance path = [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)1563 Equipment controller is an automation function that can control one or multiple equipment  
1564 function to achieve all the targets inside the given tolerance.

1565 Table 69 shows all attributes of EquipmentController.

1566 **Table 69 – 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>

1567

1568 Table 70 shows all association ends of EquipmentController with other classes.

1569 **Table 70 – Association ends of EquipmentReliabilityProfile::EquipmentController with**  
1570 **other classes**

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

1571

1572 **3.42 (NC) ExceptionalPowerTransferCorridor**1573 Inheritance path = [PowerTransferCorridor](#) : [PowerSystemResource](#) : [IdentifiedObject](#)1574 Potential power transfer corridor that can be triggered by equipment which changes its in  
1575 service status or it is operating in an island.

1576 Table 71 shows all attributes of ExceptionalPowerTransferCorridor.

1577 **Table 71 – 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>

1578

1579 **3.43 (abstract,NC) FACTSEquipment**

1580 Inheritance path = [RegulatingCondEq](#) : [EnergyConnection](#) : [ConductingEquipment](#) :

1581 [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1582 Flexible Alternating Current Transmission System regulating equipment.

1583 Table 72 shows all attributes of FACTSEquipment.

1584 **Table 72 – 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.
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>

1585

1586 Table 73 shows all association ends of FACTSEquipment with other classes.

1587 **Table 73 – Association ends of EquipmentReliabilityProfile::FACTSEquipment with**

1588 **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>

1589

1590 **3.44 Feeder**

1591 Inheritance path = [EquipmentContainer](#) : [ConnectivityNodeContainer](#) : [PowerSystemResource](#) :

1592 [IdentifiedObject](#)

1593 A collection of equipment for organizational purposes, used for grouping distribution resources.

1594 The organization a feeder does not necessarily reflect connectivity or current operation state.

1595 Table 74 shows all attributes of Feeder.

1596

**Table 74 – Attributes of EquipmentReliabilityProfile::Feeder**

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>

1597

1598

Table 75 shows all association ends of Feeder with other classes.

1599

**Table 75 – Association ends of EquipmentReliabilityProfile::Feeder with other classes**

mult from	name	mult to	type	description
0..*	NormalEnergizingSubstation	0..1	<a href="#">Substation</a>	The substation that nominally energizes the feeder. Also used for naming purposes.
0..1	NamingSecondarySubstation	0..*	<a href="#">Substation</a>	The secondary substations that are normally energized from the feeder. Used for naming purposes. Should be consistent with the other associations for energizing terminal specification and the feeder energization specification.
0..*	SubSchedulingArea	0..1	<a href="#">SubSchedulingArea</a>	(NC) The subscheduling area that has this feeder.
0..*	NormalEnergizedSubstation	0..*	<a href="#">Substation</a>	The substations that are normally energized by the feeder.

1600

**3.45 (NC) FlexibleEnergyUnit**

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

Flexible consumer or embedded producer of energy. The unit cannot be a net producer.

Table 76 shows all attributes of FlexibleEnergyUnit.

1606

**Table 76 – 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.



name	mult	type	description
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.
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>

1607

1608

Table 77 shows all association ends of FlexibleEnergyUnit with other classes.

1609

**Table 77 – Association ends of EquipmentReliabilityProfile::FlexibleEnergyUnit with other classes**

1610

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>

1611

1612

### 3.46 (abstract,NC) FunctionBlock

1613

Inheritance path = [IdentifiedObject](#)

1614

Function block is a function described as a set of elementary blocks. The blocks describe the function between input variables and output variables.

1615

1616

Table 78 shows all attributes of FunctionBlock.

1617

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

name	mult	type	description
normalEnabled	0..1	<a href="#">Boolean</a>	(NC) True, if the function block 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>

1618

1619

Table 79 shows all association ends of FunctionBlock with other classes.

1620 **Table 79 – Association ends of EquipmentReliabilityProfile::FunctionBlock with other**  
1621 **classes**

mult from	name	mult to	type	description
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) Automation function describe automation that this function block is part of.
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) Automation block group which has function blocks.

1622

### 1623 3.47 (abstract,NC) FunctionInputVariable

1624 Inheritance path = [IdentifiedObject](#)

1625 Functional input variable defines the domain of the function.

1626 Table 80 shows all attributes of FunctionInputVariable.

1627 **Table 80 – 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	0..1	<a href="#">String</a>	inherited from: <a href="#">IdentifiedObject</a>

1628

1629 Table 81 shows all association ends of FunctionInputVariable with other classes.

1630 **Table 81 – Association ends of EquipmentReliabilityProfile::FunctionInputVariable with**  
1631 **other classes**

mult from	name	mult to	type	description
1..*	Function	1..1	<a href="#">FunctionBlock</a>	(NC) Function block describe the function that function input variable provides the domain for.

1632

### 1633 3.48 (NC) FunctionOutputVariable

1634 Inheritance path = [IdentifiedObject](#)

1635 Functional output variable defines the codomain of the function.

1636 Table 82 shows all attributes of FunctionOutputVariable.

1637 **Table 82 – 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>

1638

1639 Table 83 shows all association ends of FunctionOutputVariable with other classes.

1640 **Table 83 – Association ends of EquipmentReliabilityProfile::FunctionOutputVariable**  
1641 **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.

1642

### 1643 3.49 (NC) GateInputPin

1644 Inheritance path = [FunctionInputVariable](#) : [IdentifiedObject](#)

1645 Input pin for a logical gate. The condition described in the input pin gives a logical true or false.

1646 The result from measurement and calculation are converted to a true or false.

1647 Table 84 shows all attributes of GateInputPin.

1648 **Table 84 – 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).
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) The logical operator kind used for comparison.
duration	0..1	<a href="#">Duration</a>	(NC) The time duration for which the condition is satisfied before acting. Default is 0 seconds.
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.
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>

1649

1650 Table 85 shows all association ends of GateInputPin with other classes.

1651 **Table 85 – Association ends of EquipmentReliabilityProfile::GateInputPin with other**  
1652 **classes**

mult from	name	mult to	type	description
1..*	Function	1..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>

1653

### 1654 3.50 (Description) GeneratingUnit

1655 Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1656 A single or set of synchronous machines for converting mechanical power into alternating-  
1657 current power. For example, individual machines within a set may be defined for scheduling  
1658 purposes while a single control signal is derived for the set. In this case there would be a  
1659 GeneratingUnit for each member of the set and an additional GeneratingUnit corresponding to  
1660 the set.

1661 Table 86 shows all attributes of GeneratingUnit.

1662 **Table 86 – 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.
shutdownCost	0..1	<a href="#">Money</a>	(NC) The shutdown cost incurred for each shutdown of the GeneratingUnit.
shutdownTime	0..1	<a href="#">Duration</a>	(NC) Time it takes to shutdown the unit.
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.
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.
runningLeadTime	0..1	<a href="#">Duration</a>	(NC) Time it takes to change the schedule when the unit is operating due to technical 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="#">Money</a>	(NC) The normal initial startup cost incurred for each start of the GeneratingUnit.
normalWarmStartupCost	0..1	<a href="#">Money</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.

name	mult	type	description
			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.
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>

1663

1664

Table 87 shows all association ends of GeneratingUnit with other classes.

1665

**Table 87 – Association ends of EquipmentReliabilityProfile::GeneratingUnit with other classes**

1666

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>

1667

1668

### 3.51 (NC) GeothermalGeneratingUnit

1669

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

1670

Generating unit that is generating electrical power from geothermal energy.

1671

Table 88 shows all attributes of GeothermalGeneratingUnit.

1672

**Table 88 – 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>
shutdownCost	0..1	<a href="#">Money</a>	(NC) inherited from: <a href="#">GeneratingUnit</a>
shutdownTime	0..1	<a href="#">Duration</a>	(NC) inherited from: <a href="#">GeneratingUnit</a>
normalMustRunP	0..1	<a href="#">ActivePower</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>
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="#">Money</a>	(NC) inherited from: <a href="#">GeneratingUnit</a>
normalWarmStartupCost	0..1	<a href="#">Money</a>	(NC) inherited from: <a href="#">GeneratingUnit</a>
normalMustRunQ	0..1	<a href="#">ReactivePower</a>	(NC) inherited from: <a href="#">GeneratingUnit</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>

1673

1674 Table 89 shows all association ends of GeothermalGeneratingUnit with other classes.

1675 **Table 89 – Association ends of EquipmentReliabilityProfile::GeothermalGeneratingUnit**  
1676 **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>

1677

### 1678 3.52 (Description) HydroPump

1679 Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1680 A synchronous motor-driven pump, typically associated with a pumped storage plant.

1681 Table 90 shows all attributes of HydroPump.

1682 **Table 90 – 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.  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. $V=T/\text{sum}(PF)$ .  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>

1683

1684 Table 91 shows all association ends of HydroPump with other classes.

1685 **Table 91 – Association ends of EquipmentReliabilityProfile::HydroPump with other**  
1686 **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>

1687

### 1688 3.53 (abstract) IdentifiedObject root class

1689 This is a root class to provide common identification for all classes needing identification and  
1690 naming attributes.

1691 Table 92 shows all attributes of IdentifiedObject.

1692 **Table 92 – Attributes of EquipmentReliabilityProfile::IdentifiedObject**

name	mult	type	description
energyIdentCodeEic	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.
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.  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.

1693

### 1694 3.54 (NC) ImpedanceControlFunction

1695 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

1696 Impedance control function is a function block that calculates the operating point of the  
1697 controlled equipment to achieve the target impedance.

1698 Table 93 shows all attributes of ImpedanceControlFunction.

1699 **Table 93 – Attributes of EquipmentReliabilityProfile::ImpedanceControlFunction**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

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Table 94 shows all association ends of ImpedanceControlFunction with other classes.

**Table 94 – Association ends of EquipmentReliabilityProfile::ImpedanceControlFunction with other classes**

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

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### 3.55 (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 95 shows all attributes of LimitDependencyCurve.

**Table 95 – 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>

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### 3.56 (Description) Line

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

Contains equipment beyond a substation belonging to a power transmission line.

Table 96 shows all attributes of Line.



1717

**Table 96 – 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>

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Table 97 shows all association ends of Line with other classes.

1720

**Table 97 – 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.

1721

1722

**3.57 (NC) LineCircuit**

1723

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

1724

A line circuit is a circuit that has at least one ACLineSegment and may or may not include related switching and/or auxiliary equipment.

1725

1726

Table 98 shows all attributes of LineCircuit.

1727

**Table 98 – 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>

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Table 99 shows all association ends of LineCircuit with other classes.

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**Table 99 – Association ends of EquipmentReliabilityProfile::LineCircuit with other classes**

1731

mult from	name	mult to	type	description
0..1	IdentifyingTerminal	0..1	<a href="#">Terminal</a>	(NC) inherited from: <a href="#">Circuit</a>

1732

1733

**3.58 (NC) LoadFrequencyControlArea**

1734

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

1735

A part of a synchronous area or an entire synchronous area, physically demarcated by points of measurement at interconnectors to other load frequency control (LFC) areas, operated by one or more TSOs fulfilling the obligations of load-frequency control.

1736

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Table 100 shows all attributes of LoadFrequencyControlArea.

1739 **Table 100 – 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.
frequencyRestorationReserveDelay	0..1	<a href="#">Seconds</a>	(NC) FRR delay expressed in seconds. Must be a positive multiple of AGC's cycle duration.
frequencyRestorationReserveMaxRamp	0..1	<a href="#">ActivePowerChangeRate</a>	(NC) Maximum authorized ramp for both FRR dispatching and ramp to zero.
frequencyRestorationReserveThreshold	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>

1740

1741 Table 101 shows all association ends of LoadFrequencyControlArea with other classes.

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1743

**Table 101 – Association ends of  
EquipmentReliabilityProfile::LoadFrequencyControlArea with other classes**

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.

1744

### 1745 3.59 (NC) LoadFrequencyControlBlock

1746 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

1747 A part of a synchronous area or an entire synchronous area, physically demarcated by points  
1748 of measurement at interconnectors to other load frequency control (LFC) blocks, consisting of  
1749 one or more LFC areas, operated by one or more TSOs fulfilling the obligations of load-  
1750 frequency control.

1751 Table 102 shows all attributes of LoadFrequencyControlBlock.

1752 **Table 102 – Attributes of EquipmentReliabilityProfile::LoadFrequencyControlBlock**

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>

1753

1754 Table 103 shows all association ends of LoadFrequencyControlBlock with other classes.

1755  
1756**Table 103 – 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.

1757

**3.60 (NC) LoadFrequencyControlOperator**

1759 Inheritance path = [PowerSystemOrganisationRole](#) : [OrganisationRole](#) : [IdentifiedObject](#)  
1760 A role that is responsible for operational security by operating the load frequency control (LFC)  
1761 mechanism.

1762 Table 104 shows all attributes of LoadFrequencyControlOperator.

**Table 104 – 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>

1764

1765 Table 105 shows all association ends of LoadFrequencyControlOperator with other classes.

**Table 105 – 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>

1768

**3.61 (NC) ModularStaticSynchronousSeriesCompensator**

1770 Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) :  
1771 [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1772 Modular static synchronous series compensator (MSSSC) is a type of flexible AC transmission  
1773 system regulating equipment which consists of solid-state voltage source inverter connected in  
1774 series with a transmission line. This is similar to static synchronous series compensator  
1775 (SSSC), but without injection transformer. This enables the MSSSC to be truly modular with the  
1776 ability to simply install a number of equipment in series to provide a desired maximum level of  
1777 impedance. MSSSC can be dispersed into multiple location in a circuit working collectively  
1778 under the same controller scheme.

1779 Table 106 shows all attributes of ModularStaticSynchronousSeriesCompensator.

**Table 106 – 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>

1780

1781

name	mult	type	description
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>

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

**Table 107 – 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>

1788

### 1789 3.62 (Description) NuclearGeneratingUnit

1790 Inheritance path = [GeneratingUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1791 A nuclear generating unit.

1792 Table 108 shows all attributes of NuclearGeneratingUnit.

1793 **Table 108 – 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>
shutdownCost	0..1	<a href="#">Money</a>	(NC) inherited from: <a href="#">GeneratingUnit</a>
shutdownTime	0..1	<a href="#">Duration</a>	(NC) inherited from: <a href="#">GeneratingUnit</a>
normalMustRunP	0..1	<a href="#">ActivePower</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>

name	mult	type	description
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="#">Money</a>	(NC) inherited from: <a href="#">GeneratingUnit</a>
normalWarmStartupCost	0..1	<a href="#">Money</a>	(NC) inherited from: <a href="#">GeneratingUnit</a>
normalMustRunQ	0..1	<a href="#">ReactivePower</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>

1794

1795

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

1796

1797

**Table 109 – 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>

1798

1799

### 3.63 (abstract) OperationalLimit

1800

Inheritance path = [IdentifiedObject](#)

1801

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

1802

The sub class value and normalValue attributes vary inversely to the associated OperationalLimitType.acceptableDuration (acceptableDuration for short).

