
**Industrial automation systems and
integration — Product data representation
and exchange —**

**Part 307:
Abstract test suite: Sheet metal die
planning and design**

*Systèmes d'automatisation industrielle et intégration — Représentation et
échange de données de produits —*

*Partie 307: Suite d'essais abstraits: Conception et planification de matrices
de tôle*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 10303-307, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 184, **Industrial automation systems and integration**, Subcommittee SC 4, **Industrial data**.

There is an urgent need for guidance on how to test implementations of ISO 10303 application protocols for conformance to the standard. This Technical Report contains abstract test cases that can be used to test implementations for conformance to ISO 10303-207.

This document is being issued in the Technical Report (type 2) series of publications (according to subclause G.3.2.2 of part 1 of the ISO/IEC Directives 1995 as a "prospective standard for provisional application" in the field of conformance testing of ISO 10303 application protocols because there is an urgent need for guidance on how standards in this field should be used to meet an identified need.

This document is not to be regarded as an "International Standard". It is proposed for provisional application so that experience of its use in practice may be gathered. Comments on the content of this document should be sent to the ISO Central Secretariat.

A review of this Technical Report (type 2) will be carried out not later than three years after its publication with the options of: extension for another three years; conversion into an International Standard; or withdrawal.

ISO 10303 consists of the following parts under the general title Industrial automation systems and integration - Product data representation and exchange:

- Part 1, Overview and fundamental principles;
- Part 11, Description methods: The EXPRESS language reference manual;
- Part 12, Description method: The EXPRESS-I language reference manual;
- Part 21, Implementation methods: Clear text encoding of the exchange structure;
- Part 22, Implementation method: Standard data access interface specification;
- Part 23, Implementation method: C++ language binding to the standard data access interface;
- Part 24, Implementation method: C language binding to the standard data access interface;
- Part 26, Implementation method: Interface definition language binding to the standard data access;
- Part 31, Conformance testing methodology and framework: General concepts;
- Part 32, Conformance testing methodology and framework: Requirements on testing laboratories and clients;
- Part 33, Conformance testing methodology and framework: Structure and use of abstract test suites;
- Part 34, Conformance testing methodology and framework: Abstract test methods;
- Part 35, Conformance testing methodology and framework: Abstract test methods for SDAI implementations;
- Part 41, Integrated generic resources: Fundamentals of product description and support;
- Part 42, Integrated generic resources: Geometric and topological representation;
- Part 43, Integrated generic resources: Representation structures;
- Part 44, Integrated generic resources: Product structure configuration;
- Part 45, Integrated generic resource: Materials;
- Part 46, Integrated generic resources: Visual presentation;
- Part 47, Integrated generic resource: Shape variation tolerances;
- Part 49, Integrated generic resource: Process structure and properties;

- Part 101, Integrated application resource: Draughting;
- Part 104, Integrated application resource: Finite element analysis;
- Part 105, Integrated application resource: Kinematics;
- Part 106, Integrated application resource: Building construction core model;
- Part 201, Application protocol: Explicit draughting;
- Part 202, Application protocol: Associative draughting;
- Part 203, Application protocol: Configuration controlled design;
- Part 204, Application protocol: Mechanical design using boundary representation;
- Part 205, Application protocol: Mechanical design using surface representation;
- Part 207, Application protocol: Sheet metal die planning and design;
- Part 208, Application protocol: Life cycle management - Change process;
- Part 209, Application protocol: Composite and metallic structural analysis and related design;
- Part 210, Application protocol: Electronic assembly, interconnect, and packaging design;
- Part 212, Application protocol: Electrotechnical design and installation
- Part 213, Application protocol: Numerical control process plans for machined parts;
- Part 214, Application protocol: Core data for automotive design;
- Part 215, Application protocol: Ship arrangement;
- Part 216, Application protocol: Ship moulded forms;
- Part 217, Application protocol: Ship piping;
- Part 218, Application protocol: Ship structures;
- Part 220, Application protocol: Process planning, manufacture, and assembly of layered electronic products;
- Part 221, Application protocol: Functional data and their schematic representation for process plant;
- Part 222, Application protocol: Exchange of product data for composite structures;

