



SLOVENSKI STANDARD
oSIST prEN IEC 62264-2:2025
01-marec-2025

Integracija sistemov za upravljanje podjetij - 2. del: Objektni modeli in lastnosti za integracijo sistemov za upravljanje podjetij

Enterprise-control system integration - Part 2: Object and attributes for enterprise-control system integration

Intégration des systèmes entreprise-contrôle - Partie 2: Objets et attributs pour l'intégration des systèmes de commande d'entreprise

Ta slovenski standard je istoveten z: prEN IEC 62264-2:2024

<https://standards.iteh.ai/catalog/standards/sist/102c69f6-336b-4b9c-b9f1-2b2d117c5259/osist-pren-iec-62264-2-2025>

ICS:

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.240.50	Uporabniške rešitve IT v industriji	IT applications in industry

oSIST prEN IEC 62264-2:2025

en,fr,de



65E/1147/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

IEC 62264-2 ED3

DATE OF CIRCULATION:

2024-12-27

CLOSING DATE FOR VOTING:

2025-03-21

SUPERSEDES DOCUMENTS:

65E/960/CD, 65E/1068/CC

IEC SC 65E : DEVICES AND INTEGRATION IN ENTERPRISE SYSTEMS	
SECRETARIAT: United States of America	SECRETARY: Mr David Richmond
OF INTEREST TO THE FOLLOWING COMMITTEES:	HORIZONTAL FUNCTION(S):
ASPECTS CONCERNED:	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any relevant "In Some Countries" clauses to be included should this proposal proceed. Recipients are reminded that the CDV stage is the final stage for submitting ISC clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

Enterprise-control system integration - Part 2: Object and attributes for enterprise-control system integration

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

Contents

1			
2			
3	1	Scope	18
4	2	Normative references	18
5	3	Terms, definitions, abbreviations, and conventions	20
6	3.1	Terms and definitions	20
7	3.2	Abbreviations	20
8	3.3	Conventions	21
9	4	Manufacturing operations management information models	52
10	4.1	Scope of information models	52
11	4.2	Relationships of common information models to operations management information models	53
13	4.3	Cross-model relationships between conceptual operations management information models and their objects	53
15	4.4	Cross-model relationships for MOM activity context in information exchanges	59
16	4.5	Attributes of an object in an information model	61
17	5	Common object models	76
18	5.1	Hierarchy scope information	76
19	5.2	Spatial definition information	78
20	5.3	Operational location information	81
21	5.4	Personnel information	88
22	5.5	Role-based equipment information	96
23	5.6	Physical asset information	105
24	5.7	Material information	116
25	5.8	Process segment information	141
26	5.9	Operations test information	175
27	5.10	Operations record information	191
28	5.11	Operations event information	202
29	5.12	Containers, tools, and software	229
30	6	Operations management information	230
31	6.1	Operations definition information	230
32	6.2	Operations schedule information	271
33	6.3	Operations performance information	311
34	6.4	Operations capability information	345
35	6.5	Process segment capability information	376
36	6.6	Operations segment capability information	382
37	7	Cross-reference between IEC 62264-1 data flow models and the corresponding IEC 62264-2 object model	388
39	8	List of objects	390
40	9	Compliance	393
41		Annex A (Informative) Value syntax in the value attribute	395
42		Annex B (Informative) Implementation options for specifying values in unit of measurement attribute	396
43			