1803

1804

If a particular piece of equipment has multiple operational limits of the same kind (apparent power, current, etc.), the limit with the greatest acceptableDuration shall have the smallest limit value and the limit with the smallest acceptableDuration shall have the largest limit value. Note:

1805

1806

A large current can only be allowed to flow through a piece of equipment for a short duration without causing damage, but a lesser current can be allowed to flow for a longer duration.

1807

1808

1809

Table 110 shows all attributes of OperationalLimit.

1810

**Table 110 – 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>

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1812

Table 111 shows all association ends of OperationalLimit with other classes.

1813

1814

**Table 111 – Association ends of EquipmentReliabilityProfile::OperationalLimit with other classes**

mult from	name	mult to	type	description
1..*	OperationalLimitType	1..1	<a href="#">OperationalLimitType</a>	The limit type associated with this limit.

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

1815

### 1816 3.64 (Description) OperationalLimitSet

1817 Inheritance path = [IdentifiedObject](#)

1818 A set of limits associated with equipment. Sets of limits might apply to a specific temperature,  
1819 or season for example. A set of limits may contain different severities of limit levels that would  
1820 apply to the same equipment. The set may contain limits of different types such as apparent  
1821 power and current limits or high and low voltage limits that are logically applied together as a  
1822 set.

1823 Table 112 shows all attributes of OperationalLimitSet.

1824 **Table 112 – 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>

1825

1826 Table 113 shows all association ends of OperationalLimitSet with other classes.

1827 **Table 113 – Association ends of EquipmentReliabilityProfile::OperationalLimitSet with**  
1828 **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.

1829

### 1830 3.65 OperationalLimitType

1831 Inheritance path = [IdentifiedObject](#)

1832 The operational meaning of a category of limits.

1833 Table 114 shows all attributes of OperationalLimitType.

1834 **Table 114 – 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>

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>

1835

1836

Table 115 shows all association ends of OperationalLimitType with other classes.

1837

1838

**Table 115 – Association ends of EquipmentReliabilityProfile::OperationalLimitType with other classes**

mult from	name	mult to	type	description
0..*	PermanentAmbientTemperatureDependencyCurve	0..1	<a href="#">AmbientTemperatureDependencyCurve</a>	(NC) The permanent ambient temperature dependency 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..*	TemporaryDurationOverloadLimitCurve	0..1	<a href="#">DurationOverloadLimitCurve</a>	(NC) The temporary duration overload limit curve for this operational limit type.
0..*	PermanentSolarRadiationCurve	0..1	<a href="#">SolarRadiationDependencyCurve</a>	(NC) The permanent solar radiation 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.

1839

1840

### 3.66 (NC) OrdinaryPowerTransferCorridor

1841

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

1842

Power transfer corridor defined for normal operating network.

1843

Table 116 shows all attributes of OrdinaryPowerTransferCorridor.

1844

**Table 116 – 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	0..1	<a href="#">String</a>	inherited from: <a href="#">IdentifiedObject</a>

1845

1846

### 3.67 Organisation

1847

Inheritance path = [IdentifiedObject](#)

1848

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

1849

Table 117 shows all attributes of Organisation.

1850

**Table 117 – 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>

1851

1852 **3.68 (abstract) OrganisationRole**1853 Inheritance path = [IdentifiedObject](#)1854 Identifies a way in which an organisation may participate in the utility enterprise (e.g., customer,  
1855 manufacturer, etc).

1856 Table 118 shows all attributes of OrganisationRole.

1857 **Table 118 – 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).  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>

1858

1859 Table 119 shows all association ends of OrganisationRole with other classes.

1860 **Table 119 – Association ends of EquipmentReliabilityProfile::OrganisationRole with  
1861 other classes**

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

1862

1863 **3.69 (NC) OutageCoordinationRegion**1864 Inheritance path = [Region](#) : [PowerSystemResource](#) : [IdentifiedObject](#)1865 A region that has a common organisation or service responsible for outage planning and  
1866 coordination and its impact on grid operation.

1867 Table 120 shows all attributes of OutageCoordinationRegion.

1868 **Table 120 – 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>

1869

1870 Table 121 shows all association ends of OutageCoordinationRegion with other classes.



1871  
1872**Table 121 – Association ends of  
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>

1873

**1874 3.70 (NC) OutageCoordinator**

1875 Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) :  
1876 [OrganisationRole](#) : [IdentifiedObject](#)

1877 A role that coordinates the planned availability status of relevant power system equipment to  
1878 meet the need by the asset owner or operator and the security of the power system.

1879 Table 122 shows all attributes of OutageCoordinator.

1880

**Table 122 – 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>

1881

1882 Table 123 shows all association ends of OutageCoordinator with other classes.

**1883 Table 123 – Association ends of EquipmentReliabilityProfile::OutageCoordinator with  
1884 other classes**

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

1885

**1886 3.71 (NC) OutagePlanningAgent**

1887 Inheritance path = [PowerSystemOrganisationRole](#) : [OrganisationRole](#) : [IdentifiedObject](#)

1888 An entity with the task of planning the availability status of a relevant power generating module,  
1889 a relevant demand facility or a relevant grid element.

1890 Table 124 shows all attributes of OutagePlanningAgent.

1891

**Table 124 – 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>

1892

1893 Table 125 shows all association ends of OutagePlanningAgent with other classes.

1894 **Table 125 – Association ends of EquipmentReliabilityProfile::OutagePlanningAgent with**  
1895 **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>

1896

1897 **3.72 (NC) PinTerminal**1898 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : [IdentifiedObject](#)

1899 Input pin associated with a Terminal. It is used for comparison.

1900 Table 126 shows all attributes of PinTerminal.

1901

**Table 126 – 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>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
duration	0..1	<a href="#">Duration</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>
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>

1902

1903 Table 127 shows all association ends of PinTerminal with other classes.

1904 **Table 127 – Association ends of EquipmentReliabilityProfile::PinTerminal with other**  
1905 **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	1..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>

1906

1907 **3.73 (NC) PowerElectricalChemicalUnit**1908 Inheritance path = [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) :  
1909 [IdentifiedObject](#)1910 A unit capable of either generating electrical energy from chemical reactions or using electrical  
1911 energy to cause chemical reactions.

1912 Table 128 shows all attributes of PowerElectricalChemicalUnit.

1913 **Table 128 – 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>

1914

1915 Table 129 shows all association ends of PowerElectricalChemicalUnit with other classes.

1916

1917

**Table 129 – Association ends of  
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>

1918

1919 **3.74 (NC) PowerElectronicsMarineUnit**1920 Inheritance path = [PowerElectronicsUnit](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1921 A unit that capture energy from marine sources, e.g. waves, for generating electrical power.

1922 Table 130 shows all attributes of PowerElectronicsMarineUnit.

1924 **Table 130 – 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>

1925

1926 Table 131 shows all association ends of PowerElectronicsMarineUnit with other classes.

1927  
1928**Table 131 – 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>

1929

**1930 3.75 (Description) PowerElectronicsUnit**1931 Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1932 A generating unit or battery or aggregation that connects to the AC network using power electronics rather than rotating machines.

1933 Table 132 shows all attributes of PowerElectronicsUnit.

1935

**Table 132 – 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.  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. $V=T/\text{sum}(PF)$ .  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>

1936

1937 Table 133 shows all association ends of PowerElectronicsUnit with other classes.

**1938 Table 133 – Association ends of EquipmentReliabilityProfile::PowerElectronicsUnit with  
1939 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.

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>

1940

### 1941 3.76 (NC) PowerFactorControlFunction

1942 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

1943 Power factor control function is a function block that calculates the operating point of the controlled equipment to achieve the target power factor.

1944 Table 134 shows all attributes of PowerFactorControlFunction.

#### 1946 Table 134 – Attributes of EquipmentReliabilityProfile::PowerFactorControlFunction

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

1947

1948 Table 135 shows all association ends of PowerFactorControlFunction with other classes.

#### 1949 Table 135 – Association ends of

#### 1950 EquipmentReliabilityProfile::PowerFactorControlFunction with other classes

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

1951

### 1952 3.77 (abstract,NC) PowerSystemOrganisationRole

1953 Inheritance path = [OrganisationRole](#) : [IdentifiedObject](#)

1954 A role that is responsible for the functional operational of a power system resource.

1955 Table 136 shows all attributes of PowerSystemOrganisationRole.

#### 1956 Table 136 – Attributes of EquipmentReliabilityProfile::PowerSystemOrganisationRole

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>

1957

1958 Table 137 shows all association ends of PowerSystemOrganisationRole with other classes.

1959  
1960

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

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

1961

### 1962 3.78 (abstract) PowerSystemResource

1963 Inheritance path = [IdentifiedObject](#)

1964 A power system resource (PSR) can be an item of equipment such as a switch, an equipment  
1965 container containing many individual items of equipment such as a substation, or an  
1966 organisational entity such as sub-control area. Power system resources can have  
1967 measurements associated.

1968 Table 138 shows all attributes of PowerSystemResource.

1969

**Table 138 – 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>

1970

### 1971 3.79 (abstract,NC) PowerTransferCorridor

1972 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

1973 A power transfer corridor is defined as a set of circuits (transmission lines or transformers)  
1974 separating two portions of the power system, or a subset of circuits exposed to a substantial  
1975 portion of the transmission exchange between two parts of the system.

1976 Table 139 shows all attributes of PowerTransferCorridor.

1977

**Table 139 – 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.
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>

1978

### 1979 3.80 (NC) PowerTransformerCircuit

1980 Inheritance path = [Circuit](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

1981 A power transformer circuit is a circuit that has at least one PowerTransformer and may or may  
1982 not include related switching and/or auxiliary equipment.

1983 Table 140 shows all attributes of PowerTransformerCircuit.

1984 **Table 140 – 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>

1985

1986

Table 141 shows all association ends of PowerTransformerCircuit with other classes.

1987

1988

**Table 141 – Association ends of EquipmentReliabilityProfile::PowerTransformerCircuit 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>

1989

### 1990 3.81 (abstract,NC) PropertyReference root class

1991 The reference to a class and one of its properties.

### 1992 3.82 (NC) ProportionalEnergyComponent

1993 Inheritance path = [EnergyComponent](#) : [IdentifiedObject](#)

1994 Serves for grouping components within an energy group, with proportional energy allocation to all components.

1995 Table 142 shows all attributes of ProportionalEnergyComponent.

1996 **Table 142 – 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	0..1	<a href="#">String</a>	inherited from: <a href="#">IdentifiedObject</a>

1998

1999

Table 143 shows all association ends of ProportionalEnergyComponent with other classes.

2000

2001

**Table 143 – 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..*	EnergyGroup	0..1	<a href="#">EnergyGroup</a>	(NC) inherited from: <a href="#">EnergyComponent</a>

2002

2003 **3.83 (NC,Description) PTCTriggeredEquipment**2004 Inheritance path = [IdentifiedObject](#)2005 Power Transfer Corridor triggered equipment connects the equipment that will create the  
2006 exceptional power transfer corridor when taking out of service. e.g. A system with three lines  
2007 gets an exceptional power transfer corridor when one of the lines is taken out of service.

2008 Table 144 shows all attributes of PTCTriggeredEquipment.

2009 **Table 144 – 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>

2010

2011 Table 145 shows all association ends of PTCTriggeredEquipment with other classes.

2012 **Table 145 – Association ends of EquipmentReliabilityProfile::PTCTriggeredEquipment  
2013 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.

2014

2015 **3.84 (NC) ReactivePowerControlFunction**2016 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)2017 Reactive power control function is a function block that calculate the operating point of the  
2018 controlled equipment to achieve the target reactive power.

2019 Table 146 shows all attributes of ReactivePowerControlFunction.

2020 **Table 146 – Attributes of EquipmentReliabilityProfile::ReactivePowerControlFunction**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

2021

2022 Table 147 shows all association ends of ReactivePowerControlFunction with other classes.



2023  
2024**Table 147 – Association ends of  
EquipmentReliabilityProfile::ReactivePowerControlFunction with other classes**

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

2025

**3.85 (NC) RecoveryOverloadLimitCurve**2027 Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

2028 The relation between the recovery time and an overload limit.

2029 Table 148 shows all attributes of RecoveryOverloadLimitCurve.

**Table 148 – Attributes of EquipmentReliabilityProfile::RecoveryOverloadLimitCurve**

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>

2031

**3.86 (abstract,NC) Region**2033 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

2034 A region where the system operator belongs to.

2035 Table 149 shows all attributes of Region.

**Table 149 – 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>

2037

2038 Table 150 shows all association ends of Region with other classes.

**Table 150 – 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.

2040

2041 **3.87 (abstract) RegulatingCondEq**

2042 Inheritance path = [EnergyConnection](#) : [ConductingEquipment](#) : [Equipment](#) :  
2043 [PowerSystemResource](#) : [IdentifiedObject](#)

2044 A type of conducting equipment that can regulate a quantity (i.e. voltage or flow) at a specific  
2045 point in the network.

2046 Table 151 shows all attributes of RegulatingCondEq.

2047 **Table 151 – 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>

2048

2049 Table 152 shows all association ends of RegulatingCondEq with other classes.

2050 **Table 152 – Association ends of EquipmentReliabilityProfile::RegulatingCondEq with  
2051 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>

2052

2053 **3.88 (NC) ScheduleResource**

2054 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

2055 A schedule resource is a market-based method for handling participation of small units,  
2056 particularly located on the lower voltage level that is controlled by a Distributed System  
2057 Operator (DSO). It is a collection of units that can operate in the market by providing bids, offers  
2058 and a resulting committed operational schedule for the collection.

2059 Table 153 shows all attributes of ScheduleResource.

2060 **Table 153 – Attributes of EquipmentReliabilityProfile::ScheduleResource**

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>

2061

2062 Table 154 shows all association ends of ScheduleResource with other classes.

2063 **Table 154 – Association ends of EquipmentReliabilityProfile::ScheduleResource with**  
2064 **other classes**

mult from	name	mult to	type	description
0..*	PrimaryEnergySource	0..1	<a href="#">EnergyType</a>	(NC) Primary energy reference type for this schedule resource.
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..1	ScheduleResourceController	0..1	<a href="#">ScheduleResourceController</a>	(NC) Schedule resource controller for this schedule resource.