- Part 223, Application protocol: Exchange of design and manufacturing product information for casting parts;
- Part 224, Application protocol: Mechanical product definition for process plans using machining features;
- Part 225, Application protocol: Building elements using explicit shape representation;
- Part 226, Application protocol: Ship mechanical systems;
- Part 227, Application protocol: Plant spatial configuration;
- Part 228, Application protocol: Building services: Heating, ventilation, and air conditioning;
- Part 229, Application protocol: Exchange of design and manufacturing product information for forged parts;
- Part 230, Application protocol: Building structural frame: Steelwork;
- Part 231, Application protocol: Process engineering data: Process design and process specification of major equipment;
- Part 232, Application protocol: Technical data packaging core information and exchange;
- Part 301, Abstract test suite: Explicit draughting;
- Part 302, Abstract test suite: Associative draughting;
- Part 303, Abstract test suite: Configuration controlled design;
- Part 304, Abstract test suite: Mechanical design using boundary representation;
- Part 305, Abstract test suite: Mechanical design using surface representation;
- Part 307, Abstract test suite: Sheet metal die planning and design;
- Part 308, Abstract test suite: Life cycle management - Change process;
- Part 309, Abstract test suite: Composite and metallic structural analysis and related design;
- Part 310, Abstract test suite: Electronic assembly, interconnect, and packaging design;
- Part 312, Abstract test suite: Electrotechnical design and installation;
- Part 313, Abstract test suite: Numerical control process plans for machined parts;
- Part 314, Abstract test suite: Core data for automotive mechanical design;
- Part 315, Abstract test suite: Ship arrangement;

- Part 316, Abstract test suite: Ship moulded forms;
- Part 317, Abstract test suite: Ship piping;
- Part 318, Abstract test suite: Ship structures;
- Part 320, Abstract test suite: Process planning, manufacture, and assembly of layered electronic products;
- Part 321, Abstract test suite: Functional data and their schematic representation for process plant;
- Part 322, Abstract test suite: Exchange of product data for composite structures;
- Part 323, Abstract test suite: Exchange of design and manufacturing product information for casting parts;
- Part 324, Abstract test suite: Mechanical product definition for process plans using machining features;
- Part 325, Abstract test suite: Building elements using explicit shape representation;
- Part 326, Abstract test suite: Ship mechanical systems;
- Part 327, Abstract test suite: Plant spatial configuration;
- Part 328, Abstract test suite: Building services: Heating, ventilation, and air conditioning;
- Part 329, Abstract test suite: Exchange of design and manufacturing product information for forged parts;
- Part 330, Abstract test suite: Building structural frame: Steelwork;
- Part 331, Abstract test suite: Process engineering data: Process design and process specification of major equipment;
- Part 332, Abstract test suite: Technical data packaging core information and exchange;
- Part 501, Application interpreted construct: Edge-based wireframe;
- Part 502, Application interpreted construct: Shell-based wireframe;
- Part 503, Application interpreted construct: Geometrically bounded 2D wireframe;
- Part 504, Application interpreted construct: Draughting annotation;
- Part 505, Application interpreted construct: Drawing structure and administration;
- Part 506, Application interpreted construct: Draughting elements;

- Part 507, Application interpreted construct: Geometrically bounded surface;
- Part 508, Application interpreted construct: Non-manifold surface;
- Part 509, Application interpreted construct: Manifold surface;
- Part 510, Application interpreted construct: Geometrically bounded wireframe;
- Part 511, Application interpreted construct: Topologically bounded surface;
- Part 512, Application interpreted construct: Faceted boundary representation;
- Part 513, Application interpreted construct: Elementary boundary representation;
- Part 514, Application interpreted construct: Advanced boundary representation;
- Part 515, Application interpreted construct: Constructive solid geometry;
- Part 517, Application interpreted construct: Mechanical design geometric presentation;
- Part 518, Application interpreted construct: Mechanical design shaded representation.

The structure of this International Standard is described in ISO 10303-1. The numbering of the parts of the International Standard reflects its structure:

- Parts 11 and 12 specify the description methods,
- Parts 21 to 26 specify the implementation methods,
- Parts 31 to 35 specify the conformance testing methodology and framework,
- Parts 41 to 49 specify the integrated generic resources,
- Parts 101 to 106 specify the integrated application resources,
- Parts 201 to 232 specify the application protocols,
- Parts 301 to 332 specify the abstract test suites, and
- Parts 501 to 518 specify the application interpreted constructs.

Should further parts be published, they will follow the same numbering pattern.

Annexes A, B and C form a normative part of ISO 10303. Annex D is for information only.

Introduction

ISO 10303 is an International Standard for the computer-interpretable representation and exchange of product data. The objective is to provide a neutral mechanism capable of describing product data throughout the life cycle of a product independent from any particular system. The nature of this description makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and archiving.

This International Standard is organized as a series of parts, each published separately. The parts of ISO 10303 fall into one of the following series: description methods, integrated resources, application interpreted constructs, application protocols, abstract test suites, implementation methods, and conformance testing. The series are described in ISO 10303-1. This part of ISO 10303 is a member of the abstract test suite series.

