3.7 Taxonomy

ECO712

The taxonomy section contains general information about entities and their classification into categories. The categories, the entities comprising them, and referencing guidelines follow. The term "reference" means "point to" (See Section 2.2.2.4) and may occur from the Directory Entry or Parameter Data sections.

Because this taxonomy was derived from the Specification rather than being defined before the Specification was developed, some entity relationships include exceptions to the general concepts of their category. Exceptions are identified by bracketed comments after the entity description.

NOTE: In case of any questions concerning entity definitions or relationships, refer to Chapter 4.

3.7.1 Special Purpose The Special Purpose category includes only the Null Entity. Null Entities primarily exist to simplify manual file editing; an undesired entity can effectively be deleted by changing its type to zero. Section 4.2 explains how to use the Null Entity properly. Although Null Entities may appear in place of entities in any other category, using them for part of the entities in multi-entity constructs (*e.g.,* Multi-Entity Curve or Definition categories) can cause postprocessing difficulties in some implementations.

Table 5. Special Purpose Category

Entity Type Number	Form	Entity Type
0	0	Null entity

3.7.2 Curve The Curve category includes basic geometry except points. Entities in the Curve category may be independent or may be referenced by Definition, Multi-Entity Curve, or Quasi-topological Curve categories.

Table 6. Curve Category

Entity Type Number	Form	Entity Type
100	0	Circular arc
104	0	Conic arc - general form [deprecated]
104	1	Conic arc - ellipse
104	2	Conic arc - hyperbola
104	3	Conic arc - parabola
106	11	Copious data - Piecewise planar, linear string (2D linear path)
106	12	Copious data - Piecewise linear string (3D linear path)
106	13	Copious data - Piecewise linear string (sextuples)
106	63	Simple closed planar curve
110	0	Line
110	1	Line, semi-bounded
110	2	Line, unbounded
112	0	Parametric spline curve
126	0	Rational B-spline curve
126	1	Rational B-spline curve - Line
126	2	Rational B-spline curve - Circular arc
126	3	Rational B-spline curve - Elliptical arc
126	4	Rational B-spline curve - Parabolic arc
126	5	Rational B-spline curve - Hyperbolic arc

3.7.3 Multi-Entity Curve The Multi-Entity Curve category includes entities that organize connected Curve entities. Entities in the Multi-Entity Curve category may be independent or may be referenced by Definition and Quasi-Topological Curve categories.

Table 7. Multi-Entity Curve Category

Entity Type Number	Form	Entity Type
102	0	Composite curve

3.7.4 Point The Point category includes entities which specify one or more XYZ coordinate locations. Entities in the Point category may be independent or may be referenced by entities in the Definition or Connect categories.

Table 8. Point Category

Entity Type Number	Form	Entity Type
106	1	Copious data - coordinate pairs
106	2	Copious data - coordinate triples
106	3	Copious data - coordinate sextuples
116	0	Point

3.7.5 Annotation The Annotation category includes entities which specify dimensioning characteristics, values, and text. Annotation primarily exists for human interpretation, but some software may also use the information. Entities in the Annotation category may be independent or may be referenced by the Definition category. Entity types 212 and 213 may be referenced by the Property category.

Table 9. Annotation Category

Entity Type Number	Form	Entity Type
106	20	Centerline
106	21	Centerline through circle centers
106	31	Section lines - General use, iron, brick, stone masonry
106	32	Section lines - Steel
106	33	Section lines - Bronze, brass, copper
106	34	Section lines - Plastic, rubber
106	35	Section lines - fire brick, refractory material
106	36	Section lines - Marble, slate, glass
106	37	Section lines - Lead, zinc, magnesium, insulation
106	38	Section lines - Aluminum
106	40	Witness line
(continued)		

Table 3.7.5 Annotation Category (continued)