2065

### 2066 3.89 (NC) SchedulingArea

2067 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

2068 An area where production and/or consumption of energy can be forecasted, scheduled and  
2069 measured. The area is operated by only one system operator, typically a Transmission System  
2070 Operator (TSO). The area can consist of a sub area, which has the same definition as the main  
2071 area, but it can be operated by another system operator (typically Distributed System Operator  
2072 (DSO) or a Closed Distributed System Operator (CDSO)). This includes microgrid concept. A  
2073 substation is the smallest grouping that can be included in the area. The area size should be  
2074 considered in terms of the possibility of accumulated reading (settlement metering) and the  
2075 capability of operating as an island.

2076 Table 155 shows all attributes of SchedulingArea.

2077

**Table 155 – 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.  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. $V=T/\text{sum}(PF)$ .  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>

2078

2079 Table 156 shows all association ends of SchedulingArea with other classes.

2080 **Table 156 – Association ends of EquipmentReliabilityProfile::SchedulingArea with other**  
2081 **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.
1..*	BiddingZone	1..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.

2082

### 2083 3.90 (NC) SecurityCoordinator

2084 Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) :  
2085 [OrganisationRole](#) : [IdentifiedObject](#)

2086 A role that coordinates the relevant remedial actions and their optimisation to ensure efficient  
2087 use to achieve required operational security of the power system.

2088 Table 157 shows all attributes of SecurityCoordinator.

2089 **Table 157 – 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>

2090

2091 Table 158 shows all association ends of SecurityCoordinator with other classes.

2092 **Table 158 – Association ends of EquipmentReliabilityProfile::SecurityCoordinator with**  
2093 **other classes**

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

2094

### 2095 3.91 (NC) SolarRadiationDependencyCurve

2096 Inheritance path = [LimitDependencyCurve](#) : [Curve](#) : [IdentifiedObject](#)

2097 A curve or functional relationship between

2098 - the solar radiation independent variable (X-axis), and

2099 - relative dependent (Y-axis) variables.

2100 Table 159 shows all attributes of SolarRadiationDependencyCurve.

2101 **Table 159 – 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>

2102

2103 **3.92 (NC) StaticSynchronousCompensator**

2104 Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) :  
2105 [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2106 Static synchronous compensator (STATCOM), also known as a static synchronous condenser  
2107 (STATCON), is a type of flexible AC transmission system regulating equipment used on  
2108 alternating current electricity transmission networks. It is based on a power electronics voltage-  
2109 source converter and can act as either a source or sink of reactive AC power to an electricity  
2110 network. If connected to a source of power it can also provide active AC power.

2111 Table 160 shows all attributes of StaticSynchronousCompensator.

2112 **Table 160 – 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>

2113

2114 Table 161 shows all association ends of StaticSynchronousCompensator with other classes.

2115  
2116**Table 161 – 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>

2117

**2118 3.93 (NC) StaticSynchronousSeriesCompensator**

2119 Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) :  
2120 [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2121 Static synchronous series compensator (SSSC) is a type of flexible AC transmission system  
2122 which consists of a solid-state voltage source inverter coupled with a transformer that is  
2123 connected in series with a transmission line. This device can inject an almost sinusoidal voltage  
2124 in series with the line. This injected voltage could be considered as an inductive or capacitive  
2125 reactance, which is connected in series with the transmission line. This feature can provide  
2126 controllable voltage compensation. In addition, SSSC is able to reverse the power flow by  
2127 injecting a sufficiently large series reactive compensating voltage. Moreover it can inject a  
2128 voltage proportional to the difference between the line current and the pre-configured current  
2129 threshold. It shall have two Terminal-s associated with it.

2130 Table 162 shows all attributes of StaticSynchronousSeriesCompensator.

2131  
2132**Table 162 – Attributes of  
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>

2133  
2134  
2135

Table 163 shows all association ends of StaticSynchronousSeriesCompensator with other classes.

2136  
2137**Table 163 – Association ends of  
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>

2138

**3.94 (NC) SubSchedulingArea**2140 Inheritance path = [SchedulingArea](#) : [PowerSystemResource](#) : [IdentifiedObject](#)2141 An area that is a part of another scheduling area. Typically part of a Transmission System  
2142 Operator (TSO) scheduling area operated by a Distributed System Operator (DSO) or a Close  
2143 Distributed System Operator (CDSO). This includes microgrid concept. A sub scheduling area  
2144 can contain other sub areas. A sub scheduling area leaf will form the smallest entity of any  
2145 given energy area.

2146 Table 164 shows all attributes of SubSchedulingArea.

**Table 164 – 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>
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>

2148

2149 Table 165 shows all association ends of SubSchedulingArea with other classes.

**Table 165 – Association ends of EquipmentReliabilityProfile::SubSchedulingArea with  
other classes**2150  
2151

mult from	name	mult to	type	description
0..*	SchedulingArea	1..1	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has this subscheduling area.
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>
1..*	BiddingZone	1..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>

2152

2153 **3.95 (Description) Substation**2154 Inheritance path = [EquipmentContainer](#) : [ConnectivityNodeContainer](#) : [PowerSystemResource](#) : [IdentifiedObject](#)2155 A collection of equipment for purposes other than generation or utilization, through which  
2157 electric energy in bulk is passed for the purposes of switching or modifying its characteristics.  
2158 Table 166 shows all attributes of Substation.2159 **Table 166 – 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>

2160

2161 Table 167 shows all association ends of Substation with other classes.

2162 **Table 167 – Association ends of EquipmentReliabilityProfile::Substation with other classes**  
2163

mult from	name	mult to	type	description
0..*	SchedulingArea	0..1	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has this substation.

2164

2165 **3.96 (NC) SubstationController**2166 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)2168 Substation controller is controlling the equipment to optimize the use of the controlling  
2169 equipment within a substation.

2170 Table 168 shows all attributes of SubstationController.

2171 **Table 168 – 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>

2172

2173 Table 169 shows all association ends of SubstationController with other classes.

2174 **Table 169 – Association ends of EquipmentReliabilityProfile::SubstationController with other classes**  
2175

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

2176



2177 **3.97 (NC) SynchronousArea**2178 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)2179 A synchronous area is an electrical area covered by interconnect with a common system  
2180 frequency in a steady-state.

2181 Table 170 shows all attributes of SynchronousArea.

2182 **Table 170 – 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>

2183

2184 **3.98 (abstract,NC) SystemOperationCoordinator**2185 Inheritance path = [PowerSystemOrganisationRole](#) : [OrganisationRole](#) : [IdentifiedObject](#)2186 A role that coordinates relevant information and impact in regards to operating the power  
2187 system.

2188 Table 171 shows all attributes of SystemOperationCoordinator.

2189 **Table 171 – 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>

2190

2191 Table 172 shows all association ends of SystemOperationCoordinator with other classes.

2192 **Table 172 – Association ends of**  
2193 **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>

2194

2195 **3.99 (abstract,NC) SystemOperator**2196 Inheritance path = [PowerSystemOrganisationRole](#) : [OrganisationRole](#) : [IdentifiedObject](#)

2197 System operator.

2198 Table 173 shows all attributes of SystemOperator.

2199 **Table 173 – 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>

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>

2200

2201

Table 174 shows all association ends of SystemOperator with other classes.

2202

**Table 174 – Association ends of EquipmentReliabilityProfile::SystemOperator with other classes**

2203

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

2204

2205

### 3.100 (abstract,Description) TapChanger root class

2206

Mechanism for changing transformer winding tap positions.

2207

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

2208

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

2209

mult from	name	mult to	type	description
0..*	TapChangeController	0..1	<a href="#">TapChangerController</a>	(NC) The tap changer controller that controls this TapChanger.

2210

2211

### 3.101 (abstract) Terminal

2212

Inheritance path = [ACDCTerminal](#)

2213

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

2214

2215

### 3.102 (NC) TieCorridor

2216

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

2217

A collection of one or more tie-lines or direct current poles that connect two different control areas.

2218

2219

Table 176 shows all attributes of TieCorridor.

2220

**Table 176 – 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>

2221

2222 Table 177 shows all association ends of TieCorridor with other classes.

2223 **Table 177 – Association ends of EquipmentReliabilityProfile::TieCorridor with other**  
2224 **classes**

mult from	name	mult to	type	description
0..*	LoadFrequencyControlArea	0..1	<a href="#">LoadFrequencyControlArea</a>	(NC) LoadFrequencyControlArea controlling the TieCorridor.
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) Bidding zone border in which the tie corridor is located.

2225

### 2226 3.103 (NC) ThyristorControlledSeriesCompensator

2227 Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) :  
2228 [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2229 Thyristor-controlled series capacitors (TCSC) is a type of flexible AC transmission system  
2230 regulating equipment that is configured with controlled reactors in parallel with sections of a  
2231 capacitor bank. This combination allows smooth control of the fundamental frequency  
2232 capacitive reactance over a wide range. The thyristor valve contains a string of series connected  
2233 high power thyristors. TCSC can control power flows in order to achieve eliminating of line  
2234 overloads, reducing loop flows and minimising system losses.

2235 Table 178 shows all attributes of ThyristorControlledSeriesCompensator.

2236 **Table 178 – Attributes of**  
2237 **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>

2238  
2239 Table 179 shows all association ends of ThyristorControlledSeriesCompensator with other  
2240 classes.

2241 **Table 179 – Association ends of**  
2242 **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>

2243

### 2244 3.104 (NC) TransmissionSystemOperator

2245 Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : [OrganisationRole](#) :  
2246 [IdentifiedObject](#)

2247 A system operator role that is responsible for operating of an energy transmission network.

2248 Table 180 shows all attributes of TransmissionSystemOperator.

2249 **Table 180 – 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>

2250

2251 Table 181 shows all association ends of TransmissionSystemOperator with other classes.

2252 **Table 181 – Association ends of**  
2253 **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>

2254

### 2255 3.105 (NC) UnifiedPowerFlowController

2256 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
2257 [IdentifiedObject](#)

2258 Unified power flow controller (UPFC) is providing fast-acting reactive power compensation on  
2259 high-voltage electricity transmission networks.

2260 Table 182 shows all attributes of UnifiedPowerFlowController.

2261 **Table 182 – 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>

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>

2262  
2263 Table 183 shows all association ends of UnifiedPowerFlowController with other classes.

2264 **Table 183 – Association ends of**  
2265 **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>

2266

### 2267 3.106 (NC) VoltageAngleLimit

2268 Inheritance path = [OperationalLimit](#) : [IdentifiedObject](#)

2269 Voltage angle limit between two terminals. The association end OperationalLimitSet.Terminal  
2270 defines one end and the host of the limit. The association end  
2271 VoltageAngleLimit.AngleReferenceTerminal defines the reference terminal.

2272 Table 184 shows all attributes of VoltageAngleLimit.

2273 **Table 184 – 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>

2274

2275 Table 185 shows all association ends of VoltageAngleLimit with other classes.

2276 **Table 185 – Association ends of EquipmentReliabilityProfile::VoltageAngleLimit with**  
2277 **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>

2278

### 2279 3.107 (NC) VoltageControlFunction

2280 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

2281 Voltage control function is a function block that calculate the operating point of the controlled  
2282 equipment to achieve the target voltage.  
2283 Table 186 shows all attributes of VoltageControlFunction.

2284 **Table 186 – Attributes of EquipmentReliabilityProfile::VoltageControlFunction**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

2285  
2286 Table 187 shows all association ends of VoltageControlFunction with other classes.

2287 **Table 187 – Association ends of EquipmentReliabilityProfile::VoltageControlFunction**  
2288 **with other classes**

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

2289  
2290 **3.108 Currency enumeration**

2291 Monetary currencies. ISO 4217 standard including 3-character currency code.  
2292 Table 188 shows all literals of Currency.

2293 **Table 188 – Literals of EquipmentReliabilityProfile::Currency**

literal	value	description
AED	784	United Arab Emirates dirham.
AFN	971	Afghan afghani.
ALL	008	Albanian lek.
AMD	051	Armenian dram.
ANG	532	Netherlands Antillean guilder.
AOA	973	Angolan kwanza.
ARS	032	Argentine peso.
AUD	036	Australian dollar.
AWG	533	Aruban florin.
AZN	944	Azerbaijani manat.
BAM	977	Bosnia and Herzegovina convertible mark.
BBD	052	Barbados dollar.
BDT	050	Bangladeshi taka.
BGN	975	Bulgarian lev.

literal	value	description
BHD	048	Bahraini dinar.
BIF	108	Burundian franc.
BMD	060	Bermudian dollar (customarily known as Bermuda dollar).
BND	096	Brunei dollar.
BOB	068	Boliviano.
BOV	984	Bolivian Mvdol (funds code).
BRL	986	Brazilian real.
BSD	044	Bahamian dollar.
BTN	064	Bhutanese ngultrum.
BWP	072	Botswana pula.
BYR	974	Belarusian ruble.
BZD	084	Belize dollar.
CAD	124	Canadian dollar.
CDF	976	Congolese franc.
CHF	756	Swiss franc.
CLF	990	Unidad de Fomento (funds code), Chile.
CLP	152	Chilean peso.
CNY	156	Chinese yuan.
COP	170	Colombian peso.
COU	970	Unidad de Valor Real.
CRC	188	Costa Rican colon.
CUC	931	Cuban convertible peso.
CUP	192	Cuban peso.
CVE	132	Cape Verde escudo.
CZK	203	Czech koruna.
DJF	262	Djiboutian franc.
DKK	208	Danish krone.
DOP	214	Dominican peso.
DZD	012	Algerian dinar.
EEK	233	Estonian kroon.
EGP	818	Egyptian pound.
ERN	232	Eritrean nakfa.
ETB	230	Ethiopian birr.
EUR	978	Euro.
FJD	242	Fiji dollar.
FKP	238	Falkland Islands pound.
GBP	826	Pound sterling.
GEL	981	Georgian lari.
GHS	936	Ghanaian cedi.
GIP	929	Gibraltar pound.