The purpose of an abstract test suite is to provide a basis for evaluating whether a particular implementation of an application protocol actually conforms to the requirements of that application protocol. A standard abstract test suite helps ensure that evaluations of conformance are conducted in a consistent manner by different test laboratories.

This part of ISO 10303 specifies the abstract test suite for ISO 10303-207, Application protocol: Sheet metal die planning and design. The abstract test cases presented here are the basis for conformance testing of implementations of ISO 10303-207.

This abstract test suite is made up of two major parts:

- the test purposes, the specific items to be covered by conformance testing;
- the set of abstract test cases that meet those test purposes.

The test purposes are statements of the application protocol requirements that are to be addressed by the abstract test cases. Test purposes are derived primarily from the application protocol's application elements and application interpreted model, as well as from other sources such as standards referenced by the application protocol and other requirements stated in the application protocol conformance requirements clause.

The abstract test cases address the test purposes by:

- specifying the requirements for input data to be used when testing an implementation of the application protocol;
- specifying the verdict criteria to be used when evaluating whether the implementation successfully converted the input data to a different form.

The abstract test cases set the requirements for the executable test cases that are required to actually conduct a conformance test. Executable test cases contain the scripts, detailed values, and other explicit information required to conduct a conformance test on a specific implementation of the application protocol.

At the time of publication of this document, conformance testing requirements had been established for implementations of application protocols in combination with ISO 10303-21 and ISO 10303-22. Accordingly, this part of ISO 10303 only specifies test purposes and abstract test cases appropriate to such implementations.

For ISO 10303-21, two kinds of implementations, preprocessors and postprocessors, must be tested. Both of these are addressed in this abstract test suite.

For ISO 10303-22, a class of applications that possesses the capability to upload and download application protocol-conforming to standard data access interface-models and/or schema instances to and from applications that implement the standard data access interface.

Industrial automation systems and integration — Product data representation and exchange — Part 307: Abstract test suite: Sheet metal die planning and design

1 Scope

This part of ISO 10303 specifies the abstract test suite to be used in the conformance testing of implementations of ISO 10303-207. The following are within the scope of this part of ISO 10303:

- the specification of the test purposes associated with ISO 10303-207;
- the verdict criteria to be applied during conformance testing of an implementation of ISO 10303-207 using ISO 10303-21;

NOTE - The verdict criteria are used to ascertain whether a test purpose has been satisfactorily met by an implementation under test (IUT) within the context of a given test case.

- the abstract test cases to be used as the basis for the executable test cases for conformance testing.

NOTE - This document provides test cases for conformance classes 1, 2, 4, 5, and 7. Testcases for conformance classes 3, 6, 8, 9, 10, 11, 12, 13, 14 are not provided in this document.

The following are outside the scope of this part of ISO 10303:

- the creation of executable test cases;
- testing other than conformance testing;
- other implementation methods.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 10303. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 10303 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 10303-1:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 1: Overview and fundamental principles.*

ISO 10303-11:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 11: Description methods: The EXPRESS language reference manual.*

ISO 10303-21:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 21: Implementation methods: Clear text encoding of the exchange structure.*

ISO 10303-22:1998, : *Industrial automation systems and integration - Product data representation and exchange - Part 22: Implementation methods: Standard Data Access Interface.*

ISO 10303-31:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 31: Conformance testing methodology and framework: General concepts .*

ISO/FDIS 10303-207, *Industrial automation systems and integration - Product data representation and exchange - Part 207: Application Protocol: Sheet metal die planning and design.*

3 Definitions and abbreviations

3.1 Terms defined in ISO 10303-1

This part of ISO 10303 makes use of the following terms defined in ISO 10303-1:

- abstract test suite (ATS);
- application interpreted model (AIM);
- application object;
- application protocol (AP);
- application reference model (ARM);
- conformance class (CC);
- implementation method.

3.2 Terms defined in ISO 10303-31

This part of ISO 10303 makes use of the following abbreviations defined in ISO 10303-31:

- abstract test case (ATC);
- conformance testing;
- executable test case;

- implementation under test (IUT);
- postprocessor;
- preprocessor;
- test purpose;
- verdict criteria.

3.3 Terms defined in ISO 10303-207

This part of ISO 10303 makes use of the following terms defined in ISO 10303-207:

- cam;
- die;
- die face;
- die set;
- die structure;
- feature;
- feature property;
- hard aid;
- in-process;
- mating die;
- part process plan;
- sheet metal;
- sheet metal part;
- stamping press.

3.4 Other definitions

For the purposes of this part of ISO 10303, the following definitions apply:

3.4.1 application element (AE): an application object, attribute, or assertion defining the information requirements in clause 4 of an AP.

3.4.2 domain test purpose: a type of test purpose that is based on general requirements of the application domain of the application protocol.