44	B.1	Specifying value(s) for the “value unit of measurement” attribute in operations-	
45		related class and definition property objects (IEC 62264-2) and work-related	
46		definition and type property objects (IEC 62264-4).....	396
47	B.2	Specifying value(s) for the “unit of measurement” attribute where no object	
48		specifies permissible values.....	397
49	Annex C (Informative)	Use cases and examples	401
50	C.1	Use case and examples	401
51	C.2	Application of the standard.....	407
52	C.3	Database mapping of the models	407
53	C.4	XML usage.....	408
54	Annex D (Informative)	Example data sets	412
55	D.1	General.....	412
56	D.2	Material model example	412
57	D.3	Equipment model and hierarchy scope examples	414
58	D.4	Personnel model example	418
59	D.5	Operations capability example	419
60	D.6	Operations performance example.....	420
61	D.7	Operations test model use case examples	420
62	D.8	Example of planning and response state attributes and defined values	427
63	D.9	Operations event definition record specification example	430
64	D.10	Resource acquired example	430
65	D.11	Work commenced/redirected/completed/aborted example	433
66	Annex E (Informative)	Questions and answers about object use	436
67	E.1	General.....	436
68	E.2	Inflow materials.....	436
69	E.3	Multiple products per process segment	436
70	E.4	Process segments vs. operations segments	437
71	E.5	Segment parameter references	438
72	E.6	Use of hierarchy scope in parameter objects	439
73	E.7	Use of spatial definition in personnel objects.....	439
74	E.8	How class name and property IDs are used to identify elements	440
75	E.9	Possible capability overcounts	441
76	E.10	Routing and process capability	443
77	E.11	Product and process capability dependencies	444
78	E.12	Representation of dependencies	445
79	E.13	How a material transfer is handled	446
80	E.14	How to extend the standard when properties cannot be used	447
81	E.15	Modeling of tools.....	447
82	E.16	What is equipment and what is a physical asset?	447
83	E.17	How should dependencies in the operations schedule and operations response	
84		be handled?	448
85	E.18	How are “mixed” operations types used?.....	448
86	E.19	What is the relationship between this standard and MESA International’s	
87		B2MML?	449

88	Annex F (informative) Implementation considerations for inheritance and persistence of	
89	data exchange object models	452
90	F.1 Object inheritance considerations	452
91	F.2 Record inheritance	454
92	F.3 Object persistence considerations	455
93	Annex G (informative) Logical information flows	458
94	Annex H (Informative) Conceptual model to implementation model transformations	460
95	Annex I (informative) Conceptual model to implementation data model examples	465
96	I.1 Conceptual object model example: personnel model	465
97	I.2 MESA – B2MML 7.0 (XSD) implementation model.....	467
98	I.3 Simplified XSD implementation model	468
99	I.4 Object Management Group (OMG) – Interface Definition Language (IDL) –	
100	Common Data Representation (CDR) implementation model	468
101	I.5 OPC Unified Architecture (UA) implementation model	469
102	I.6 Flat buffers – Interactive Data Language (IDL) implementation model	471
103	I.7 Internet Engineering Task Force (IETF) – JavaScript Object Notation (JSON) –	
104	Schema implementation model	471
105	I.8 Open Source Robotics Foundation (OSRF) as so known as Open Robotics,	
106	Robot Operating System (ROS) message description specifications (MDS)	472
107	I.9 World Wide Web Consortium (W3C) Resource Description Framework (RDF)	
108	schema	472
109	I.10 SQL database model.....	473
110	I.11 Transport Protocols.....	473
111	Bibliography	475

112

Figures

113		
114		
115	Figure 1 – Example of aggregation relationship notation	27
116	Figure 2 – Example of composition relationship notation	28
117	Figure 3 – Example: Object model using the simplified UML diagram for an information	
118	model, personnel model	36
119	Figure 4 – Simplified UML model convention for cross-model relationships between	
120	resource objects	40
121	Figure 5 – Operations information models supporting operations management activities	52
122	Figure 6 – Information and object model inter-relationships for operations management	
123	information exchanges	55
124	Figure 7 – Data flow diagram for defined cross-model MOM relationships between	
125	operations management and work information models	60
126	Figure 8 – Hierarchy scope model	77
127	Figure 9 – Example, value attribute for WKT in 2D (3D is equally supported).....	80
128	Figure 10 – Operational location model	81
129	Figure 11 – Personnel model.....	88
130	Figure 12 – Role-based equipment model.....	97
131	Figure 13 – Physical asset model	106