literal	value	description
GMD	270	Gambian dalasi.
GNF	324	Guinean franc.
GTQ	320	Guatemalan quetzal.
GYD	328	Guyanese dollar.
HKD	344	Hong Kong dollar.
HNL	340	Honduran lempira.
HRK	191	Croatian kuna.
HTG	332	Haitian gourde.
HUF	348	Hungarian forint.
IDR	360	Indonesian rupiah.
ILS	376	Israeli new sheqel.
INR	356	Indian rupee.
IQD	368	Iraqi dinar.
IRR	364	Iranian rial.
ISK	352	Icelandic króna.
JMD	388	Jamaican dollar.
JOD	400	Jordanian dinar.
JPY	392	Japanese yen.
KES	404	Kenyan shilling.
KGS	417	Kyrgyzstani som.
KHR	116	Cambodian riel.
KMF	174	Comoro franc.
KPW	408	North Korean won.
KRW	410	South Korean won.
KWD	414	Kuwaiti dinar.
KYD	136	Cayman Islands dollar.
KZT	398	Kazakhstani tenge.
LAK	418	Lao kip.
LBP	422	Lebanese pound.
LKR	144	Sri Lanka rupee.
LRD	430	Liberian dollar.
LSL	426	Lesotho loti.
LTL	440	Lithuanian litas.
LVL	428	Latvian lats.
LYD	434	Libyan dinar.
MAD	504	Moroccan dirham.
MDL	498	Moldovan leu.
MGA	969	Malagasy ariary.
MKD	807	Macedonian denar.
MMK	104	Myanma kyat.
MNT	496	Mongolian tugrik.



literal	value	description
MOP	446	Macanese pataca.
MRO	478	Mauritanian ouguiya.
MUR	480	Mauritian rupee.
MVR	462	Maldivian rufiyaa.
MWK	454	Malawian kwacha.
MXN	484	Mexican peso.
MYR	458	Malaysian ringgit.
MZN	943	Mozambican metical.
NAD	516	Namibian dollar.
NGN	566	Nigerian naira.
NIO	558	Cordoba oro.
NOK	578	Norwegian krone.
NPR	524	Nepalese rupee.
NZD	554	New Zealand dollar.
OMR	512	Omani rial.
PAB	590	Panamanian balboa.
PEN	604	Peruvian nuevo sol.
PGK	598	Papua New Guinean kina.
PHP	608	Philippine peso.
PKR	586	Pakistani rupee.
PLN	985	Polish zloty.
PYG	600	Paraguayan guaraní.
QAR	634	Qatari rial.
RON	946	Romanian new leu.
RSD	941	Serbian dinar.
RUB	643	Russian rouble.
RWF	646	Rwandan franc.
SAR	682	Saudi riyal.
SBD	090	Solomon Islands dollar.
SCR	690	Seychelles rupee.
SDG	938	Sudanese pound.
SEK	752	Swedish krona/kronor.
SGD	702	Singapore dollar.
SHP	654	Saint Helena pound.
SLL	694	Sierra Leonean leone.
SOS	706	Somali shilling.
SRD	968	Surinamese dollar.
STD	678	São Tomé and Príncipe dobra.
SYP	760	Syrian pound.
SZL	748	Lilangeni.
THB	764	Thai baht.

literal	value	description
TJS	972	Tajikistani somoni.
TMT	934	Turkmenistani manat.
TND	788	Tunisian dinar.
TOP	776	Tongan pa'anga.
TRY	949	Turkish lira.
TTD	780	Trinidad and Tobago dollar.
TWD	901	New Taiwan dollar.
TZS	834	Tanzanian shilling.
UAH	980	Ukrainian hryvnia.
UGX	800	Ugandan shilling.
USD	840	United States dollar.
UYU	858	Uruguayan peso.
UZS	860	Uzbekistan som.
VEF	937	Venezuelan bolívar fuerte.
VND	704	Vietnamese Dong.
VUV	548	Vanuatu vatu.
WST	882	Samoan tala.
XAF	950	CFA franc BEAC.
XCD	951	East Caribbean dollar.
XOF	952	CFA Franc BCEAO.
XPF	953	CFP franc.
YER	886	Yemeni rial.
ZAR	710	South African rand.
ZMK	894	Zambian kwacha.
ZWL	932	Zimbabwe dollar.

2294

2295 **3.109 CurveStyle enumeration**

2296 Style or shape of curve.

2297 Table 189 shows all literals of CurveStyle.

2298

**Table 189 – 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.

2299

2300 **3.110 (NC) MarineUnitKind enumeration**

2301 Kind of marine energy capture.

2302 Table 190 shows all literals of MarineUnitKind.

2303

**Table 190 – 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.
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.

2304

**3.111 OperationalLimitDirectionKind enumeration**

2306 The direction attribute describes the side of a limit that is a violation.

2307 Table 191 shows all literals of OperationalLimitDirectionKind.

2308

**Table 191 – 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.

2309

**3.112 (NC) PinTerminalKind enumeration**

2311 The kind of quantities that can serve as an input value for the pin.

2312 Table 192 shows all literals of PinTerminalKind.

2313

**Table 192 – 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.

2314

**3.113 (NC) NuclearReactorKind enumeration**

2316 Kind of nuclear reactor.

2317 Table 193 shows all literals of NuclearReactorKind.

2318

**Table 193 – 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 D2O) 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.

2319

**2320 3.114 (NC) GeothermalUnitKind enumeration**

2321 Kind of geothermal.

2322 Table 194 shows all literals of GeothermalUnitKind.

2323

**Table 194 – 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.

2324

**2325 3.115 (NC) LogicalOperatorsKind enumeration**

2326 Kinds of logical operators for comparison.

2327 Table 195 shows all literals of LogicalOperatorsKind.

2328

**Table 195 – 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.

literal	value	description
greaterThan		Greater than comparison operation.

2329

2330 **3.116 (NC) PowerElectricalChemicalUnitKind enumeration**

2331 Kind of power electrical chemical unit.

2332 Table 196 shows all literals of PowerElectricalChemicalUnitKind.

2333 **Table 196 – 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.

2334

2335 **3.117 UnitMultiplier enumeration**

2336 The unit multipliers defined for the CIM. When applied to unit symbols, the unit symbol is  
2337 treated as a derived unit. Regardless of the contents of the unit symbol text, the unit symbol  
2338 shall be treated as if it were a single-character unit symbol. Unit symbols should not contain  
2339 multipliers, and it should be left to the multiplier to define the multiple for an entire data type.

2340 For example, if a unit symbol is "m2Pers" and the multiplier is "k", then the value is  $k(m^{**2}/s)$ ,  
2341 and the multiplier applies to the entire final value, not to any individual part of the value. This  
2342 can be conceptualized by substituting a derived unit symbol for the unit type. If one imagines  
2343 that the symbol "P" represents the derived unit "m2Pers", then applying the multiplier "k" can  
2344 be conceptualized simply as "kP".

2345 For example, the SI unit for mass is "kg" and not "g". If the unit symbol is defined as "kg", then  
2346 the multiplier is applied to "kg" as a whole and does not replace the "k" in front of the "g". In  
2347 this case, the multiplier of "m" would be used with the unit symbol of "kg" to represent one gram.  
2348 As a text string, this violates the instructions in IEC 80000-1. However, because the unit symbol  
2349 in CIM is treated as a derived unit instead of as an SI unit, it makes more sense to conceptualize  
2350 the "kg" as if it were replaced by one of the proposed replacements for the SI mass symbol. If  
2351 one imagines that the "kg" were replaced by a symbol "P", then it is easier to conceptualize the  
2352 multiplier "m" as creating the proper unit "mP", and not the forbidden unit "mkg".

2353 Table 197 shows all literals of UnitMultiplier.

2354 **Table 197 – Literals of EquipmentReliabilityProfile::UnitMultiplier**

literal	value	description
none	0	No multiplier or equivalently multiply by 1.
k	3	Kilo $10^{**3}$ .
M	6	Mega $10^{**6}$ .

2355

2356 **3.118 UnitSymbol enumeration**

2357 The derived units defined for usage in the CIM. In some cases, the derived unit is equal to an  
2358 SI unit. Whenever possible, the standard derived symbol is used instead of the formula for the  
2359 derived unit. For example, the unit symbol Farad is defined as "F" instead of "CPerV". In cases  
2360 where a standard symbol does not exist for a derived unit, the formula for the unit is used as

2361 the unit symbol. For example, density does not have a standard symbol and so it is represented  
2362 as "kgPerm3". With the exception of the "kg", which is an SI unit, the unit symbols do not contain  
2363 multipliers and therefore represent the base derived unit to which a multiplier can be applied as  
2364 a whole.

2365 Every unit symbol is treated as an unparseable text as if it were a single-letter symbol. The  
2366 meaning of each unit symbol is defined by the accompanying descriptive text and not by the  
2367 text contents of the unit symbol.

2368 To allow the widest possible range of serializations without requiring special character handling,  
2369 several substitutions are made which deviate from the format described in IEC 80000-1. The  
2370 division symbol "/" is replaced by the letters "Per". Exponents are written in plain text after the  
2371 unit as "m3" instead of being formatted as "m" with a superscript of 3 or introducing a symbol  
2372 as in "m^3". The degree symbol "°" is replaced with the letters "deg". Any clarification of the  
2373 meaning for a substitution is included in the description for the unit symbol.

2374 Non-SI units are included in list of unit symbols to allow sources of data to be correctly labelled  
2375 with their non-SI units (for example, a GPS sensor that is reporting numbers that represent feet  
2376 instead of meters). This allows software to use the unit symbol information correctly convert  
2377 and scale the raw data of those sources into SI-based units.

2378 The integer values are used for harmonization with IEC 61850.

2379 Table 198 shows all literals of UnitSymbol.

2380

**Table 198 – Literals of EquipmentReliabilityProfile::UnitSymbol**

literal	value	description
none	0	Dimension less quantity, e.g. count, per unit, etc.
s	4	Time in seconds.
A	5	Current in amperes.
deg	9	Plane angle in degrees.
degC	23	Relative temperature in degrees Celsius. 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.
V	29	Electric potential in volts (W/A).
ohm	30	Electric resistance in ohms (V/A).
Hz	33	Frequency in hertz (1/s).
W	38	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	39	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	55	Heat flux density, irradiance, watts per square metre.
VAr	63	Reactive power in volt amperes reactive. The "reactive" or "imaginary" component of electrical power ( $VI\sin(\phi)$ ). (See also real power and apparent power).  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

literal	value	description
		the method in use and the suitability of the measurement for the intended purpose.
WPers	81	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.

2381

2382 **3.119 ActivePower datatype**2383 Product of RMS value of the voltage and the RMS value of the in-phase component of the  
2384 current.

2385 Table 199 shows all attributes of ActivePower.

2386 **Table 199 – Attributes of EquipmentReliabilityProfile::ActivePower**

name	mult	type	description
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=M)
unit	0..1	<a href="#">UnitSymbol</a>	(const=W)
value	0..1	<a href="#">Float</a>	

2387

2388 **3.120 ActivePowerChangeRate datatype**

2389 Rate of change of active power per time.

2390 Table 200 shows all attributes of ActivePowerChangeRate.

2391 **Table 200 – Attributes of EquipmentReliabilityProfile::ActivePowerChangeRate**

name	mult	type	description
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=M)
unit	0..1	<a href="#">UnitSymbol</a>	(const=WPers)
value	0..1	<a href="#">Float</a>	

2392

2393 **3.121 AngleDegrees datatype**

2394 Measurement of angle in degrees.

2395 Table 201 shows all attributes of AngleDegrees.

2396 **Table 201 – Attributes of EquipmentReliabilityProfile::AngleDegrees**

name	mult	type	description
value	0..1	<a href="#">Float</a>	
unit	0..1	<a href="#">UnitSymbol</a>	(const=deg)
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)

2397

2398 **3.122 Frequency datatype**

2399 Cycles per second.

2400 Table 202 shows all attributes of Frequency.

2401

**Table 202 – Attributes of EquipmentReliabilityProfile::Frequency**

name	mult	type	description
value	0..1	<a href="#">Float</a>	
unit	0..1	<a href="#">UnitSymbol</a>	(const=Hz)
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)

2402

**3.123 Impedance datatype**

2404 Ratio of voltage to current.

2405 Table 203 shows all attributes of Impedance.

2406

**Table 203 – Attributes of EquipmentReliabilityProfile::Impedance**

name	mult	type	description
value	0..1	<a href="#">Float</a>	
unit	0..1	<a href="#">UnitSymbol</a>	(const=ohm)
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)

2407

**3.124 Money datatype**

2409 Amount of money.

2410 Table 204 shows all attributes of Money.

2411

**Table 204 – Attributes of EquipmentReliabilityProfile::Money**

name	mult	type	description
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)
unit	0..1	<a href="#">Currency</a>	
value	0..1	<a href="#">Decimal</a>	

2412

**3.125 PerCent datatype**

2414 Percentage on a defined base. For example, specify as 100 to indicate at the defined base.

2415 Table 205 shows all attributes of PerCent.

2416

**Table 205 – 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>	(const=none)
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)

2417

**3.126 Reactance datatype**

2419 Reactance (imaginary part of impedance), at rated frequency.

2420 Table 206 shows all attributes of Reactance.

2421

**Table 206 – Attributes of EquipmentReliabilityProfile::Reactance**

name	mult	type	description
value	0..1	<a href="#">Float</a>	
unit	0..1	<a href="#">UnitSymbol</a>	(const=ohm)



name	mult	type	description
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)

2422

2423 **3.127 Seconds datatype**

2424 Time, in seconds.

2425 Table 207 shows all attributes of Seconds.

2426

**Table 207 – 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>	(const=s)
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)

2427

2428 **3.128 VoltagePerReactivePower datatype**

2429 Voltage variation with reactive power.

2430 Table 208 shows all attributes of VoltagePerReactivePower.

2431

**Table 208 – Attributes of EquipmentReliabilityProfile::VoltagePerReactivePower**

name	mult	type	description
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=k)
unit	0..1	<a href="#">UnitSymbol</a>	(const=VPerVAr)
value	0..1	<a href="#">Float</a>	

2432

2433 **3.129 Boolean primitive**

2434 A type with the value space "true" and "false".

2435 **3.130 Decimal primitive**

2436 Decimal is the base-10 notational system for representing real numbers.

2437 **3.131 Duration primitive**

2438 Duration as "PnYnMnDTnHnMnS" which conforms to ISO 8601, where nY expresses a number  
 2439 of years, nM a number of months, nD a number of days. The letter T separates the date  
 2440 expression from the time expression and, after it, nH identifies a number of hours, nM a number  
 2441 of minutes and nS a number of seconds. The number of seconds could be expressed as a  
 2442 decimal number, but all other numbers are integers.

2443 **3.132 Float primitive**

2444 A floating point number. The range is unspecified and not limited.

2445 **3.133 Integer primitive**

2446 An integer number. The range is unspecified and not limited.

2447 **3.134 String primitive**

2448 A string consisting of a sequence of characters. The character encoding is UTF-8. The string  
 2449 length is unspecified and unlimited.