3.4.3 external reference test purpose: a type of test purpose that is based on an external standard referenced by the application protocol.

3.4.4 input specification: a description of the information to be used in preprocessor conformance testing to build the required model to satisfy the test purpose and verdict criteria.

3.5 Abbreviations

For the purposes of this part of ISO 10303, the following abbreviations apply:

ATC	Abstract Test Case
ATS	Abstract Test Suite
AE	Application Element
AIM	Application Interpreted Model
AP	Application Protocol
ARM	Application Reference Model
CC	Conformance Class
IUT	Implementation Under Test
SI	International System of Units
B-rep	Boundary representation
CSG	Constructive Solid Geometry

4 Test purposes

This clause specifies the test purposes for this part of ISO 10303. Test purposes in 4.1 and 4.2 are derived from the information requirements contained in clause 4 of ISO 10303-207 and the AIM EXPRESS schema in annex A of ISO 10303-207. Each test purpose statement identifies some specific element from the AEs or the AIM. Every test purpose statement implicitly requires that the identified element, as specified in the test purpose statement, will be correctly instantiated by the implementation under test.

4.1 Application element test purposes

AE test purposes are individually identified by the prefix “ae” in the test purpose number. Each test purpose derived from the information requirements shall be interpreted as given in the following

statement: the IUT shall preserve the semantic associated with the unique application element from which the test purpose was derived. This implies that the semantics of the application element are preserved by the IUT between the input and output of a test, according to the reference path specified in the mapping table of the AP. AE test purposes apply to the input specifications of both preprocessor and postprocessor test cases. AE test purposes are derived from the AP information requirements as follows:

- application objects (see 4.2 of ISO 10303-207). A test purpose derived from an application object is a simple statement of the object's name. Each application object test purpose is documented in a separate subclause.
- application objects with categorisations (subtypes) (see 4.2 of ISO 10303-207). Test purposes derived from application objects with categorisations are statements of the application object name as a specific subtype.
- application object attributes (see 4.2 of ISO 10303-207). Test purposes derived from application object attributes are statements of the application object name with a specific attribute name.
- application assertions (see 4.3 of ISO 10303-207). Test purposes derived from application assertions are statements describing the relationship between two application objects. Application assertion test purposes address the directions of relationships as well as the number (cardinality) of relationships.

Each application object test purpose is listed as a separate subclause, with its related application object attribute test purposes and assertion test purposes.

4.1.1 Angle_distance_dimension

ae1 Angle_distance_dimension
 ae2 Angle_distance_dimension with clockwise = EQUAL
 ae3 Angle_distance_dimension with clockwise = SMALL
 ae4 Angle_distance_dimension with clockwise = LARGE
 ae5 Angle_distance_dimension with orientation = EQUAL
 ae6 Angle_distance_dimension with orientation = SMALL
 ae7 Angle_distance_dimension with orientation = LARGE

4.1.2 Assembly_component_relationship

ae57 Assembly_component_relationship (6.18)
 ae58 Assembly_component_relationship with component_quantity (6.18)
 ae59 Assembly_component_relationship <substitutes for> zero Assembly_component_relationship (6.18)
 ae60 Assembly_component_relationship <substitutes for> one Assembly_component_relationship
 ae61 Assembly_component_relationship <substitutes for> many Assembly_component_relationship
 ae62 Assembly_component_relationship <has as the shape of the component in the assembly> zero Shape_definition (6.18)
 ae63 Assembly_component_relationship <has as the shape of the component in the assembly> one Shape_definition
 ae64 Assembly_component_relationship <has as the shape of the component in the assembly> many Shape_definition

ae65 Assembly_component_relationship <is substitute for> zero Assembly_component_relationship (6.18)

ae66 Assembly_component_relationship <is substitute for> one Assembly_component_relationship

ae67 Assembly_component_relationship <is substitute for> many Assembly_component_relationship

4.1.3 Change_order

ae117 Change_order (6.4)

ae118 Change_order with change_design_location (6.4)

ae119 Change_order with implementor (6.4)

ae120 Change_order <is based on> zero Work_item (6.4)

ae121 Change_order <is based on> one Work_item

ae122 Change_order <is based on> many Work_item

ae123 Change_order <is the subject of> zero Work_item (6.4)

ae124 Change_order <is the subject of> one Work_item

ae125 Change_order <is the subject of> many Work_item

4.1.4 Change_request

ae175 Change_request (6.2, 6.4)

ae176 Change_request with problem_change_description (6.2, 6.4)

ae177 Change_request with recommended_solution (6.2 6.4)