132	Figure 14 – Physical asset and equipment relationships	107
133	Figure 15 – Material model	117
134	Figure 16 – Example, material with an assembly	140
135	Figure 17 – Process segment model	142
136	Figure 18 – Example, Segment dependency	175
137	Figure 19 – Operations test model	175
138	Figure 20 – Operations record model (abstract)	192
139	Figure 21 – Operations event model	203
140	Figure 22 – Example, Relationship of operations event definition with operations events	211
141	Figure 23 – Operations definition model	231
142	Figure 24 – Operations schedule model	272
143	Figure 25 – Operations performance model	312
144	Figure 26 – Operations capability model	346
145	Figure 27 – Process segment capability model	377
146	Figure 28 – Operations segment capability model	383
147	Figure C.1 – Personnel model	402
148	Figure C.2 – Instances of a person class	404
149	Figure C.3 – UML model for class and class properties	405
150	Figure C.4 – Class property	405
151	Figure C.5 – Instances of a person properties	406
152	Figure C.6 – Instances of person and person properties	406
153	Figure C.7 – XML schema for a person object	409
154	Figure C.8 – XML schema for person properties	409
155	Figure C.9 – Example of person and person property	410
156	Figure C.10 – Example of person class information	410
157	Figure C.11 – Adaptor to map different property IDs and values	411
158	Figure D.1 – Example of simplified job order state model	429
159	Figure D.2 – Typical MOM functions subscribing to the <i>ResourceAcquired</i> event	431
160	Figure D.3 – Typical MOM functions subscribing to the <i>WorkCommenced</i> ,	
161	<i>WorkRedirected</i> , <i>WorkCompleted</i> and <i>WorkAborted</i> events	434
162	Figure E.1 – Class and property IDs used to identify elements	441
163	Figure E.2 – A property defining overlapping subsets of the capability	442
164	Figure E.3 – Routing for a product	443
165	Figure E.4 – Routing with co-products and material dependencies	444
166	Figure E.5 – Product and process capability relationships	445
167	Figure E.6 – Time-based dependencies	446
168	Figure E.7 – Mixed operation example	449
169	Figure F.1 – Enterprise to manufacturing system conceptual information flows	458
170	Figure F.2 – Conceptual information flows among multiple systems	459

171	Figure I.1 – Conceptual object model example: personnel model	465
172	Figure I.2 – OPC UA Specification Notation	470
173	Figure I.3 – OPC UA representation of the personnel model	471

174

175

176

Tables

177

178	Table 1 – Simplified UML symbols and notation used in object models	23
-----	---------------------------------------------------------------------------	----

179	Table 2 – Relationship role name template with examples for each relationship name by	
180	relationship type	30

181	Table 3 – Object color convention for object relationships between information models	35
-----	---------------------------------------------------------------------------------------------	----

182	Table 4 – Example: Relationship table for an object model, personnel model relationships ...	36
-----	----------------------------------------------------------------------------------------------	----

183	Table 5 – Example: Relationship role table, Personnel class relationship roles	38
-----	--------------------------------------------------------------------------------------	----

184	Table 6 – Example: Usage of object attribute table	39
-----	----------------------------------------------------------	----

185	Table 7 – Detailed UML model relationships in Figure 4	41
-----	--------------------------------------------------------------	----

186	Table 8 – Resource reference object relationship roles	43
-----	--------------------------------------------------------------	----

187	Table 9 – Example: Personnel requirement cross-model relationships to personnel model	
188	(resource group and resource)	44

189	Table 10 – Example: Personnel requirement cross-model relationships to personnel	
190	reference objects	44

191	Table 11 – Resource reference object property relationship roles	45
-----	------------------------------------------------------------------------	----

192	Table 12 – Example: Personnel requirement property cross-model relationships to	
193	personnel model	45

194	Table 13 – Example: Personnel requirement property cross-model relationships to	
195	personnel reference object properties	46

196	Table 14 – Resource group relationship roles	46
-----	----------------------------------------------------	----

197	Table 15 – Example: Personnel requirement cross-model relationships to personnel class ...	47
-----	--------------------------------------------------------------------------------------------	----

198	Table 16 – Resource group property relationship roles	47
-----	-------------------------------------------------------------	----

199	Table 17 – Example: Personnel requirement property cross-model relationships with a	
200	Personnel class property	47

201	Table 18 – Resource relationship roles	48
-----	----------------------------------------------	----

202	Table 19 – Example: Personnel requirement cross-model relationships with a person	48
-----	-----------------------------------------------------------------------------------------	----

203	Table 20 – Resource property relationship roles	48
-----	-------------------------------------------------------	----

204	Table 21 – Example: Personnel requirement property cross-model relationships with a	
205	person property	49

206	Table 22 – Base resource reference object relationship roles	49
-----	--------------------------------------------------------------------	----