Entity Type Number	Form	Entity Type
202	0	Angular dimension
204	0	Curve Dimension
206	0	Diameter dimension
208	0	Flag note
210	0	General label
212	0	General note
212	1	General note - dual-stack dimension
212	2	General note - imbedded font change dimension
212	3	General note - superscripted dimension
212	4	General note - subscripted dimension
212	5	General note - superscripted/subscripted dimension
212	6	General note - multiple stack - left justified
212	7	General note - multiple stack - center justified
212	8	General note - multiple stack - right justified
212	100	General note - simple fractional dimension
212	101	General note - dual stack fractional dimension
212	102	General note - imbedded font change/double fractional dimension
212	105	General note - super-/sub-scripted fractional dimension
213	0	New General note
214	1	Leader arrow - Wedge
214	2	Leader arrow - Triangle
214	3	Leader arrow - Filled triangle
214	4	Leader arrow - No arrowhead
214	5	Leader arrow - Circle
214	6	Leader arrow - Filled circle
214	7	Leader arrow - Rectangle
214	8	Leader arrow - Filled rectangle
214	9	Leader arrow - Slash
214	10	Leader arrow - Integral sign
214	11	Leader arrow - Open triangle
214	12	Leader arrow - Dimension origin
216	0	Linear dimension
216	1	Linear dimension (Diameter)
216	2	Linear dimension (Radius)
218	0	Ordinate dimension
218	1	Ordinate dimension with datum
220	0	Point dimension
222	0	Radius dimension
222	1	Radius dimension/multiple leader
228	0	General symbol
228	1	Datum feature symbol
228	2	Datum target symbol
228	3	Feature control frame
230	0	Sectioned area (Standard Crosshatching)
230	1	Sectioned area (Inverted Crosshatching)

3.7.6 Surface The Surface category includes entities that define flat or sculptured faces of an object. Some Surfaces define the absence of material. Entities in the Surface category may be independent or may be referenced by entities in the Definition category or by Entity Type 510.

Table 10. Surface Category

Entity Type Number	Form	Entity Type
108	-1	Planar hole [deprecated]
108	0	Plane, Unbounded
108	1	Plane, Bounded
114	0	Parametric spline surface
118	0	Ruled surface (Equal relative arc length)
118	1	Ruled surface (Equal relative parametric values)
120	0	Surface of Revolution
122	0	Tabulated cylinder
123	0	Direction
128	0	Rational B-spline surface
128	1	Rational B-spline surface - Plane
128	2	Rational B-spline surface - Right circular cylinder
128	3	Rational B-spline surface - Cone
128	4	Rational B-spline surface - Sphere
128	5	Rational B-spline surface - Torus
128	6	Rational B-spline surface - Surface of Revolution
128	7	Rational B-spline surface - Tabulated cylinder
128	8	Rational B-spline surface - Ruled surface
128	9	Rational B-spline surface - General quadric surface

3.7.7 Positioning The Positioning category includes entities that locate other entities. Positioning entities may be referenced by all entity categories except Property and B-REP Collector.

Table 11. Positioning Category

Entity Type Number	Form	Entity Type
124	0	Transformation matrix
124	1	Orthonormal mirror
124	10	Cartesian coordinate system [FEM usage only]
124	11	Cylindrical coordinate system [FEM usage only]
124	12	Spherical coordinate system [FEM usage only]

3.7.8 Electrical The Electrical category includes entities that specify aspects of Layered Electrical Products and schematics. Entities in the Electrical category may be referenced by Definition category.

Table 12. Electrical Category

Entity Type Number	Form	Entity Type
125	0	Flash - defined by attached entity
125	1	Flash - circular
125	2	Flash - rectangular
125	3	Flash - donut
125	4	Flash - canoe
320	0	Network subfigure definition [referenced by Type 420]
420	0	Network subfigure instance

3.7.9 Relative The Relative category includes entities that create another entity at a specified offset distance from an existing entity. Entities in the Relative category may be independent or referenced by entities in the Definition category.

Table 13. Relative Category

Entity Type Number	Form	Entity Type
130	0	Offset curve [may reference Curve or Multi-Entity Curve categories]
140	0	Offset surface [may reference Surface category]

3.7.10 Finite Element Modeling (FEM) Entities in the FEM category are used for analyzing a geometric model for stress, *etc*, as an alternative to physical testing. Relationships among entities are complex; refer to specific entity types for more information.

Table 14. FEM Category

Entity Type Number	Form	Entity Type
132	0	Connect point
134	0	Node
136	0	Finite element
138	0	Nodal displacement and rotation
146	0	Nodal results
148	0	Element results
418	0	Load and constraint case data

3.7.11 Quasi-topological Curve The Quasi-topological Curve category includes entities which define the edges of surfaces. Entities in the Quasi-topological Curve category may be referenced by the Quasi-topological Surface category.