4.1.5 Coincidence_defaults

ae227 Coincidence_defaults (6.10, 6.11, 6.12)

ae228 Coincidence_defaults with position (6.10, 6.11, 6.12)

ae229 Coincidence_defaults with angle

ae230 Coincidence_defaults <provides default uncertainties for> zero Shape_definition (6.10, 6.11, 6.12)

ae231 Coincidence_defaults <provides default uncertainties for> one Shape_definition

ae232 Coincidence_defaults <provides default uncertainties for> many Shape_definition

4.1.6 Curve_distance_dimension

ae282 Curve_distance_dimension

4.1.7 Curve_length_size_dimension

ae332 Curve_length_size_dimension

4.1.8 Designed_item

ae382 Designed_item (6.5, 6.6, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.25)

ae383 Designed_item with creation_date_and_time (6.5, 6.6, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.25)

ae384 Designed_item with data_exchange_history (6.5, 6.6, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.25)

ae385 Designed_item with data_ownership (6.5, 6.6, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19,

6.25)

ae386 Designed_item with designer (6.5, 6.6, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.25)

ae387 Designed_item with generating_system_information (6.5, 6.6, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.25)

ae388 Designed_item with media_requirements (6.5, 6.6, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.25)

4.1.9 Diameter_size_dimension

ae438 Diameter_size_dimension

4.1.10 Die

ae488 Die (6.6, 6.7, 6.8, 6.9, 6.15, 6.18, 6.19, 6.21)

4.1.11 Die_definition

ae538 Die_definition (6.6, 6.7, 6.8, 6.9, 6.15, 6.18, 6.19, 6.21)

ae539 Die_definition with die_function_description (6.6, 6.7, 6.8, 6.9, 6.15, 6.18, 6.19, 6.21)

ae540 Die_definition with die_layout_specification_reference (6.6, 6.7, 6.8, 6.9, 6.15, 6.18, 6.19, 6.21)

ae541 Die_definition with die_structure_specification_reference (6.6, 6.7, 6.8, 6.9, 6.15, 6.18, 6.19, 6.21)

ae542 Die_definition with die_weight (6.6, 6.7, 6.8, 6.9, 6.15, 6.18, 6.19, 6.21)

ae543 Die_definition with pattern_casting_specification (6.6, 6.7, 6.8, 6.9, 6.18, 6.19, 6.21)

ae544 Die_definition <is constrained by> zero Die_definition_constraint (6.6, 6.7, 6.8, 6.9, 6.18, 6.19, 6.21)

ae545 Die_definition <is constrained by> one Die_definition_constraint (6.15)

ae546 Die_definition <is constrained by> many Die_definition_constraint

ae547 Die_definition <defines tool for> zero Process_operation (6.6, 6.7, 6.8, 6.9, 6.18, 6.19, 6.21)

ae548 Die_definition <defines tool for> one Process_operation

ae549 Die_definition <defines tool for> many Process_operation

4.1.12 Die_definition_constraint

ae599 Die_definition_constraint (6.15)

ae600 Die_definition_constraint with constraint_description (6.15)

ae601 Die_definition_constraint <constrains> zero Die_definition (6.15)

ae602 Die_definition_constraint <constrains> one Die_definition (6.15)

ae603 Die_definition_constraint <constrains> many Die_definition

4.1.13 Die_shape_definition

ae653 Die_shape_definition (6.8, 6.9)

ae654 Die_shape_definition <is called out by> zero Shape_tolerance

ae655 Die_shape_definition <is called out by> one Shape_tolerance

ae656 Die_shape_definition <is called out by> many Shape_tolerance

4.1.14 Dimension_tolerance_range

ae762 Dimension_tolerance_range
 ae763 Dimension_tolerance_range with tolerance_fitting_type
 ae764 Dimension_tolerance_range <has as upper limit> zero Tolerance_value
 ae765 Dimension_tolerance_range <has as upper limit> one Tolerance_value
 ae766 Dimension_tolerance_range <has as upper limit> many Tolerance_value
 ae767 Dimension_tolerance_range <has as lower limit> zero Tolerance_value
 ae768 Dimension_tolerance_range <has as lower limit> one Tolerance_value
 ae769 Dimension_tolerance_range <has as lower limit> many Tolerance_value
 ae770 Dimension_tolerance_range <describes permissible variation of> zero Dimensional_representation
 ae771 Dimension_tolerance_range <describes permissible variation of> one Dimensional_representation
 ae772 Dimension_tolerance_range <describes permissible variation of> many Dimensional_representation
 ae773 Dimension_tolerance_range <describes permissible variation of> zero Dimensional_representation
 ae774 Dimension_tolerance_range <describes permissible variation of> one Dimensional_representation
 ae775 Dimension_tolerance_range <describes permissible variation of> many Dimensional_representation