207	Table 23 – Example: Personnel requirement cross-model relationships with a personnel	
208	specification	49

209	Table 24 – Base resource reference object property relationship roles	50
-----	-----------------------------------------------------------------------------	----

210	Table 25 – Example: Personnel requirement property cross-model relationships with a	
211	personnel specification property	50

212	Table 26 – Applied resource reference object relationship roles	50
-----	-----------------------------------------------------------------------	----

213	Table 27 – Example: Personnel actual cross-model relationships with a personnel	
214	requirement	51
215	Table 28 – Applied resource reference object property relationship roles	51
216	Table 29 – Example: Personnel actual property cross-model relationships with a	
217	personnel requirement property	51
218	Table 30 – Operations management information models cross-model relationships to	
219	resource information models and base/applied resource reference objects	57
220	Table 31 – Cross-model MOM relationship description	60
221	Table 32 – Common header attributes for a primary object	63
222	Table 33 – Common header attributes for a property object	66
223	Table 34 – Class, definition, or type property objects with permissible value and value	
224	(default) attributes	68
225	Table 35 – Comment sub-attributes	69
226	Table 36 – Personnel identification manifest sub-attributes	70
227	Table 37 – Commonly used CCTS types for exchange	73
228	Table 38 – Hierarchy scope relationships	77
229	Table 39 – Hierarchy scope relationship roles	77
230	Table 40 – Hierarchy scope attributes	78
231	Table 41 – Attributes of spatial definition	79
232	Table 42 – Operational location model relationships	81
233	Table 43 – Operational location class relationship roles	83
234	Table 44 – Operational location class attributes	83
235	Table 45 – Operational location class property relationship roles	84
236	Table 46 – Operational location class property attributes	84
237	Table 47 – Operational location relationship roles	85
238	Table 48 – Operational location attributes	86
239	Table 49 – Operational location property relationship roles	87
240	Table 50 – Operational location property attributes	87
241	Table 51 – Personnel model relationships	88
242	Table 52 – Personnel class relationship roles	89
243	Table 53 – Personnel class attributes	90
244	Table 54 – Personnel class property relationship roles	91
245	Table 55 – Personnel class property attributes	92
246	Table 56 – Person relationship roles	93
247	Table 57 – Person attributes	94
248	Table 58 – Person property relationship roles	95
249	Table 59 – Person property attributes	95
250	Table 60 – Role-based equipment model relationships	97
251	Table 61 – Equipment class relationship roles	98
252	Table 62 – Equipment class attributes	99

253	Table 63 – Equipment class property relationship roles	100
254	Table 64 – Equipment class property attributes	101
255	Table 65 – Equipment relationship roles	102
256	Table 66 – Equipment attributes	103
257	Table 67 – Equipment property relationships	104
258	Table 68 – Equipment property attributes	105
259	Table 69 – Physical asset model relationships	106
260	Table 70 – Physical asset and equipment relationships	108
261	Table 71 – Physical asset class relationship roles	108
262	Table 72 – Physical asset class attributes	109
263	Table 73 – Physical asset class property relationship roles	110
264	Table 74 – Physical asset class property attributes	111
265	Table 75 – Physical asset relationship roles	112
266	Table 76 – Physical asset attributes	113
267	Table 77 – Physical asset property relationship roles	114
268	Table 78 – Physical asset property attributes	114
269	Table 79 – Equipment asset mapping relationship roles	115
270	Table 80 – Equipment asset mapping attributes	116
271	Table 81 – Material model relationships	118
272	Table 82 – Material class relationship roles	119
273	Table 83 – Material class attributes	120
274	Table 84 – Material class property relationship roles	123
275	Table 85 – Material class property attributes	124
276	Table 86 – Material definition relationship roles	125
277	Table 87 – Material definition attributes	126
278	Table 88 – Material definition property relationship roles	128
279	Table 89 – Material definition property attributes	129
280	Table 90 – Material lot relationship roles	130
281	Table 91 – Material lot attributes	131
282	Table 92 – Material lot property relationship roles	134
283	Table 93 – Material lot property attributes	135
284	Table 94 – Material subplot relationship roles	136
285	Table 95 – Material subplot attributes	137
286	Table 96 – Process segment model relationships	143
287	Table 97 – Process segment relationship roles	147
288	Table 98 – Process segment attributes	148
289	Table 99 – Process segment parameter relationship roles	149
290	Table 100 – Process segment parameter attributes	150
291	Table 101 – Personnel segment specification relationship roles	150

