

ISO 10303-28:2007-10 (E)

Industrial automation systems and integration — Product data representation and exchange — Part 28: Implementation methods: XML representations of EXPRESS schemas and data, using XML schemas

Contents	Page
1 Scope.....	1
2 Normative references.....	1
3 Terms, definitions, abbreviations, and conventions	2
3.1 Terms defined in ISO 10303-1.....	2
3.2 Terms defined in ISO 10303-11.....	2
3.3 Terms defined in the XML Standards.....	4
3.4 Other terms and definitions.....	5
3.5 Conflicting terminology.....	7
3.6 Abbreviations.....	7
3.7 Conventions	7
3.7.1 Text conventions.....	8
3.7.2 Namespace conventions.....	8
4 Conformance.....	8
4.1 Conformance of an XML document	9
4.1.1 Conformance of an iso-10303-28 document.....	9
4.1.2 Conformance of a uos document.....	10
4.1.3 Conformance of a configured document	10
4.2 Conformance of a derived XML schema document	10
4.3 Conformance of a configuration file.....	11
4.4 Conformance of a pre-processor	11
4.5 Conformance of a post-processor.....	12
4.6 Conformance of an XML schema generator.....	12
5 Document level elements.....	12
5.1 The iso-10303-28 document	13
5.2 Document and uos header information	14
5.2.1 The exp:header element.....	14
5.2.2 The name element.....	15
5.2.3 The time_stamp element.....	15
5.2.4 The author element	15
5.2.5 The organization element.....	15
5.2.6 The authorization element	15
5.2.7 The originating_system element.....	15
5.2.8 The preprocessor_version element	15
5.3 The schema_population element.....	15
5.4 The express element.....	17
5.4.1 By-reference representation of an EXPRESS schema.....	18
5.4.2 By-value representation of an EXPRESS schema.....	18
5.5 The configuration element.....	18
5.6 The unit of serialization element.....	18
5.7 The uos document	20
5.8 The configured document	20
5.9 Enterprise data objects	20
6 Derived XML Schema.....	20
6.1 Preconditions.....	21
6.2 Unmapped EXPRESS concepts.....	21
6.3 Abstract entity data types.....	21

7	Default XML Schema Binding	22
7.1	Naming conventions	22
7.1.1	Schema	22
7.1.2	EXPRESS identifiers	22
7.1.3	Data types	22
7.2	XML Schema data types corresponding to EXPRESS data types	22
7.2.1	EXPRESS simple data types	23
7.2.2	Aggregation data types	30
7.2.3	Constructed data types	44
7.2.4	Defined data types	45
7.2.5	ENTITY data types	45
7.3	XML Schema definitions and declarations for EXPRESS defined data types	45
7.3.1	Simple underlying types	46
7.3.2	Aggregate underlying types	47
7.3.3	ENUMERATION underlying types	48
7.3.4	SELECT underlying types	49
7.3.5	Defined data type underlying type	53
7.4	Instance elements corresponding to EXPRESS data types	54
7.4.1	Instance elements for simple data types	55
7.4.2	Instance elements for anonymous aggregation data types	59
7.4.3	Instance elements for defined data types	62
7.4.4	Instance elements for entity data types	63
7.4.5	Instance element attributes	63
7.4.6	Referenceable instances	64
7.5	XML Schema definitions and declarations for EXPRESS entity data types	64
7.5.1	Type graph associated with the EXPRESS entity data type	65
7.5.2	Complex entity instances	66
7.5.3	Base XML data types and elements for EXPRESS entity data types	66
7.5.4	XML data type definitions for entity data types	69
7.5.5	Instance elements corresponding to entity data types	71
7.5.6	XML groups corresponding to entity data types	72
7.5.7	Single entity value elements corresponding to entity data types	75
7.5.8	Proxy elements corresponding to entity data types	77
7.5.9	XML Uniqueness constraints for entity data types	78
7.6	XML Schema declarations for EXPRESS attributes	79
7.6.1	Accessor element and attribute naming	79
7.6.2	EXPRESS attributes mapped to XML schema	80
7.6.3	Accessor elements	81
7.7	XML Schema and namespaces for EXPRESS Schema	86
7.7.1	Namespace prefixes	86
7.7.2	URI for the target namespace of the derived XML schema	87
7.7.3	Namespace declarations for the derived XML schema	88
7.7.4	Import declarations for the derived XML schema	88
7.8	Context-schema specific unit of serialization	89
8	Configured XML Schema Binding	91
8.1	Naming conventions	91
8.1.1	Schema	91
8.1.2	EXPRESS identifiers	91
8.1.3	Data types	91
8.2	XML Schema data types corresponding to EXPRESS data types	92
8.2.1	EXPRESS simple data types	92
8.2.2	Aggregation data types	97
8.2.3	Constructed data types	108
8.2.4	Defined data types	108