4.1.15 Dimensional_representation

ae706 Dimensional_representation (6.10)
 ae707 Dimensional_representation <may vary according to> zero Dimension_tolerance_range (6.10)
 ae708 Dimensional_representation <may vary according to> one Dimension_tolerance_range
 ae709 Dimensional_representation <may vary according to> many Dimension_tolerance_range
 ae710 Dimensional_representation <may vary according to> zero Dimension_tolerance_range (6.10)
 ae711 Dimensional_representation <may vary according to> one Dimension_tolerance_range
 ae712 Dimensional_representation <may vary according to> many Dimension_tolerance_range

4.1.16 Distance_dimension

ae825 Distance_dimension (6.10)

4.1.17 Envelope_relationship

ae875 Envelope_relationship

4.1.18 External_item_reference

ae925 External_item_reference (6.7, 6.10, 6.11, 6.12, 6.20)
 ae926 External_item_reference with manual_reference_description (6.7, 6.10, 6.11, 6.12, 6.20)
 ae927 External_item_reference with name (6.7, 6.10, 6.11, 6.12, 6.20)
 ae928 External_item_reference with needed_modifications (6.7, 6.10, 6.11, 6.12, 6.20)

4.1.19 External_order

ae978 External_order (6.4)
 ae979 External_order with contractual_requirement (6.4)
 ae980 External_order with purchase_order_number (6.4)
 ae981 External_order with purchasing_agent (6.4)

ae982 External_order with supplier_identification (6.4)
 ae983 External_order <role description> zero Start_order (6.4)
 ae984 External_order <role description> one Start_order
 ae985 External_order <role description> many Start_order

4.1.20 Feature

ae1035 Feature (6.10)
 ae1036 Feature with designer
 ae1037 Feature with feature_name (6.10)
 ae1038 Feature <possesses> zero Feature_property (6.10)
 ae1039 Feature <possesses> one Feature_property
 ae1040 Feature <possesses> many Feature_property
 ae1041 Feature <defines the shape of> zero Shape_definition
 ae1042 Feature <defines the shape of> one Shape_definition (6.10)
 ae1043 Feature <defines the shape of> many Shape_definition
 ae1044 Feature <is included in> zero Item_definition (6.10)
 ae1045 Feature <is included in> one Item_definition
 ae1046 Feature <is included in> many Item_definition

4.1.21 Feature_property

ae1096 Feature_property
 ae1097 Feature_property with property_description
 ae1098 Feature_property with property_type
 ae1099 Feature_property <is possessed by> zero Feature
 ae1100 Feature_property <is possessed by> one Feature
 ae1101 Feature_property <is possessed by> many Feature

4.1.22 Feature_shape_definition

ae1151 Feature_shape_definition
 ae1152 Feature_shape_definition <is called out by> zero Shape_tolerance
 ae1153 Feature_shape_definition <is called out by> one Shape_tolerance
 ae1154 Feature_shape_definition <is called out by> many Shape_tolerance

4.1.23 Final_part_definition

ae1204 Final_part_definition (6.5, 6.10, 6.11, 6.12, 6.16, 6.17, 6.20, 6.21, 6.25)
 ae1205 Final_part_definition <defines the part on> zero Part_on_product (6.5, 6.10, 6.11, 6.12, 6.16, 6.17, 6.20, 6.21)
 ae1206 Final_part_definition <defines the part on> one Part_on_product (6.25)
 ae1207 Final_part_definition <defines the part on> many Part_on_product
 ae1208 Final_part_definition <has manufacture defined by> zero Part_process_plan (6.5, 6.10, 6.11, 6.12, 6.16, 6.17, 6.20, 6.21, 6.25)
 ae1209 Final_part_definition <has manufacture defined by> one Part_process_plan
 ae1210 Final_part_definition <has manufacture defined by> many Part_process_plan

4.1.24 In_process_part_definition

ae1366 In_process_part_definition (6.10, 6.11, 6.12)

ae1367 In_process_part_definition <is operated upon by> zero Process_operation (6.10, 6.11, 6.12)

ae1368 In_process_part_definition <is operated upon by> one Process_operation

ae1369 In_process_part_definition <is operated upon by> many Process_operation

4.1.25 Input_item_die_relationship

ae1260 Input_item_die_relationship (6.21)

ae1261 Input_item_die_relationship <has input item position within the die described by> zero Shape_definition (6.21)

ae1262 Input_item_die_relationship <has input item position within the die described by> one Shape_definition

ae1263 Input_item_die_relationship <has input item position within the die described by> many Shape_definition

4.1.26 Internal_order

ae1313 Internal_order (6.3)

ae1314 Internal_order with authorized_hours (6.3)

ae1315 Internal_order with charge_number (6.3)

ae1316 Internal_order with source_department (6.3)