2450 **3.135 (NC) ACTieCorridor**2451 Inheritance path = [TieCorridor](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2452 A collection of one or more AC tie lines that connect two different control areas.

2453 Table 209 shows all attributes of ACTieCorridor.

2454

**Table 209 – 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>

2455

2456

Table 210 shows all association ends of ACTieCorridor with other classes.

2457

2458

**Table 210 – 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>
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) inherited from: <a href="#">TieCorridor</a>

2459

2460

**3.136 (abstract) Conductor**

2461

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

2462

2463

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

2464

2465

Table 211 shows all attributes of Conductor.

2466

**Table 211 – 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>

2467

2468

Table 212 shows all association ends of Conductor with other classes.

2469

2470

**Table 212 – 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>

2471

2472 **3.137 (NC) CurrentControlFunction**2473 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

2474 Current control function is a function block that calculates the operating point of the controlled equipment to achieve the target current.

2476 Table 213 shows all attributes of CurrentControlFunction.

2477 **Table 213 – Attributes of EquipmentReliabilityProfile::CurrentControlFunction**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

2478

2479 Table 214 shows all association ends of CurrentControlFunction with other classes.

2480 **Table 214 – Association ends of EquipmentReliabilityProfile::CurrentControlFunction with other classes**

2481

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

2482

2483 **3.138 (NC) TCSCCompensationPoint root class**

2484 Compensation point of a TCSC compensator.

2485 Table 215 shows all attributes of TCSCCompensationPoint.

2486 **Table 215 – 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.  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.

2487

2488 Table 216 shows all association ends of TCSCCompensationPoint with other classes.

2489 **Table 216 – Association ends of EquipmentReliabilityProfile::TCSCCompensationPoint**  
2490 **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.

2491

2492 **3.139 (NC) StaticVarCompensator**

2493 Inheritance path = [FACTSEquipment](#) : [RegulatingCondEq](#) : [EnergyConnection](#) :

2494 [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2495 A facility for providing variable and controllable shunt reactive power. The SVC typically

2496 consists of a stepdown transformer, filter, thyristor-controlled reactor, and thyristor-switched

2497 capacitor arms.

2498 The SVC may operate in fixed MVar output mode or in voltage control mode. When in voltage

2499 control mode, the output of the SVC will be proportional to the deviation of voltage at the

2500 controlled bus from the voltage setpoint. The SVC characteristic slope defines the proportion.

2501 If the voltage at the controlled bus is equal to the voltage setpoint, the SVC MVar output is zero.

2502 Table 217 shows all attributes of StaticVarCompensator.

2503 **Table 217 – 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>

2504

2505 Table 218 shows all association ends of StaticVarCompensator with other classes.

2506 **Table 218 – Association ends of EquipmentReliabilityProfile::StaticVarCompensator**  
2507 **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>

2508

2509 **3.140 (NC) LossCurve**2510 Inheritance path = [Curve](#) : [IdentifiedObject](#)

2511 Represents the losses in the equipment due to operation position.

2512 Table 219 shows all attributes of LossCurve.

2513 **Table 219 – Attributes of EquipmentReliabilityProfile::LossCurve**

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>

2514

2515 Table 220 shows all association ends of LossCurve with other classes.

2516 **Table 220 – Association ends of EquipmentReliabilityProfile::LossCurve with other classes**

2517

mult from	name	mult to	type	description
0..*	FACTSEquipment	0..1	<a href="#">FACTSEquipment</a>	(NC) The FACTS equipment which has a loss curve.

2518

2519 **3.141 (Description) DCSwitch**2520 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2521 A switch within the DC system.

2522 Table 221 shows all attributes of DCSwitch.

2524 **Table 221 – Attributes of EquipmentReliabilityProfile::DCSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

2525

2526 Table 222 shows all association ends of DCSwitch with other classes.

2527 **Table 222 – Association ends of EquipmentReliabilityProfile::DCSwitch with other**  
2528 **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>

2529

### 2530 3.142 (abstract) DCConductingEquipment

2531 Inheritance path = [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2532 The parts of the DC power system that are designed to carry current or that are conductively  
2533 connected through DC terminals.

2534 Table 223 shows all attributes of DCConductingEquipment.

2535 **Table 223 – Attributes of EquipmentReliabilityProfile::DCConductingEquipment**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</a>	The maximum continuous current carrying capacity in amps governed by the device material and construction. The attribute shall be a positive value.
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>

2536

2537 Table 224 shows all association ends of DCConductingEquipment with other classes.

2538 **Table 224 – Association ends of EquipmentReliabilityProfile::DCConductingEquipment**  
2539 **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>

2540

### 2541 3.143 (Description) DCDisconnector

2542 Inheritance path = [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2543 [IdentifiedObject](#)

2544 A disconnector within a DC system.

2545 Table 225 shows all attributes of DCDisconnector.

2546 **Table 225 – Attributes of EquipmentReliabilityProfile::DCDisconnector**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

2547  
2548

Table 226 shows all association ends of DCDisconnector with other classes.

2549  
2550**Table 226 – Association ends of EquipmentReliabilityProfile::DCDisconnector 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>

2551

**3.144 (Description) DCBreaker**2553 Inheritance path = [DCSwitch](#) : [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2554 [IdentifiedObject](#)

2555 A breaker within a DC system.

2556 Table 227 shows all attributes of DCBreaker.

2557

**Table 227 – Attributes of EquipmentReliabilityProfile::DCBreaker**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

2558

2559 Table 228 shows all association ends of DCBreaker with other classes.

2560  
2561**Table 228 – 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>

2562

**3.145 (Description) DCGround**2564 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2565 [IdentifiedObject](#)

2566 A ground within a DC system.

2567 Table 229 shows all attributes of DCGround.

2568

**Table 229 – Attributes of EquipmentReliabilityProfile::DCGround**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

2569  
2570

Table 230 shows all association ends of DCGround with other classes.

2571  
2572**Table 230 – 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>

2573

**3.146 (Description) DCBusbar**2575 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2576 [IdentifiedObject](#)

2577 A busbar within a DC system.

2578 Table 231 shows all attributes of DCBusbar.

2579

**Table 231 – Attributes of EquipmentReliabilityProfile::DCBusbar**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

2580

2581 Table 232 shows all association ends of DCBusbar with other classes.

2582  
2583**Table 232 – 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>

2584

**3.147 (Description) DCShunt**2586 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2587 [IdentifiedObject](#)2588 A shunt device within the DC system, typically used for filtering. Needed for transient and short  
2589 circuit studies.

2590 Table 233 shows all attributes of DCShunt.

2591

**Table 233 – Attributes of EquipmentReliabilityProfile::DCShunt**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

2592

2593

Table 234 shows all association ends of DCShunt with other classes.

2594

**Table 234 – Association ends of EquipmentReliabilityProfile::DCShunt with other classes**

2595

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>

2596

2597

### 3.148 (Description) DCSeriesDevice

2598

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

2599

2600

A series device within the DC system, typically a reactor used for filtering or smoothing. Needed for transient and short circuit studies.

2601

2602

Table 235 shows all attributes of DCSeriesDevice.

2603

**Table 235 – Attributes of EquipmentReliabilityProfile::DCSeriesDevice**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

2604

2605

Table 236 shows all association ends of DCSeriesDevice with other classes.

2606

**Table 236 – Association ends of EquipmentReliabilityProfile::DCSeriesDevice with other classes**

2607

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>

2608

2609

### 3.149 (Description) DCLineSegment

2610

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

2611

2612

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

2613

2614

2615

Table 237 shows all attributes of DCLineSegment.

2616

**Table 237 – Attributes of EquipmentReliabilityProfile::DCLineSegment**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</a>	inherited from: <a href="#">DCConductingEquipment</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>

2617

2618 Table 238 shows all association ends of DCLineSegment with other classes.

2619 **Table 238 – Association ends of EquipmentReliabilityProfile::DCLineSegment with other**  
2620 **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>

2621

2622 **3.150 (Description) DCChopper**2623 Inheritance path = [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2624 [IdentifiedObject](#)2625 Low resistance equipment used in the internal DC circuit to balance voltages. It has typically  
2626 positive and negative pole terminals and a ground.

2627 Table 239 shows all attributes of DCChopper.

2628 **Table 239 – Attributes of EquipmentReliabilityProfile::DCChopper**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

2629

2630 Table 240 shows all association ends of DCChopper with other classes.

2631 **Table 240 – Association ends of EquipmentReliabilityProfile::DCChopper with other**  
2632 **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>

2633

2634 **3.151 (Description) TieFlow**2635 Inheritance path = [IdentifiedObject](#)2636 Defines the structure (in terms of location and direction) of the net interchange constraint for a  
2637 control area. This constraint may be used by either AGC or power flow.

2638 Table 241 shows all attributes of TieFlow.

2639

**Table 241 – 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>

2640

2641

Table 242 shows all association ends of TieFlow with other classes.

2642

**Table 242 – 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.

2643

2644

**3.152 (NC) PowerPlantController**

2645

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

2646

2647

Power plant controller is controlling the equipment of a power plant.

2648

Table 243 shows all attributes of PowerPlantController.

2649

**Table 243 – 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>

2650

2651

Table 244 shows all association ends of PowerPlantController with other classes.

2652

**Table 244 – Association ends of EquipmentReliabilityProfile::PowerPlantController with other classes**

2653

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

2654

2655

**3.153 (NC) TCSCController**

2656

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

2657

2658

TCSC controller is controlling the equipment to optimize the performance of the TCSC.

2659

Table 245 shows all attributes of TCSCController.

2660

**Table 245 – Attributes of EquipmentReliabilityProfile::TCSCController**

name	mult	type	description
type	0..1	<a href="#">String</a>	(NC) inherited from: <a href="#">AutomationFunction</a>

name	mult	type	description
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>

2661

2662

Table 246 shows all association ends of TCSCController with other classes.

2663

**Table 246 – Association ends of EquipmentReliabilityProfile::TCSCController with other classes**

2664

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

2665

2666

### 3.154 (NC) DCCurrentControlFunction

2667

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

2668

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

2669

2670

Table 247 shows all attributes of DCCurrentControlFunction.

2671

**Table 247 – 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>
targetDeadband	0..1	<a href="#">Float</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>

2672

2673

Table 248 shows all association ends of DCCurrentControlFunction with other classes.

2674

**Table 248 – Association ends of EquipmentReliabilityProfile::DCCurrentControlFunction with other classes**

2675

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

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

2676

2677 **3.155 (NC) DCVoltageControlFunction**2678 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

2679 DC voltage control function is a function block that calculate the operating point of the controlled equipment to achieve the target voltage.

2681 Table 249 shows all attributes of DCVoltageControlFunction.

2682 **Table 249 – Attributes of EquipmentReliabilityProfile::DCVoltageControlFunction**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

2683

2684 Table 250 shows all association ends of DCVoltageControlFunction with other classes.

2685 **Table 250 – Association ends of EquipmentReliabilityProfile::DCVoltageControlFunction with other classes**

2686

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

2687

2688 **3.156 (NC) PhaseControlFunction**2689 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

2690 Phase control function is a function block that calculate the operating point of the controlled equipment to achieve the target voltage.

2692 Table 251 shows all attributes of PhaseControlFunction.

2693 **Table 251 – Attributes of EquipmentReliabilityProfile::PhaseControlFunction**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

2694

2695

Table 252 shows all association ends of PhaseControlFunction with other classes.

2696

**Table 252 – Association ends of EquipmentReliabilityProfile::PhaseControlFunction with other classes**

2697

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

2698

### 2699 3.157 (NC) RampingPrincipleKind enumeration

2700 Kind of ramping principle.

2701 Table 253 shows all literals of RampingPrincipleKind.

2702 **Table 253 – 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 before (e.g. 19:29h) and finishes 1 min after (e.g. 19:31h).

2703

### 2704 3.158 (NC) DirectCurrentCircuit

2705 Inheritance path = [Circuit](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

2706 A direct current circuit is a circuit consists of direct current equipment.

2707 Table 254 shows all attributes of DirectCurrentCircuit.

2708 **Table 254 – 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>

2709

2710 Table 255 shows all association ends of DirectCurrentCircuit with other classes.

2711 **Table 255 – Association ends of EquipmentReliabilityProfile::DirectCurrentCircuit with other classes**  
2712

mult from	name	mult to	type	description
0..1	IdentifyingTerminal	0..1	<a href="#">Terminal</a>	(NC) inherited from: <a href="#">Circuit</a>

2713

2714 **3.159 (NC) OverlappingZone**2715 Inheritance path = [IdentifiedObject](#)2716 A collection of all the overlapping cross border assessed elements which have the same sets  
2717 of impacted and impacting regions.

2718 Table 256 shows all attributes of OverlappingZone.

2719 **Table 256 – 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>

2720

2721 **3.160 (NC) TapChangerController**2722 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
2723 [IdentifiedObject](#)2724 Tap changer controller is an equipment controller that controls a tap changer, e.g. how the  
2725 voltage at the end of a line varies with the load level and compensation of the voltage drop by  
2726 tap adjustment.

2727 Table 257 shows all attributes of TapChangerController.

2728 **Table 257 – 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	mult	type	description
name	0..1	<a href="#">String</a>	inherited from: <a href="#">IdentifiedObject</a>

2729

2730

Table 258 shows all association ends of TapChangerController with other classes.

2731

**Table 258 – Association ends of EquipmentReliabilityProfile::TapChangerController with other classes**

2732

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

2733

2734

### 3.161 (NC) CurrentDroopControlFunction

2735

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

2736

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

2737

2738

Table 259 shows all attributes of CurrentDroopControlFunction.

2739

**Table 259 – 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>
targetDeadband	0..1	<a href="#">Float</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>

2740

2741

Table 260 shows all association ends of CurrentDroopControlFunction with other classes.

2742

**Table 260 – Association ends of EquipmentReliabilityProfile::CurrentDroopControlFunction with other classes**

2743

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

2744

2745

### 3.162 (NC) VoltageInjectionControlFunction

2746

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



2747 Voltage injection control function is a function block that calculates the operating point of the  
2748 controlled equipment to achieve the target voltage injection. The controlled point is the Terminal  
2749 with sequenceNumber =1.

2750 Table 261 shows all attributes of VoltageInjectionControlFunction.

2751 **Table 261 – Attributes of EquipmentReliabilityProfile::VoltageInjectionControlFunction**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

2752

2753 Table 262 shows all association ends of VoltageInjectionControlFunction with other classes.

2754

2755 **Table 262 – Association ends of EquipmentReliabilityProfile::VoltageInjectionControlFunction with other classes**

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

2756

2757 **3.163 (NC) SSSCController**

2758 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
2759 [IdentifiedObject](#)

2760 The controller of a Static synchronous series compensator (SSSC).

2761 Table 263 shows all attributes of SSSCController.

2762

**Table 263 – 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>
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>

2763

2764

Table 264 shows all association ends of SSSCController with other classes.