292	Table 102 – Personnel segment specification attributes	152
293	Table 103 – Personnel segment specification property relationship roles	153
294	Table 104 – Personnel segment specification property attributes	154
295	Table 105 – Equipment segment specification relationship roles	155
296	Table 106 – Equipment segment specification attributes	157
297	Table 107 – Equipment segment specification property relationship roles	158
298	Table 108 – Equipment segment specification property attributes	159
299	Table 109 – Physical asset segment specification relationship roles	160
300	Table 110 – Physical asset segment specification attributes	161
301	Table 111 – Physical asset segment specification property relationship roles	162
302	Table 112 – Physical asset segment specification property attributes	164
303	Table 113 – Material segment specification relationship roles	165
304	Table 114 – Material segment specification attributes	166
305	Table 115 – Material segment specification property relationships	171
306	Table 116 – Material segment specification property attributes	172
307	Table 117 – Segment dependency relationship roles	173
308	Table 118 – Segment dependency attributes	173
309	Table 119 – Operations test model relationships	176
310	Table 120 – Instances of operations test requirement	177
311	Table 121 – Operations test requirement relationship roles in the operations test model	178
312	Table 122 – Instances of testable object / testable object property pair	179
313	Table 123 – Testable object relationship roles in operations test model	180
314	Table 124 – Testable object property relationship roles in the operations test model	180
315	Table 125 – Test specification relationship roles	181
316	Table 126 – Test specification attributes	182
317	Table 127 – Test specification property relationship roles	184
318	Table 128 – Test specification property attributes	184
319	Table 129 – Test specification criteria relationship roles	185
320	Table 130 – Test specification criteria attributes	185
321	Table 131 – Evaluated property relationship roles	187
322	Table 132 – Evaluated property attributes	187
323	Table 133 – Test result relationship roles	188
324	Table 134 – Test result attributes	188
325	Table 135 – Property measurement relationship roles	189
326	Table 136 – Property measurement attributes	190
327	Table 137 – Instances of resource actual	191
328	Table 138 – Resource actual relationship roles in operations test model	191
329	Table 139 – Operations record model (abstract) relationships	193
330	Table 140 – Operations record specification relationship roles	194

331	Table 141 – Operations record specification attributes	195
332	Table 142 – Operations record template relationship roles	198
333	Table 143 – Operations record template attributes	198
334	Table 144 – Operations record entry template relationships	200
335	Table 145 – Operations record entry template attributes	201
336	Table 146 – Operations Event model relationships	203
337	Table 147 – Operations event class relationship roles	205
338	Table 148 – Operations event class attributes	206
339	Table 149 – Example of operations event class locked hierarchy	206
340	Table 150 – Operations event class property relationship roles	207
341	Table 151 – Operations event class property attributes	208
342	Table 152 – Operations event class record specification relationship roles	209
343	Table 153 – Operations event definition relationship roles	211
344	Table 154 – Operations event definition attributes	212
345	Table 155 – Operations event definition property relationship roles	215
346	Table 156 – Operations event definition property attributes	216
347	Table 157 – Operations event definition record specification relationship roles	218
348	Table 158 – Operations event relationship roles	220
349	Table 159 – Operations event attributes	220
350	Table 160 – Operations event property relationship roles	223
351	Table 161 – Operations event property attributes	224
352	Table 162 – Operations event record relationship roles	224
353	Table 163 – Operations event record attributes	225
354	Table 164 – Operations event record entry relationships	227
355	Table 165 – Operations event record entry attributes	228
356	Table 166 – Operations definition model relationships	232
357	Table 167 – Operations definition relationship roles	236
358	Table 168 – Operations definition attributes	238
359	Table 169 – Operations material bill relationship roles	239
360	Table 170 – Operations material bill attributes	240
361	Table 171 – Operations material bill item relationship roles	241
362	Table 172 – Operations material bill item attributes	241
363	Table 173 – Operations segment relationship roles	243
364	Table 174 – Operations segment attributes	246
365	Table 175 – Parameter specification relationship roles	247
366	Table 176 – Parameter specification attributes	248
367	Table 177 – Personnel specification relationship roles	249
368	Table 178 – Personnel specification attributes	250
369	Table 179 – Personnel specification property relationship roles	251