4.1.27 Item

ae1419 Item (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.25)

ae1420 Item with item_description (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.25)

ae1421 Item with item_name (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.25)

ae1422 Item with item_number (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.25)

ae1423 Item <is classified by> zero Item_classification (6.25)

ae1424 Item <is classified by> one Item_classification (6.15, 6.20, 6.21, 6.22)

ae1425 Item <is classified by> many Item_classification (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.20, 6.25)

ae1426 Item <is versioned by> zero Item_version (6.22)

ae1427 Item <is versioned by> one Item_version (6.15, 6.25)

ae1428 Item <is versioned by> many Item_version (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

4.1.28 Item_classification

ae1478 Item_classification (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.25)

ae1479 Item_classification with classification_description (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.25)

ae1480 Item_classification with classification_identification (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.25)

ae1481 Item_classification with classification_name (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.25)

ae1482 Item_classification <is primary in> zero Item_classification_relationship (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1483 Item_classification <is primary in> one Item_classification_relationship (6.22)

ae1484 Item_classification <is primary in> many Item_classification_relationship

ae1485 Item_classification <is secondary in> zero Item_classification_relationship (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1486 Item_classification <is secondary in> one Item_classification_relationship (6.22)

ae1487 Item_classification <is secondary in> many Item_classification_relationship

ae1488 Item_classification <classifies> zero Item

ae1489 Item_classification <classifies> one Item (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1490 Item_classification <classifies> many Item (6.16, 6.17, 6.18, 6.19, 6.22)

4.1.29 Item_classification_relationship

ae1540 Item_classification_relationship (6.22)

ae1541 Item_classification_relationship with relationship_description (6.22)

ae1542 Item_classification_relationship <has as primary> zero Item_classification

ae1543 Item_classification_relationship <has as primary> one Item_classification

ae1544 Item_classification_relationship <has as primary> many Item_classification (6.22)

ae1545 Item_classification_relationship <has as secondary> zero Item_classification

ae1546 Item_classification_relationship <has as secondary> one Item_classification

ae1547 Item_classification_relationship <has as secondary> many Item_classification (6.22)

4.1.30 Item_definition

ae1597 Item_definition (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1598 Item_definition with approval (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1599 Item_definition with approval_status (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1600 Item_definition with definition_description (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1601 Item_definition with procurement_information (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1602 Item_definition with proprietary_security_usage_information (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1603 Item_definition <includes> zero Feature

ae1604 Item_definition <includes> one Feature (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1605 Item_definition <includes> many Feature

ae1606 Item_definition <is first in> zero Item_definition_relationship

ae1607 Item_definition <is first in> one Item_definition_relationship (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)

ae1608 Item_definition <is first in> many Item_definition_relationship

ae1609 Item_definition <is second in> zero Item_definition_relationship

ae1610 Item_definition <is second in> one Item_definition_relationship (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1611 Item_definition <is second in> many Item_definition_relationship
 ae1612 Item_definition <has shape characterized by> zero Shape_definition
 ae1613 Item_definition <has shape characterized by> one Shape_definition (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1614 Item_definition <has shape characterized by> many Shape_definition
 ae1615 Item_definition <defines> zero Item_version
 ae1616 Item_definition <defines> one Item_version (6.5, 6.6, 6.7, 6.8, 6.9, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1617 Item_definition <defines> many Item_version

4.1.31 Item_definition_relationship

ae1667 Item_definition_relationship (6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21)
 ae1668 Item_definition_relationship with relationship_description (6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21)
 ae1669 Item_definition_relationship <has as first> zero Item_definition (6.10, 6.11, 6.12, 6.16, 6.17, 6.20, 6.21)
 ae1670 Item_definition_relationship <has as first> one Item_definition (6.18, 6.19)
 ae1671 Item_definition_relationship <has as first> many Item_definition
 ae1672 Item_definition_relationship <has as second> zero Item_definition (6.10, 6.11, 6.12, 6.16, 6.17, 6.20, 6.21)
 ae1673 Item_definition_relationship <has as second> one Item_definition (6.18, 6.19)
 ae1674 Item_definition_relationship <has as second> many Item_definition

4.1.32 Item_version

ae1724 Item_version (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1725 Item_version with approval (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1726 Item_version with approval_status (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1727 Item_version with description (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1728 Item_version with item_version_identification (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1729 Item_version with revision_date_and_time (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1730 Item_version <is defined by> zero Item_definition (6.10, 6.11, 6.12)
 ae1731 Item_version <is defined by> one Item_definition (6.5, 6.11, 6.12, 6.20, 6.25)
 ae1732 Item_version <is defined by> many Item_definition (6.6, 6.7, 6.8, 6.9, 6.10, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1733 Item_version <versions> zero Item
 ae1734 Item_version <versions> one Item (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.25)
 ae1735 Item_version <versions> many Item