2765

2766

**Table 264 – 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>

2767

2768

### 3.164 (NC) CurrentDropOverride root class

2769

Current droop override uses the following logic:

2770

- 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.

2771

2772

2773

2774

2775

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

2776

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

2777

Table 265 shows all attributes of CurrentDropOverride.

2778

**Table 265 – Attributes of EquipmentReliabilityProfile::CurrentDropOverride**

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.  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.

2779

2780

Table 266 shows all association ends of CurrentDropOverride with other classes.

2781

2782

**Table 266 – Association ends of EquipmentReliabilityProfile::CurrentDropOverride 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 CurrentDropOverride applies to.

2783

2784 **3.165 CurrentFlow datatype**

2785 Electrical current with sign convention: positive flow is out of the conducting equipment into the connectivity node. Can be both AC and DC.

2786 Table 267 shows all attributes of CurrentFlow.

2788 **Table 267 – Attributes of EquipmentReliabilityProfile::CurrentFlow**

name	mult	type	description
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)
unit	0..1	<a href="#">UnitSymbol</a>	(const=A)
value	0..1	<a href="#">Float</a>	

2789

2790 **3.166 Voltage datatype**

2791 Electrical voltage, can be both AC and DC.

2792 Table 268 shows all attributes of Voltage.

2793 **Table 268 – Attributes of EquipmentReliabilityProfile::Voltage**

name	mult	type	description
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=k)
unit	0..1	<a href="#">UnitSymbol</a>	(const=V)
value	0..1	<a href="#">Float</a>	

2794

2795 **3.167 PU datatype**

2796 Per Unit - a positive or negative value referred to a defined base. Values typically range from -10 to +10.

2797 Table 269 shows all attributes of PU.

2799 **Table 269 – Attributes of EquipmentReliabilityProfile::PU**

name	mult	type	description
value	0..1	<a href="#">Float</a>	
unit	0..1	<a href="#">UnitSymbol</a>	(const=none)
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)

2800

2801 **3.168 Resistance datatype**

2802 Resistance (real part of impedance).

2803 Table 270 shows all attributes of Resistance.

2804 **Table 270 – Attributes of EquipmentReliabilityProfile::Resistance**

name	mult	type	description
value	0..1	<a href="#">Float</a>	
unit	0..1	<a href="#">UnitSymbol</a>	(const=ohm)
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)

2805

2806 **3.169 (abstract) SynchronousMachine root class**

2807 An electromechanical device that operates with shaft rotating synchronously with the network.

2808 It is a single machine operating either as a generator or synchronous condenser or pump.

2809 **3.170 ReactiveCapabilityCurve**2810 Inheritance path = [Curve](#) : [IdentifiedObject](#)

2811 Reactive power rating envelope versus the synchronous machine's active power, in both the  
 2812 generating and motoring modes. For each active power value there is a corresponding high and  
 2813 low reactive power limit value. Typically there will be a separate curve for each coolant  
 2814 condition, such as hydrogen pressure. The Y1 axis values represent reactive minimum and the  
 2815 Y2 axis values represent reactive maximum.

2816 Table 271 shows all attributes of ReactiveCapabilityCurve.

2817 **Table 271 – 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.
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>

2818

2819 Table 272 shows all association ends of ReactiveCapabilityCurve with other classes.

2820 **Table 272 – Association ends of EquipmentReliabilityProfile::ReactiveCapabilityCurve**  
2821 **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.

2822

2823 **3.171 Temperature datatype**

2824 Value of temperature in degrees Celsius.

2825 Table 273 shows all attributes of Temperature.

2826 **Table 273 – Attributes of EquipmentReliabilityProfile::Temperature**

name	mult	type	description
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=none)
unit	0..1	<a href="#">UnitSymbol</a>	(const=degC)

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

2827

2828 **3.172 Pressure datatype**

2829 Pressure in pascals.

2830 Table 274 shows all attributes of Pressure.

2831

**Table 274 – Attributes of EquipmentReliabilityProfile::Pressure**

name	mult	type	description
value	0..1	<a href="#">Float</a>	
unit	0..1	<a href="#">UnitSymbol</a>	(const=Pa)
multiplier	0..1	<a href="#">UnitMultiplier</a>	(const=k)

2832

2833 **3.173 (abstract) VsConverter root class**

2834 DC side of the voltage source converter (VSC).

2835 **3.174 VsCapabilityCurve**2836 Inheritance path = [Curve](#) : [IdentifiedObject](#)

2837 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.

2839 Table 275 shows all attributes of VsCapabilityCurve.

2840

**Table 275 – 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>

2841

2842 Table 276 shows all association ends of VsCapabilityCurve with other classes.

**Table 276 – Association ends of EquipmentReliabilityProfile::VsCapabilityCurve with other classes**

2844

mult from	name	mult to	type	description
0..*	VsConverter	1..1	<a href="#">VsConverter</a>	(NC) Converter with this capability curve.

2845

2846 **3.175 (Description) EquivalentInjection root class**2847 This class represents equivalent injections (generation or load). Voltage regulation is allowed  
2848 only at the point of connection.

2849 Table 277 shows all association ends of EquivalentInjection with other classes.

2850 **Table 277 – Association ends of EquipmentReliabilityProfile::EquivalentInjection with**  
2851 **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.

2852

2853 **3.176 (NC) SSSCSimulationSettings root class**

2854 SSSC control simulation settings used by the algorithm for power flow calculations.

2855 Table 278 shows all attributes of SSSCSimulationSettings.

2856 **Table 278 – 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.
isEstimateDLdVSensitive	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.  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.

2857

2858 **3.177 (NC) RotatingMachineController**2859 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
2860 [IdentifiedObject](#)2861 Rotating machine controller is controlling the equipment which may be used as a generator or  
2862 motor.

2863 Table 279 shows all attributes of RotatingMachineController.

2864 **Table 279 – 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>

2865  
2866 Table 280 shows all association ends of RotatingMachineController with other classes.

2867 **Table 280 – Association ends of**  
2868 **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>

2869  
2870 **3.178 (NC) InjectionController**  
2871 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
2872 [IdentifiedObject](#)  
2873 Injection controller is controlling the equipment which represents an injection or an external  
2874 network.  
2875 Table 281 shows all attributes of InjectionController.

2876 **Table 281 – 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>

2877  
2878 Table 282 shows all association ends of InjectionController with other classes.

2879 **Table 282 – Association ends of EquipmentReliabilityProfile::InjectionController with**  
2880 **other classes**

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

2881  
2882 **3.179 (abstract) ACDCConverter**  
2883 Inheritance path = [ConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) :  
2884 [IdentifiedObject](#)

2885 A unit with valves for three phases, together with unit control equipment, essential protective  
2886 and switching devices, DC storage capacitors, phase reactors and auxiliaries, if any, used for  
2887 conversion.  
2888 Table 283 shows all attributes of ACDCConverter.

2889 **Table 283 – Attributes of EquipmentReliabilityProfile::ACDCConverter**

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>

2890  
2891 Table 284 shows all association ends of ACDCConverter with other classes.

2892 **Table 284 – Association ends of EquipmentReliabilityProfile::ACDCConverter with other**  
2893 **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>

2894  
2895 **3.180 Reservoir**

2896 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)  
2897 A water storage facility within a hydro system, including: ponds, lakes, lagoons, and rivers. The  
2898 storage is usually behind some type of dam.  
2899 Table 285 shows all attributes of Reservoir.

2900 **Table 285 – Attributes of EquipmentReliabilityProfile::Reservoir**

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>

2901  
2902 **3.181 (Description) HydroPowerPlant root class**

2903 A hydro power station which can generate or pump. When generating, the generator turbines  
2904 receive water from an upper reservoir. When pumping, the pumps receive their water from a  
2905 lower reservoir.  
2906 Table 286 shows all association ends of HydroPowerPlant with other classes.

2907 **Table 286 – Association ends of EquipmentReliabilityProfile::HydroPowerPlant with**  
2908 **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.

2909



2910 **3.182 (NC) InfeedLimit**2911 Inheritance path = [OperationalLimit](#) : [IdentifiedObject](#)

2912 Infeed limit set constraints fed in to the network by two or more terminals.

2913 Table 287 shows all attributes of InfeedLimit.

2914 **Table 287 – 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>

2915

2916 Table 288 shows all association ends of InfeedLimit with other classes.

2917 **Table 288 – Association ends of EquipmentReliabilityProfile::InfeedLimit with other classes**

2918

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>

2919

2920 **3.183 (NC) InfeedTerminal root class**

2921 Infeed terminal defines the terminals that are linked to an infeed limit.

2922 Table 289 shows all attributes of InfeedTerminal.

2923 **Table 289 – 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 achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.  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.

2924

2925 Table 290 shows all association ends of InfeedTerminal with other classes.

2926 **Table 290 – Association ends of EquipmentReliabilityProfile::InfeedTerminal with other classes**

2927

mult from	name	mult to	type	description
0..*	ACDCTerminal	1..1	<a href="#">ACDCTerminal</a>	(NC) ACDCTerminal which is connected to an infeed terminal.

mult from	name	mult to	type	description
0..*	InfeedConstraint	1..1	<a href="#">InfeedLimit</a>	(NC) Infeed constraint which belongs to an infeed terminal.

2928

2929 **3.184 (NC) FuelStorage**2930 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

2931 Fuel storage. e.g. pile of coal that can be shared between multiple thermal generating units.

2932 Table 291 shows all attributes of FuelStorage.

2933

**Table 291 – Attributes of EquipmentReliabilityProfile::FuelStorage**

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>

2934

2935 **3.185 (Description) FossilFuel root class**

2936 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.

2938 Table 292 shows all association ends of FossilFuel with other classes.

2939

**Table 292 – Association ends of EquipmentReliabilityProfile::FossilFuel with other classes**

2940

mult from	name	mult to	type	description
0..*	FuelStorage	0..1	<a href="#">FuelStorage</a>	(NC) Fuel storage that store fossil fuels.

2941

2942 **3.186 (NC) PowerCapacity root class**

2943 Power capacity defines the capacity in regard to generation, consumption and transmission (import and export) for a relevant power system resource, e.g. bidding zone, including maximum and minimum electrical power capacity and any capacity allocation.

2946 **3.187 (NC) PowerShiftKeyStrategy**2947 Inheritance path = [IdentifiedObject](#)

2948 Strategy of the power shift key.

2949 Table 293 shows all attributes of PowerShiftKeyStrategy.

2950

**Table 293 – 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

name	mult	type	description
			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. 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>

2951

2952

Table 294 shows all association ends of PowerShiftKeyStrategy with other classes.

2953

**Table 294 – Association ends of EquipmentReliabilityProfile::PowerShiftKeyStrategy with other classes**

2954

mult from	name	mult to	type	description
0..*	SchedulingArea	0..1	<a href="#">SchedulingArea</a>	(NC) Scheduling area associated with power shift key strategy.

2955

### 2956 3.188 (NC) ShiftMethodKind enumeration

2957 Kind of shift method. Describes the way a power schedule should be distributed amongst  
2958 production and consumption. e.g. Type of generating and load shift key.

2959 Table 295 shows all literals of ShiftMethodKind.

2960

**Table 295 – 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.

2961

### 2962 3.189 (NC) PowerShiftKeyKind enumeration

2963 Kind of generating and load shift keys strategy.

2964 Table 296 shows all literals of PowerShiftKeyKind.

2965

**Table 296 – 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.
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)

2966

**2967 3.190 (NC) PowerBlockKind enumeration**

2968 Power block kind describes the increase and/or decrease of power.

2969 Table 297 shows all literals of PowerBlockKind.

2970

**Table 297 – 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.

literal	value	description
powerIncreaseAndDecrease		Increase and decrease in the power. The block represents action for increased and decreased power.

2971

2972 **3.191 (NC) EnergyGroup**2973 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

2974 An energy group is an aggregation of energy components which have the same energy characteristic, e.g. fuel type and technology. It can be used to allocate energy.

2975

2976 Table 298 shows all attributes of EnergyGroup.

2977

**Table 298 – Attributes of EquipmentReliabilityProfile::EnergyGroup**

name	mult	type	description
normalParticipationFactor or	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.
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>

2978

2979 Table 299 shows all association ends of EnergyGroup with other classes.

**Table 299 – Association ends of EquipmentReliabilityProfile::EnergyGroup with other classes**

2980

2981

mult from	name	mult to	type	description
0..*	EnergyType	0..1	<a href="#">EnergyType</a>	(NC) The energy type that the energy group are defined by.
0..*	SchedulingArea	1..1	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has this energy group.

2982

2983 **3.192 (NC) EnergyKind enumeration**

2984 Categories of energy used for energy groups.

2985 Table 300 shows all literals of EnergyKind.

2986

**Table 300 – Literals of EquipmentReliabilityProfile::EnergyKind**

literal	value	description
hydroRunOfRiver		Hydro run of river.
hydroWaterReservoir		Hydro water reservoir.
hydroPump		Hydro pump.
biomass		Biomass.
fossil		Fossil.
geothermal		Geothermal.
marine		Marine.
nuclear		Nuclear.

literal	value	description
uncontrollableConsumption		Consumption where there is no flexibility and it is measurable and under possibility to provide a forecast. e.g. TV, indoor lightning.
timeShiftConsumption		Operation can be shifted in time but can have a deadline e.g. washing machine, dishwasher.
battery		Battery storage.
bufferConsumption		Flexibility in operation but bound to some buffering capability e.g. battery, electrical vehicle, cooling system, freezer.
solar		Solar.
unconstrainedConsumption		Consumption is not constrained by any buffer and provides full flexibility. It is difficult to measure and to provide forecast. The consumption can be provided by local production. e.g. gas generator, diesel generator wood fire, etc.
waste		Waste.
wind		Wind.
other		Other.

2987

2988 **3.193 (abstract,NC) EnergySourceReference root class**

2989 An energy source reference refers to a set of fuel types characteristic for reporting, e.g.  
2990 European Energy Certificate System (EECS). The kind of energy should be possible to be linked  
2991 with different type of energy forecast, e.g. wind production for a given area based on wind  
2992 forecast.