370	Table 180 – Personnel specification property attributes	252
371	Table 181 – Equipment specification relationship roles	254
372	Table 182 – Equipment specification attributes	255
373	Table 183 – Equipment specification property relationship roles	256
374	Table 184 – Equipment specification property attributes	257
375	Table 185 – Physical asset specification relationship roles	259
376	Table 186 – Physical asset specification attributes	260
377	Table 187 – Physical asset specification property relationship roles	261
378	Table 188 – Physical asset specification property attributes	262
379	Table 189 – Material specification relationship roles	263
380	Table 190 – Material specification attributes	265
381	Table 191 – Material specification property relationship roles	267
382	Table 192 – Material specification property attributes	269
383	Table 193 – Segment dependency relationship roles	270
384	Table 194 – Segment dependency attributes	270
385	Table 195 – Operations schedule model relationships	273
386	Table 196 – Operations schedule relationship roles	276
387	Table 197 – Operations schedule attributes	276
388	Table 198 – Operations request relationship roles	279
389	Table 199 – Operations request attributes	280
390	Table 200 – Segment requirement relationship roles	282
391	Table 201 – Segment requirement attributes	284
392	Table 202 – Segment parameter relationship roles	286
393	Table 203 – Segment parameter attributes	286
394	Table 204 – Personnel requirement relationship roles	288
395	Table 205 – Personnel requirement attributes	289
396	Table 206 – Personnel requirement property relationship roles	290
397	Table 207 – Personnel requirement property attributes	291
398	Table 208 – Equipment requirement relationship roles	293
399	Table 209 – Equipment requirement attributes	294
400	Table 210 – Equipment requirement property relationships	295
401	Table 211 – Equipment requirement property attributes	296
402	Table 212 – Physical asset requirement relationship roles	298
403	Table 213 – Physical asset requirement attributes	299
404	Table 214 – Physical asset requirement property relationship roles	301
405	Table 215 – Physical asset requirement property attributes	302
406	Table 216 – Material requirement relationship roles	303
407	Table 217 – Material requirement attributes	305
408	Table 218 – Material requirement property relationship roles	308

409	Table 219 – Material requirement property attributes	309
410	Table 220 – Requested segment response relationship roles	310
411	Table 221 – Operations performance model relationships	313
412	Table 222 – Operations performance relationship roles	315
413	Table 223 – Operations performance attributes	316
414	Table 224 – Operations response relationship roles	318
415	Table 225 – Operations response attributes	319
416	Table 226 – Segment response relationship roles	321
417	Table 227 – Segment response attributes	322
418	Table 228 – Segment data relationship roles	324
419	Table 229 – Segment data attributes	324
420	Table 230 – Personnel actual relationship roles	325
421	Table 231 – Personnel actual attributes	326
422	Table 232 – Personnel actual property relationship roles	328
423	Table 233 – Personnel actual property attributes	328
424	Table 234 – Equipment actual relationship roles	330
425	Table 235 – Equipment actual attributes	331
426	Table 236 – Equipment actual property relationship roles	332
427	Table 237 – Equipment actual property attributes	333
428	Table 238 – Physical asset actual relationship roles	335
429	Table 239 – Physical asset actual attributes	336
430	Table 240 – Physical asset actual property relationship roles	337
431	Table 241 – Physical asset actual property attributes	338
432	Table 242 – Material actual relationship roles	339
433	Table 243 – Material actual attributes	341
434	Table 244 – Material actual property relationship roles	343
435	Table 245 – Material actual property attributes	344
436	Table 246 – Operations capability model relationships	346
437	Table 247 – Operations capability relationship roles	348
438	Table 248 – Operations capability attributes	349
439	Table 249 – Personnel capability relationship roles	352
440	Table 250 – Personnel capability attributes	352
441	Table 251 – Personnel capability property relationship roles	355
442	Table 252 – Personnel capability property attributes	356
443	Table 253 – Equipment capability relationship roles	357
444	Table 254 – Equipment capability attributes	358
445	Table 255 – Equipment capability property relationships	361
446	Table 256 – Equipment capability property attributes	361
447	Table 257 – Physical asset capability relationship roles	363