8.2.5	ENTITY data types.....	108
8.3	XML Schema definitions and declarations for EXPRESS defined data types	108
8.3.1	Simple underlying types	109
8.3.2	Aggregate underlying types.....	111
8.3.3	ENUMERATION underlying types	112
8.3.4	SELECT underlying types.....	112
8.3.5	Defined data type underlying type.....	115
8.3.6	Defined data types mapped by map configuration directive.....	116
8.4	Instance elements corresponding to EXPRESS data types	116
8.4.1	Instance elements for simple data types.....	117
8.4.2	Instance elements for anonymous aggregation data types	120
8.4.3	Instance elements for defined data types	124
8.4.4	Instance elements for entity data types	124
8.4.5	Instance element attributes.....	124
8.4.6	XML identity-constraints for instance elements.....	125
8.4.7	Referenceable instances	128
8.5	XML Schema definitions and declarations for EXPRESS entity data types	129
8.5.1	Type graph associated with the EXPRESS entity data type	131
8.5.2	Complex entity instances.....	131
8.5.3	Base XML data types and elements for EXPRESS entity data types.....	132
8.5.4	XML data type definitions for entity data types	134
8.5.5	Instance elements corresponding to entity data types.....	146
8.5.6	XML groups corresponding to entity data types.....	147
8.5.7	Single entity value elements corresponding to entity data types	149
8.5.8	Proxy elements corresponding to entity data types.....	150
8.5.9	XML Identity constraints corresponding to entity data types.....	151
8.5.10	XML Uniqueness constraints for entity data types.....	154
8.5.11	Dynamic subtype elements corresponding to entity data types	155
8.6	XML Schema declarations for EXPRESS attributes	156
8.6.1	Accessor element and attribute naming	157
8.6.2	EXPRESS attributes mapped to XML schema.....	157
8.6.3	Accessor attributes.....	159
8.6.4	Accessor elements	163
8.6.5	Type-tagged attributes	170
8.6.6	No-tag attributes	173
8.7	XML Schema and namespaces for EXPRESS Schema.....	174
8.7.1	Namespace prefixes.....	175
8.7.2	URI for the target namespace of the derived XML schema	175
8.7.3	Namespace declarations for the derived XML schema	175
8.7.4	Import declarations for the derived XML schema.....	175
8.8	Context-schema specific unit of serialization	176
9	XML document creation.....	177
9.1	Preconditions.....	177
9.2	General XML document structure	177
9.2.1	Structure of an iso-10303-28 document.....	178
9.2.2	Structure of a uos document	178
9.2.3	Encoding of EXPRESS schemas	179
9.2.4	Encoding of configuration files	179
9.2.5	Encoding of population definitions.....	180
9.2.6	Encoding of data sets – the unit of serialization	180
9.3	Representation of EXPRESS entity instances.....	183
9.3.1	By-value representation of entity instances	184
9.3.2	External representation of EXPRESS entity instances	187
9.3.3	By-reference representation of EXPRESS entity instances.....	189