2993 **3.194 (NC) DCHarmonicFilter**

2994 Inheritance path = [DCSeriesDevice](#) : [DCConductingEquipment](#) : [Equipment](#) :  
2995 [PowerSystemResource](#) : [IdentifiedObject](#)

2996 DC harmonic filter (IEC 60633) is a filter which, in conjunction with the DC reactor(s) and with  
2997 the DC surge capacitor(s), if any, serves the primary function of reducing (current or voltage)  
2998 ripple on the DC transmission line and/or earth electrode line.

2999 Table 301 shows all attributes of DCHarmonicFilter.

3000 **Table 301 – Attributes of EquipmentReliabilityProfile::DCHarmonicFilter**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3001

3002 Table 302 shows all association ends of DCHarmonicFilter with other classes.

3003 **Table 302 – Association ends of EquipmentReliabilityProfile::DCHarmonicFilter with other classes**  
3004

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>

3005

3006 **3.195 (NC) DCsmoothingReactor**

3007 Inheritance path = [DCSeriesDevice](#) : [DCConductingEquipment](#) : [Equipment](#) :  
3008 [PowerSystemResource](#) : [IdentifiedObject](#)

3009 Reactor (IEC 60633) connected in series with a converter unit or converter units on the DC side  
3010 for the primary purpose of smoothing the direct current and reducing current transients.

3011 Table 303 shows all attributes of DCsmoothingReactor.

3012 **Table 303 – Attributes of EquipmentReliabilityProfile::DCsmoothingReactor**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3013

3014 Table 304 shows all association ends of DCsmoothingReactor with other classes.

3015 **Table 304 – Association ends of EquipmentReliabilityProfile::DCsmoothingReactor with  
3016 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>

3017

3018 **3.196 (NC) DCsmoothingReactorArrester**

3019 Inheritance path = [DCSeriesDevice](#) : [DCConductingEquipment](#) : [Equipment](#) :  
3020 [PowerSystemResource](#) : [IdentifiedObject](#)

3021 Arrester (IEC 60633) connected between the terminals of a smoothing reactor.

3022 Table 305 shows all attributes of DCsmoothingReactorArrester.

3023 **Table 305 – Attributes of EquipmentReliabilityProfile::DCsmoothingReactorArrester**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3024

3025 Table 306 shows all association ends of DCsmoothingReactorArrester with other classes.

3026  
3027**Table 306 – 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>

3028

**3.197 (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 commute 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 307 shows all attributes of DCHighSpeedSwitch.

**Table 307 – Attributes of EquipmentReliabilityProfile::DCHighSpeedSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3040

Table 308 shows all association ends of DCHighSpeedSwitch with other classes.

**Table 308 – 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>

3044

**3.198 (abstract,NC) DCCommutationSwitch**

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

DC commutation switch (IEC 60633) is a type of high-speed DC switch specifically designed to commute load current into an alternative parallel current path.

Table 309 shows all attributes of DCCommutationSwitch.

**Table 309 – Attributes of EquipmentReliabilityProfile::DCCommutationSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>



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>

3052

3053

Table 310 shows all association ends of DCCommutationSwitch with other classes.

3054

**Table 310 – Association ends of EquipmentReliabilityProfile::DCCommutationSwitch with other classes**

3055

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>

3056

3057

### 3.199 (NC) DCConverterParallelingSwitch

3058

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

3059

3060

3061

3062

3063

3064

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 311 shows all attributes of DCConverterParallelingSwitch.

3065

**Table 311 – Attributes of EquipmentReliabilityProfile::DCConverterParallelingSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3066

3067

Table 312 shows all association ends of DCConverterParallelingSwitch with other classes.

3068

**Table 312 – Association ends of EquipmentReliabilityProfile::DCConverterParallelingSwitch with other classes**

3069

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>

3070

3071

### 3.200 (NC) DCBypassSwitch

3072

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

3073

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3079

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 313 shows all attributes of DCBypassSwitch.

3080 **Table 313 – Attributes of EquipmentReliabilityProfile::DCBypassSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3081  
3082 Table 314 shows all association ends of DCBypassSwitch with other classes.

3083 **Table 314 – Association ends of EquipmentReliabilityProfile::DCBypassSwitch with**  
3084 **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>

3085  
3086 **3.201 (NC) DCNeutralBusGroundingSwitch**

3087 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) :  
3088 [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3089 Neutral bus grounding switch (IEC 60633) or a neutral bus earthing switch is a DC commutation  
3090 switch connected from the neutral bus to the station earth mat on a bipolar DC scheme,  
3091 designed to provide a temporary earth connection in the event of an open circuit fault on the  
3092 electrode line until the imbalance of current between the two poles can be reduced to a safe  
3093 minimum level or the electrode line connection can be restored.

3094 Table 315 shows all attributes of DCNeutralBusGroundingSwitch.

3095 **Table 315 – Attributes of EquipmentReliabilityProfile::DCNeutralBusGroundingSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3096  
3097 Table 316 shows all association ends of DCNeutralBusGroundingSwitch with other classes.

3098 **Table 316 – Association ends of**  
3099 **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>

3100

3101 **3.202 (NC) DCNeutralBusSwitch**

3102 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) :  
3103 [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3104 Neutral bus switch (IEC 60633) is a DC commutation switch connected in series with the neutral  
3105 bus on a bipolar DC scheme, designed to commutate current out of the pole conductor or neutral  
3106 bus and into the electrode line or dedicated metallic return conductor or earth in response to a  
3107 fault in a converter or neutral bus.

3108 Table 317 shows all attributes of DCNeutralBusSwitch.

3109 **Table 317 – Attributes of EquipmentReliabilityProfile::DCNeutralBusSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3110

3111 Table 318 shows all association ends of DCNeutralBusSwitch with other classes.

3112 **Table 318 – Association ends of EquipmentReliabilityProfile::DCNeutralBusSwitch with**  
3113 **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>

3114

3115 **3.203 (NC) DCMetallicReturnSwitch**

3116 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) :  
3117 [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3118 Metallic return transfer switch (IEC 60633) is a DC commutation switch used to transfer DC  
3119 current from an earth return path to a metallic return path. Although the term "metallic return  
3120 transfer breaker" has been widely used in the industry for many years, it is misleading since  
3121 such switches have no ability to interrupt fault current.

3122 Table 319 shows all attributes of DCMetallicReturnSwitch.

3123 **Table 319 – Attributes of EquipmentReliabilityProfile::DCMetallicReturnSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3124

3125 Table 320 shows all association ends of DCMetallicReturnSwitch with other classes.

3126 **Table 320 – Association ends of EquipmentReliabilityProfile::DCMetalicReturnSwitch**  
3127 **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>

3128

### 3129 3.204 (NC) DCEarthReturnTransferSwitch

3130 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) :  
3131 [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3132 Earth return transfer switch (IEC 60633) DC commutation switch used to transfer DC current  
3133 from a metallic return path to an earth return path. In some applications, this function is  
3134 performed by a by-pass switch. Although the term "earth return transfer breaker" has been  
3135 widely used in the industry for many years, it is misleading since such switches have no ability  
3136 to interrupt fault current.

3137 Table 321 shows all attributes of DCEarthReturnTransferSwitch.

3138 **Table 321 – Attributes of EquipmentReliabilityProfile::DCEarthReturnTransferSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

3139

3140 Table 322 shows all association ends of DCEarthReturnTransferSwitch with other classes.

3141 **Table 322 – Association ends of**  
3142 **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>

3143

### 3144 3.205 (NC) DCLineParallelingSwitch

3145 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : [DCSwitch](#) :  
3146 [DCConductingEquipment](#) : [Equipment](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3147 Line paralleling switch (IEC 60633) DC commutation switch placed in series with one or more  
3148 high-voltage pole conductors, allowing two or more lines to be connected in parallel or to revert  
3149 to single-line operation while conducting load current.

3150 Table 323 shows all attributes of DCLineParallelingSwitch.

3151 **Table 323 – Attributes of EquipmentReliabilityProfile::DCLineParallelingSwitch**

name	mult	type	description
ratedCurrent	0..1	<a href="#">CurrentFlow</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>

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>

3152

3153 Table 324 shows all association ends of DCLineParallelingSwitch with other classes.

3154 **Table 324 – Association ends of EquipmentReliabilityProfile::DCLineParallelingSwitch**  
3155 **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>

3156

3157 **3.206 (abstract,NC) DirectCurrentEquipmentController**3158 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
3159 [IdentifiedObject](#)3160 Direct current equipment controller used to control different parts of the hierarchical structure  
3161 of the DC control system defined by IEC 60633.

3162 Table 325 shows all attributes of DirectCurrentEquipmentController.

3163 **Table 325 – Attributes of**  
3164 **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>
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>

3165

3166 Table 326 shows all association ends of DirectCurrentEquipmentController with other classes.

3167 **Table 326 – Association ends of**  
3168 **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>

3169

3170 **3.207 (NC) ACDCConverterController**3171 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :  
3172 [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)3173 ACDC converter unit control. According to IEC 60633, it is the control system used for the  
3174 controlling, monitoring and protection of a single converter unit.

3175 Table 327 shows all attributes of ACDCConverterController.

3176 **Table 327 – Attributes of EquipmentReliabilityProfile::ACDCConverterController**

name	mult	type	description
type	0..1	<a href="#">String</a>	(NC) inherited from: <a href="#">AutomationFunction</a>

name	mult	type	description
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>

3177

3178

Table 328 shows all association ends of ACDCConverterController with other classes.

3179

**Table 328 – Association ends of EquipmentReliabilityProfile::ACDCConverterController with other classes**

3180

mult from	name	mult to	type	description
0..1	ACDCConverter	1..1	<a href="#">ACDCConverter</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>

3181

3182

### 3.208 (NC) DirectCurrentPoleController

3183

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

3184

3185

DC system pole control, which is the control system of a pole in accordance with IEC 60633.

3186

Table 329 shows all attributes of DirectCurrentPoleController.

3187

**Table 329 – 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>

3188

3189

Table 330 shows all association ends of DirectCurrentPoleController with other classes.

3190

**Table 330 – Association ends of EquipmentReliabilityProfile::DirectCurrentPoleController with other classes**

3191

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.
0..*	DirectCurrentMasterController	0..1	<a href="#">DirectCurrentMasterController</a>	(NC) DC master controller that has a DC pole controller.
2..2	DirectCurrentBipoleController	0..1	<a href="#">DirectCurrentBipoleController</a>	(NC) DC bipole controller that controls this DC pole controller.
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>

3192

3193 **3.209 (NC) DirectCurrentBipoleController**

3194 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :  
3195 [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3196 DC system bipole control that is the control system of a bipole in accordance with IEC 60633.

3197 Table 331 shows all attributes of DirectCurrentBipoleController.

3198 **Table 331 – 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>
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>

3199

3200 Table 332 shows all association ends of DirectCurrentBipoleController with other classes.

3201 **Table 332 – Association ends of**  
3202 **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>

3203

3204 **3.210 (abstract,NC) DirectCurrentSubstationController**

3205 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :  
3206 [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3207 Control system used for the controlling, monitoring and protection within a DC substation (IEC  
3208 60633). A DC substation control may be implemented at the bipole and/or pole level and may  
3209 be referred to as local control.

3210 Table 333 shows all attributes of DirectCurrentSubstationController.

3211 **Table 333 – Attributes of**  
3212 **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>

3213

3214 Table 334 shows all association ends of DirectCurrentSubstationController with other classes.

3215  
3216**Table 334 – Association ends of  
EquipmentReliabilityProfile::DirectCurrentSubstationController with other classes**

mult from	name	mult 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>

3217

**3.211 (NC) DirectCurrentSubstationPoleController**

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

3220  
3221 Control system of a substation pole (IEC 60633).

3222 Table 335 shows all attributes of DirectCurrentSubstationPoleController.

3223  
3224**Table 335 – 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>

3225

3226 Table 336 shows all association ends of DirectCurrentSubstationPoleController with other  
3227 classes.3228  
3229**Table 336 – 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>

3230

**3.212 (NC) DirectCurrentSubstationBipoleController**

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

3233  
3234 Control system of a substation bipole (IEC 60633).

3235 Table 337 shows all attributes of DirectCurrentSubstationBipoleController.

3236  
3237**Table 337 – Attributes of  
EquipmentReliabilityProfile::DirectCurrentSubstationBipoleController**

name	mult	type	description
type	0..1	<a href="#">String</a>	(NC) inherited from: <a href="#">AutomationFunction</a>



name	mult	type	description
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>

3238  
3239  
3240

Table 338 shows all association ends of DirectCurrentSubstationBipoleController with other classes.

3241  
3242  
3243

**Table 338 – Association ends of  
EquipmentReliabilityProfile::DirectCurrentSubstationBipoleController with other  
classes**

mult from	name	mult 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>

3244

### 3.213 (NC) DCSubstation

3246 Inheritance path = [DCEquipmentContainer](#) : [EquipmentContainer](#) : [ConnectivityNodeContainer](#) :  
3247 [PowerSystemResource](#) : [IdentifiedObject](#)

3248 DC substation or DC converter station (IEC 60633) is part of an DC system which consists of  
3249 one or more converter units installed in a single location together with buildings, reactors, filters,  
3250 reactive power supply, control, monitoring, protective, measuring and auxiliary equipment. A  
3251 DC substation forming part of an DC transmission system may be referred to as an DC  
3252 transmission substation.

3253 Table 339 shows all attributes of DCSubstation.

3254

**Table 339 – 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>

3255  
3256

Table 340 shows all association ends of DCSubstation with other classes.

3257 **Table 340 – Association ends of EquipmentReliabilityProfile::DCSubstation with other**  
3258 **classes**

mult from	name	mult to	type	description
0..*	Substation	0..1	<a href="#">Substation</a>	(NC) Substation that contains this DC substation.

3259

### 3260 **3.214 (NC) DCSubstationPole**

3261 Inheritance path = [DCEquipmentContainer](#) : [EquipmentContainer](#) : [ConnectivityNodeContainer](#) :  
3262 [PowerSystemResource](#) : [IdentifiedObject](#)

3263 Part of an DC system pole (IEC 60633) which is contained within a DC substation.

3264 Table 341 shows all attributes of DCSubstationPole.

3265 **Table 341 – 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>

3266

3267 Table 342 shows all association ends of DCSubstationPole with other classes.

3268 **Table 342 – Association ends of EquipmentReliabilityProfile::DCSubstationPole with**  
3269 **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.

3270

### 3271 **3.215 (NC) DCSubstationBipole**

3272 Inheritance path = [DCEquipmentContainer](#) : [EquipmentContainer](#) : [ConnectivityNodeContainer](#) :  
3273 [PowerSystemResource](#) : [IdentifiedObject](#)

3274 Part of a bipolar DC system (IEC 60633) contained within a DC substation.

3275 Table 343 shows all attributes of DCSubstationBipole.

3276 **Table 343 – 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>

3277

3278 Table 344 shows all association ends of DCSubstationBipole with other classes.

3279 **Table 344 – Association ends of EquipmentReliabilityProfile::DCSubstationBipole with**  
3280 **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.