Table 15. Quasi-topological Curve Category

Entity Type Number	Form	Entity Type
141	0	Boundary [referenced by Type 143 only]
142	0	Curve on a parametric surface [referenced by type 144 only]

3.7.12 Quasi-topological Surface The Quasi-topological Surface category includes entities which define non-infinite surfaces. Entities in the Quasi-topological Surface category may be independent or may be referenced by Definition category.

Table 16. Quasi-topological Surface Category

Entity Type Number	Form	Entity Type
143	0	Bounded surface
144	0	Trimmed surface

3.7.13 Constructive Solid Geometry (CSG) The Constructive Solid Geometry category includes entities that specify solid objects by combination of basic shapes. Entities in the CSG category may be independent or may be referenced by other CSG entities (except self-referencing) or by entities in the Definition or B-REP Collector categories.

Table 17. CSG Category

Entity Type Number	Form	Entity Type
150	0	Block
152	0	Right angular wedge
154	0	Right circular cylinder
156	0	Right circular cone frustrum
158	0	Sphere
160	0	Torus
162	0	Solid of revolution - axis closed
162	1	Solid of revolution - self-closing
164	0	Solid of linear extrusion
168	0	Ellipsoid
180	0	Boolean tree
182	0	CSG Selected Component
184	0	Solid assembly
430	0	Solid instance

3.7.14 B-REP Solid The B-REP Solid defines a solid object in terms of shells, faces, edges, and vertices. Entities in the B-REP Solid category may be independent or may be refereced by entities in the Definition cagetory.

Table 18. B-REP Solid Category

Entity Type Number	Form	Entity Type
186	0	Manifold Solid B-Rep Object

3.7.15 B-REP Surface B-REP Surface entities assist in the definition of a B-REP solid object. Except for Entity Type 190, entities in the B-REP Surface category may not be independent and shall be referenced by Entity Type 510.

Table 19. B-REP Surface Category

Entity Type Number	Form	Entity Type
190	0	Plane surface - unparameterized
190	1	Plane surface - parameterized
192	0	Right circular cylinder surface - unparameterized
192	1	Right circular cylinder surface - parameterized
194	0	Right circular conical surface - unparameterized
194	1	Right circular conical surface - parameterized
196	0	Spherical surface - unparameterized
196	1	Spherical surface - parameterized
198	0	Toroidal surface - unparameterized
198	1	Toroidal surface - parameterized

3.7.16 B-REP Collector B-REP Collector entities assist in the definition of a B-REP solid object by organizing the topological relationships that comprise it. Entities in the B-REP Collector category may not be independent. Entity Type 514 shall be referenced by the B-REP Solid category.

Table 20. B-REP Collector Category

Entity Type Number	Form	Entity Type
502	1	Vertex Entity
504	1	Edge Entity [may only reference Vertex]
508	1	Loop Entity [may only reference Edge or Vertex]
510	1	Face Entity [may only reference Loop or a Class I, II, or III Surface]
514	1	Shell Entity [may only reference Face]

3.7.17 Definition Entities in the Definition category are used to specify particular characteristics of other entities. Entities in the Definition category may be independent or may be referenced by other Definition entities (except self referencing) or by entities in the Instantiation category. Entity Type 312 may be referenced by the Property category. Refer to specific entity definitions for permissible combinations.

Table 21. Definition Category

Entity Type Number	Form	Entity Type
302	1	Group definition - predefined
302	2	External logical reference file index definition - predefined
302	3	Views visible definition - predefined
302	4	Views visible, Color, Line weight definition - predefined
302	5	Entity label display definition - predefined
302	6	View list definition - predefined
302	7	Group without back-pointers definition - predefined
302	8	Signal string definition - predefined
302	9	Single parent definition - predefined
302	10	Text node definition - predefined
302	11	Connect node definition - predefined
302	12	External reference file index definition - predefined
302	13	Dimensioned geometry definition - predefined
302	14	Ordered group with backpointers definition - predefined
302	15	Ordered group without backpointers definition - predefined
302	16	Planar group definition - predefined
302	18	Flow definition - predefined
302	19	Segmented views visible definition - predefined
302	20	Piping flow definition - predefined
302	21	Dimensioned geometry definition - predefined
304	1	Line font definition - subfigure
304	2	Line font definition - repeating pattern
306	0	MACRO definition
308	0	Subfigure definition
310	0	Text font definition
312	0	Text template - absolute coordinates
312	1	Text template - relative coordinates
314	0	Color definition
316	0	Units data