9.3.4	Complex entity representation of EXPRESS entity instances	190
9.4	Representation of an EXPRESS attribute	192
9.4.1	Determining by-reference or by-value representation	192
9.4.2	Representation of EXPRESS attribute value as accessor attribute	193
9.4.3	Attribute-tag representation of EXPRESS attribute value	194
9.4.4	Double-tag representation of EXPRESS attribute value	196
9.4.5	Type tag representation of EXPRESS attribute value	197
9.4.6	No-tag representation of entity instance as EXPRESS attribute value	198
9.4.7	No-tag-simple representation of entity instance as EXPRESS attribute value	198
9.5	Representation of simple values	198
9.5.1	Representation of BINARY values	199
9.5.2	Representation of BOOLEAN values	199
9.5.3	Representation of INTEGER values	199
9.5.4	Representation of LOGICAL values	200
9.5.5	Representation of NUMBER values	201
9.5.6	Representation of REAL values	201
9.5.7	Representation of STRING values	202
9.6	Representation of enumeration items	203
9.7	Representation of values of SELECT types	204
9.8	Representation of aggregate values	206
9.8.1	List-of-values representation of aggregate values	207
9.8.2	Sequence-of-elements representation of aggregate values	209
9.8.3	Indexed representation of aggregate values	210
9.8.4	List-of-references representation of aggregate values	211
9.8.5	Aggregates of aggregate values	212
9.8.6	Aggregates of values of defined data types	219
9.8.7	Instance elements for component values	219
9.9	Representation of values of defined data types	220
9.10	Representation of values in instance elements	221
9.10.1	By-value instance elements for non-entity data types	222
9.10.2	By-reference instance elements for non-entity data types	223
10	Configuration Language	223
10.1	The configuration element	225
10.1.1	By-reference representation of a configuration file	226
10.1.2	By-value representation of a configuration file	226
10.2	Configuration options	226
10.2.1	name	227
10.2.2	exp-type	227
10.2.3	content	227
10.2.4	aggregate-content	228
10.2.5	exp-attribute	228
10.2.6	entity-attribute	229
10.2.7	concrete-attribute	229
10.2.8	tagless	229
10.2.9	flatten	230
10.2.10	use-id	230
10.2.11	keep	231
10.2.12	keep-all	231
10.2.13	map	232
10.2.14	naming-convention	234
10.2.15	inheritance	234
10.2.16	notation	234
10.2.17	tag-source and tag-value	234
10.2.18	namespace	235

10.2.19	ref.....	236
10.2.20	use.....	236
10.2.21	implementation.....	236
10.2.22	facet.....	237
10.2.23	generate-keys.....	237
10.2.24	embed-schema-items.....	238
10.2.25	alias and prefix.....	238
10.2.26	select.....	238
10.3	Scoping elements.....	239
10.3.1	Option element.....	240
10.3.2	Type element.....	240
10.3.3	Entity element.....	241
10.3.4	Attribute element.....	246
10.3.5	Inverse element.....	248
10.3.6	Aggregate element.....	250
10.3.7	Schema element.....	251
10.3.8	UosElement element.....	255
10.3.9	UosEntity element.....	255
10.3.10	RootEntity element.....	255
10.4	Configuration attributes.....	256
10.5	Applicability of configuration directives.....	257
10.5.1	exp-attribute.....	257
10.5.2	content and use-id.....	259
10.5.3	exp-type.....	260
10.5.4	map.....	260
10.5.5	tagless.....	261
10.5.6	flatten.....	261
10.5.7	inheritance.....	262
10.5.8	notation.....	262
10.5.9	keep.....	262
10.5.10	ref.....	262
10.5.11	use.....	262
10.5.12	implementation.....	263
10.5.13	facet.....	263
Annex A (normative) Universal Resource Names for bindings of EXPRESS schemas.....		264
Annex B (normative) XML Schema for the configuration language.....		265
Annex C (normative) Base XML Schema.....		272
Annex D (normative) Document Schema.....		280
Annex E (normative) Valid populations of EXPRESS entity instances.....		291
Annex F (normative) Information object registration.....		302
Annex G (informative) Configuration language examples.....		303
Bibliography.....		307
Index.....		308

Figures

Figure 1 -	Choice group.....	73
Figure 2 -	Choice group for inheritance mapping	148

Tables

Table 1	— Namespace prefixes.....	8
Table 2	— Subclause governing aggregation data type correspondence	30
Table 3	— Subclause governing aggregation data type correspondence	99
Table 4	— Instance elements for <code>STRING</code> data types mapped to XML data types.....	120
Table 5	— XML key names for anonymous <code>EXPRESS</code> data types.....	127
Table 6	— Representation of <code>EXPRESS</code> characters invalid in XML <code>normalizedString</code>	203
Table 7	— Subclause governing XML representation of aggregate value	207
Table 8	— Subclause governing XML representation of aggregates of aggregate values .	213
Table 9	— Pattern strings for select	239