3281

### 3282 3.216 (abstract,NC) DCSystem

3283 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

3284 Electrical power system which transfers energy in the form of direct current between two or  
3285 more AC buses (defined in IEC 60633).

3286 Table 345 shows all attributes of DCSystem.

3287 **Table 345 – 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>

3288

### 3289 3.217 (NC) BipolarDCSystem

3290 Inheritance path = [DCSystem](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3291 Bipolar DC system (IEC 60633) consists of two poles of opposite polarity with respect to earth.

3292 The overhead lines, if any, of the two poles may be carried on common or separate towers.

3293 Table 346 shows all attributes of BipolarDCSystem.

3294 **Table 346 – 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>

3295

3296 **3.218 (NC) MonopolarDCSystem**3297 Inheritance path = [DCSystem](#) : [PowerSystemResource](#) : [IdentifiedObject](#)

3298 Monopolar DC system (IEC 60633) is a DC system with only one pole.

3299 Table 347 shows all attributes of MonopolarDCSystem.

3300 **Table 347 – 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>
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>

3301

3302 **3.219 (NC) DCBiPole**3303 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

3304 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.

3307 Table 348 shows all attributes of DCBiPole.

3308 **Table 348 – 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>

3309

3310 Table 349 shows all association ends of DCBiPole with other classes.

3311 **Table 349 – Association ends of EquipmentReliabilityProfile::DCBiPole with other**  
3312 **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.

3313

3314 **3.220 (abstract,NC) PointOfCommonCoupling**

3315 Inheritance path = [IdentifiedObject](#)

3316 Point of Common Coupling (PCC) refers to the location where multiple electrical sources or  
3317 loads are electrically connected and provide a reference point where the voltages and currents  
3318 from different parts of the system are considered to be common. The PCC is used to support  
3319 system analysis, control, and monitoring, as it provides a reference for understanding the  
3320 interactions and power flow between various components within the system. It is also relevant  
3321 to define the requirement and responsibility between different actors in operating a power  
3322 system.

3323 Table 350 shows all attributes of PointOfCommonCoupling.

3324 **Table 350 – Attributes of EquipmentReliabilityProfile::PointOfCommonCoupling**

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>

3325

3326 **3.221 (NC) ACPointOfCommonCoupling**

3327 Inheritance path = [PointOfCommonCoupling](#) : [IdentifiedObject](#)

3328 Point of interconnection of the DC converter station to the adjacent AC system (IEC 60633).

3329 Table 351 shows all attributes of ACPointOfCommonCoupling.

3330 **Table 351 – Attributes of EquipmentReliabilityProfile::ACPointOfCommonCoupling**

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>

3331

3332 Table 352 shows all association ends of ACPointOfCommonCoupling with other classes.

3333 **Table 352 – Association ends of**  
3334 **EquipmentReliabilityProfile::ACPointOfCommonCoupling with other classes**

mult from	name	mult to	type	description
0..1	ConnectivityNode	1..1	<a href="#">ConnectivityNode</a>	(NC) Connectivity node which is a point of common coupling AC.

3335

3336 **3.222 (NC) DCPointOfCommonCoupling**3337 Inheritance path = [PointOfCommonCoupling](#) : [IdentifiedObject](#)

3338 Point of interconnection of the DC converter station to the DC transmission line (IEC 60633).

3339 Table 353 shows all attributes of DCPointOfCommonCoupling.

3340 **Table 353 – Attributes of EquipmentReliabilityProfile::DCPointOfCommonCoupling**

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>

3341

3342 Table 354 shows all association ends of DCPointOfCommonCoupling with other classes.

3343 **Table 354 – Association ends of  
EquipmentReliabilityProfile::DCPointOfCommonCoupling with other classes**

3344

mult from	name	mult to	type	description
0..1	DCNode	1..1	<a href="#">DCNode</a>	(NC) The DCNode that is a point of common coupling DC.

3345

3346 **3.223 ConnectivityNode**3347 Inheritance path = [IdentifiedObject](#)

3348 Connectivity nodes are points where terminals of AC conducting equipment are connected together with zero impedance.

3349 Table 355 shows all attributes of ConnectivityNode.

3351 **Table 355 – 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>

3352

3353 **3.224 DCNode**3354 Inheritance path = [IdentifiedObject](#)

3355 DC nodes are points where terminals of DC conducting equipment are connected together with zero impedance.

3357 Table 356 shows all attributes of DCNode.

3358 **Table 356 – 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>

3359

3360 **3.225 (NC) AutomationBlockGroup root class**

3361 Grouping of function block that are operated with the same priority as settings.

3362 Table 357 shows all attributes of AutomationBlockGroup.

3363 **Table 357 – 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.

3364

3365 Table 358 shows all association ends of AutomationBlockGroup with other classes.

3366 **Table 358 – Association ends of EquipmentReliabilityProfile::AutomationBlockGroup with other classes**

3367

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

3368

3369 **3.226 (NC) FrequencyControlFuntion**3370 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

3371 Frequency control function is a function block that calculate the operating point of the controlled equipment to achieve the target frequency.

3372 Table 359 shows all attributes of FrequencyControlFuntion.

3374 **Table 359 – Attributes of EquipmentReliabilityProfile::FrequencyControlFuntion**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

3375

3376 Table 360 shows all association ends of FrequencyControlFuntion with other classes.

3377 **Table 360 – Association ends of EquipmentReliabilityProfile::FrequencyControlFuntion with other classes**

3378

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

3379

3380 **3.227 (abstract,NC) SystemControl**3381 Inheritance path = [AutomationFunction](#) : [PowerSystemResource](#) : [IdentifiedObject](#)3382 System control is the management and regulation of various parameters within the electrical  
3383 grid to ensure its stable and reliable operation. The primary goal of system control is to maintain  
3384 the balance between electricity generation and consumption, while also managing factors such  
3385 as voltage, frequency, and power quality. This involves the use of control devices, automation,  
3386 and monitoring systems to respond to changes in the grid and maintain its overall stability.3387 This serves as Integrated AC and DC control system (IEC 60633) which governs the integrated  
3388 operation of AC and DC systems of a power system.

3389 Table 361 shows all attributes of SystemControl.

3390 **Table 361 – 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>

3391

3392 Table 362 shows all association ends of SystemControl with other classes.

3393 **Table 362 – Association ends of EquipmentReliabilityProfile::SystemControl with other**  
3394 **classes**

mult from	name	mult to	type	description
0..1	EquipmentController	1..*	<a href="#">EquipmentController</a>	(NC) Equipment controller controlles by this system control
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>

3395

3396 **3.228 (NC) ArealInterchangeController**3397 Inheritance path = [SystemControl](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
3398 [IdentifiedObject](#)

3399 Area interchange control is set to control active power of an area.

3400 Table 363 shows all attributes of ArealInterchangeController.

3401 **Table 363 – Attributes of EquipmentReliabilityProfile::ArealInterchangeController**

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>

3402



3403 Table 364 shows all association ends of AreaInterchangeController with other classes.

3404 **Table 364 – Association ends of EquipmentReliabilityProfile::AreaInterchangeController**  
3405 **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>

3406

### 3407 3.229 (NC) PowerFrequencyController

3408 Inheritance path = [SystemControl](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
3409 [IdentifiedObject](#)

3410 Power frequency controller is controlling the active power balance as typically done by the  
3411 secondary control. If an unbalance between the scheduled active power values of each  
3412 generation unit and the loads plus losses occurs, primary control will adapt (increase/decrease)  
3413 the active power production of each unit (depending on the power shift key strategy), leading  
3414 to an over- or under-frequency situation. The secondary frequency controller will then control  
3415 the frequency back to its nominal value, re- establishing a cost-efficient generation delivered  
3416 by each unit.

3417 Table 365 shows all attributes of PowerFrequencyController.

3418 **Table 365 – Attributes of EquipmentReliabilityProfile::PowerFrequencyController**

name	mult	type	description
mode	1..1	<a href="#">PowerFrequencyControl Kind</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>

3419

3420 Table 366 shows all association ends of PowerFrequencyController with other classes.

3421 **Table 366 – Association ends of**  
3422 **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..*	PowerShiftKeyStrategy	0..1	<a href="#">PowerShiftKeyStrategy</a>	(NC) Power shift key strategy for this power frequency controller.
0..1	MonitoringArea	0..1	<a href="#">MonitoringArea</a>	(NC) Monitoring area that has this power frequency controller.

mult from	name	mult to	type	description
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>

3423

3424 **3.230 (NC) PowerFrequencyControlKind enumeration**

3425 Kinds of power frequency control modes.

3426 Table 367 shows all literals of PowerFrequencyControlKind.

3427 **Table 367 – Literals of EquipmentReliabilityProfile::PowerFrequencyControlKind**

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

3428

3429 **3.231 (abstract,NC) MonitoringArea**3430 Inheritance path = [PowerSystemResource](#) : [IdentifiedObject](#)

3431 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.

3434 Table 368 shows all attributes of MonitoringArea.

3435 **Table 368 – 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>

3436

3437 **3.232 (NC) FrequencyMonitoringTerminal root class**

3438 Frequency monitoring terminal provides location in the model where the frequency is monitored for the purpose of power frequency control.

3440 Table 369 shows all attributes of FrequencyMonitoringTerminal.

3441 **Table 369 – 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.  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.

3442

3443 Table 370 shows all association ends of FrequencyMonitoringTerminal with other classes.

3444 **Table 370 – Association ends of**  
3445 **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.

3446

### 3447 **3.233 (NC) PowerElectronicsUnitController**

3448 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
3449 [IdentifiedObject](#)

3450 Power electronics unit controller is controlling the equipment to optimize the power electronics  
3451 unit.

3452 Table 371 shows all attributes of PowerElectronicsUnitController.

3453 **Table 371 – 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>
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>

3454

3455 Table 372 shows all association ends of PowerElectronicsUnitController with other classes.

3456 **Table 372 – Association ends of**  
3457 **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>

3458

### 3459 **3.234 (NC) ScheduleResourceController**

3460 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : [PowerSystemResource](#) :  
3461 [IdentifiedObject](#)

3462 Schedule resource controller is controlling the equipment to optimize the schedule resource.

3463 Table 373 shows all attributes of ScheduleResourceController.

3464 **Table 373 – 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>

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>

3465

3466

Table 374 shows all association ends of ScheduleResourceController with other classes.

3467

3468

**Table 374 – 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>

3469

3470

### 3.235 (NC) PowerElectronicsConnectionController

3471

3472

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

3473

3474

Power electronics connection controller is controlling the equipment to optimize the power electronics connection.

3475

Table 375 shows all attributes of PowerElectronicsConnectionController.

3476

3477

**Table 375 – Attributes of  
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>
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>

3478

3479

3480

Table 376 shows all association ends of PowerElectronicsConnectionController with other classes.

3481

3482

**Table 376 – 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>

3483

3484

### 3.236 (NC) DCSystemDirectionKind enumeration

3485

3486

Direction kinds of the DC system.

Table 377 shows all literals of DCSystemDirectionKind.

3487 **Table 377 – 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.

3488

3489 **3.237 (NC) DCSystemTransmissionKind enumeration**

3490 DC system transmission kind.

3491 Table 378 shows all literals of DCSystemTransmissionKind.

3492 **Table 378 – 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.

3493

3494 **3.238 ReactivePower datatype**

3495 Product of RMS value of the voltage and the RMS value of the quadrature component of the current.

3497 Table 379 shows all attributes of ReactivePower.

3498 **Table 379 – Attributes of EquipmentReliabilityProfile::ReactivePower**

name	mult	type	description
value	0..1	<a href="#">Float</a>	
unit	0..1	<a href="#">UnitSymbol</a>	(const=VAr)
multiplier	0..1	<a href="#">UnitMultiplier</a>	

3499

3500 **3.239 (NC) CoordinatedCapacityCalculator**3501 Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) : [OrganisationRole](#) : [IdentifiedObject](#)

3503 A role that coordinates and executes the task of calculating transmission capacity.

3504 Table 380 shows all attributes of CoordinatedCapacityCalculator.

3505 **Table 380 – Attributes of EquipmentReliabilityProfile::CoordinatedCapacityCalculator**

name	mult	type	description
globalLocationNumber	0..1	<a href="#">String</a>	(NC) inherited from: <a href="#">OrganisationRole</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>

3506

3507 Table 381 shows all association ends of CoordinatedCapacityCalculator with other classes.

3508

3509

**Table 381 – 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>

3510

### 3511 3.240 (NC) ACEmulationControlFunction

3512 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#)

3513 The AC emulation control function is used when AC emulation model is activated for a DC  
3514 system. It consists in computing the active power set point of the DC system as a function of  
3515 the voltage angle difference between both points of common coupling with the AC network in  
3516 order to mimic the behavior of an AC transmission line. This control mode enables the automatic  
3517 adjustment of the active power reference following variations of the AC system operational  
3518 point.

3519 The setpoint of the DC system is calculated by  $P_{setpoint} = P_{ref} + K_{dc} * (\text{angle1} - \text{angle2})$ , where

3520 -  $P_{ref}$  is the existing active power setpoint;

3521 -  $K_{dc}$  is the control system gain and

3522 -  $\text{angle1}$  and  $\text{angle2}$  are the phase angle measurement (measured at points of common coupling  
3523 with the AC network) respectively at the side 1 and 2 of the DC system.

3524 Table 382 shows all attributes of ACEmulationControlFunction.

3525 **Table 382 – Attributes of EquipmentReliabilityProfile::ACEmulationControlFunction**

name	mult	type	description
isDiscrete	1..1	<a href="#">Boolean</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	<a href="#">Float</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>

3526

3527 Table 383 shows all association ends of ACEmulationControlFunction with other classes.

3528  
3529**Table 383 – Association ends of  
EquipmentReliabilityProfile::ACEmulationControlFunction with other classes**

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

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3532

3533

**Annex A(informative): Sample data**3534 **A.1 General**

3535 This Annex is designed to illustrate the profile by using fragments of sample data. It is not meant  
3536 to be a complete set of examples covering all possibilities of using the profile. Defining a  
3537 complete set of test data is considered a separate activity to be performed for the purpose of  
3538 setting up interoperability testing and conformity related to this profile.

3539 **A.2 Sample instance data**

3540 Test data files are available in the CIM EG SharePoint.