3.7.18 Instantiation Instantiation entities create a specific instance of an entity in the Definition category. Entities in the Instantiation category may be independent or may be referenced by entities in the Definition category (except circular or self referencing). Refer to specific entity definitions for permissible combinations.

Table 22. Instantiation Category

Entity Type Number	Form	Entity Type
402	1	Group instance
402	2	External logical reference file index
402	3	Views visible instance
402	4	Views visible, Color, Line weight instance
402	5	Entity label display instance
402	6	View list instance
402	7	Group without back-pointers instance
402	8	Signal string instance
402	9	Single parent instance
402	10	Text node instance
402	11	Connect node instance
402	12	External reference file index
402	13	Dimensioned geometry instance
402	14	Ordered group with backpointers instance
402	15	Ordered group without backpointers instance
402	16	Planar group instance
402	17	Alternate representation instance
402	18	Flow instance
402	19	Segemented views visible
402	20	Piping flow
402	21	Dimensioned geometry
408	0	Single subfigure instance
412	0	Rectangular subfigure instance
414	0	Circular subfigure instance
416	0	External reference from library
416	1	External reference of entire library
416	2	External logical reference to file
416	3	External reference to a subfigure
416	4	External reference to a subfigure

3.7.19 Tabular Data Entities in the Tabular Data category organize data into tables.

Table 23. Tabular Data Category

Entity Type Number	Form	Entity Type
322	0	Attribute Table Definition - One-to-many (Definition only)
322	1	Attribute Table Definition - One-to-one
322	2	Attribute Table Definition - One-to-many with Text Template
422	0	Attribute table instance
422	1	Attribute table instance - table in row major order

3.7.20 Drawing The Drawing and View categories work together to provide a human-interpretable depiction of a two- or three-dimensional model. Entities in the Drawing category are independent and may not be referenced by any other category.

Table 24. Drawing Category

Entity Type Number	Form	Entity Type
404	0	Drawing
404	1	Drawing with rotated views

3.7.21 Property Each entity in the Property Category contains numeric or textual data to specify additional information about the entity or entities referencing it. Entities in the Property category may be referenced by other Property entities (except self or circular referencing), or by entities in any other category. Referencing by the Special Purpose category results in ignoring the reference. Refer to Section 4.98 for detailed information.

Table 25. Property Category

Entity Type Number	Form	Entity Type
406	1	Property - Definition levels
406	2	Property - Region restriction
406	3	Property - Level function
406	4	Property - Region fill
406	5	Property - Line widening
406	6	Property - Drilled hole
406	7	Property - Reference designator
406	8	Property - Pin number
406	9	Property - Part number
406	10	Property - Hierarchy
406	11	Property - Tabular data
406	12	Property - External reference file list
406	13	Property - Nominal size
406	14	Property - Line specification
406	15	Property - Name
406	16	Property - Drawing size
406	17	Property - Drawing units
406	18	Property - Intercharacter spacing
406	19	Property - Predefined line font patterns
406	20	Property - Highlight
406	21	Property - Pick
406	22	Property - Uniform rectangular grid
406	23	Property - Associativity Group Type
406	24	Property - Level to PWB Layer Map
406	25	Property - PWB Artwork Stackup
406	26	Property - PWB Drilled Hole
406	27	Property - Generic data
406	28	Property - Dimension units
406	29	Property - Dimension tolerance
406	30	Property - Dimension display data
406	31	Property - Basic dimension
406	32	Property - Drawing Sheet Approval
406	33	Property - Drawing Sheet ID
406	34	Property - Underscore
406	35	Property - Overscore
406	36	Property - Closure
406	37	Property - Signal Bus Width
406	38	Property - URL Anchor
406	39	Property - Planarity
406	40	Property - Continuity