4.1.33 Linear_distance_dimension

ae1785 Linear_distance_dimension (6.10)

4.1.34 Made_in_house

ae1835 Made_in_house (6.5, 6.6)

4.1.35 Make_similar_to_relationship

ae1885 Make_similar_to_relationship (6.16)

4.1.36 Marketable_assembly

ae1935 Marketable_assembly (6.25)

ae1936 Marketable_assembly with model_identification (6.25)

ae1937 Marketable_assembly with production_year (6.25)

ae1938 Marketable_assembly with style_identification (6.25)

ae1939 Marketable_assembly <is the product for> zero Part_on_product (6.25)

ae1940 Marketable_assembly <is the product for> one Part_on_product

ae1941 Marketable_assembly <is the product for> many Part_on_product

4.1.37 Material

ae1991 Material (6.20)

4.1.38 Material_definition

ae2041 Material_definition (6.20)

ae2042 Material_definition with material_description (6.20)

ae2043 Material_definition with material_specification (6.20)

ae2044 Material_definition <specifies material for> zero Part_definition (6.20)

ae2045 Material_definition <specifies material for> one Part_definition

ae2046 Material_definition <specifies material for> many Part_definition

4.1.39 Material_shape_definition

ae2096 Material_shape_definition

ae2097 Material_shape_definition <is called out by> zero Shape_tolerance

ae2098 Material_shape_definition <is called out by> one Shape_tolerance

ae2099 Material_shape_definition <is called out by> many Shape_tolerance

4.1.40 Mating_relationship

ae2149 Mating_relationship

ae2150 Mating_relationship <has on the shape of the interface> zero Shape_definition

ae2151 Mating_relationship <has on the shape of the interface> one Shape_definition

ae2152 Mating_relationship <has on the shape of the interface> many Shape_definition

4.1.41 Part

ae2202 Part (6.5, 6.10, 6.11, 6.12, 6.15, 6.17, 6.20, 6.21, 6.22, 6.25)

4.1.42 Part_definition

ae2252 Part_definition (6.5, 6.10, 6.11, 6.12, 6.16, 6.17, 6.20, 6.21, 6.25)

ae2253 Part_definition <has material specified by> zero Material_definition (6.5, 6.10, 6.11, 6.12, 6.16, 6.17, 6.20, 6.21, 6.25)

ae2254 Part_definition <has material specified by> one Material_definition

ae2255 Part_definition <has material specified by> many Material_definition

4.1.43 Part_on_product

ae2305 Part_on_product (6.25)

ae2306 Part_on_product <is located at> zero Part_on_product_location

ae2307 Part_on_product <is located at> one Part_on_product_location (6.25)

ae2308 Part_on_product <is located at> many Part_on_product_location

ae2309 Part_on_product <has> zero Production_effectivity

ae2310 Part_on_product <has> one Production_effectivity (6.25)

ae2311 Part_on_product <has> many Production_effectivity

ae2312 Part_on_product <is defined by> zero Final_part_definition

ae2313 Part_on_product <is defined by> one Final_part_definition (6.25)

ae2314 Part_on_product <is defined by> many Final_part_definition

ae2315 Part_on_product <has> zero Marketable_assembly (6.25)

ae2316 Part_on_product <has> one Marketable_assembly

ae2317 Part_on_product <has> many Marketable_assembly

4.1.44 Part_on_product_location

ae2367 Part_on_product_location (6.25)

ae2368 Part_on_product_location with intraproduct_location (6.25)

ae2369 Part_on_product_location <has> zero Part_on_product

ae2370 Part_on_product_location <has> one Part_on_product (6.25)

ae2371 Part_on_product_location <has> many Part_on_product

4.1.45 Part_process_plan

ae2421 Part_process_plan (6.13, 6.14, 6.15)

ae2422 Part_process_plan with approval (6.13, 6.14, 6.15)

ae2423 Part_process_plan with approval_status (6.13, 6.14, 6.15)

ae2424 Part_process_plan with creation_date_and_time (6.13, 6.14, 6.15)

ae2425 Part_process_plan with data_ownership (6.13, 6.14, 6.15)

ae2426 Part_process_plan with generating_system_information (6.13, 6.14, 6.15)

ae2427 Part_process_plan with part_process_version_identification (6.13, 6.14, 6.15)

ae2428 Part_process_plan with plan_status (6.13, 6.14, 6.15)

ae2429 Part_process_plan with planner (6.13, 6.14, 6.15)

ae2430 Part_process_plan with production_rate (6.13, 6.14)

ae2431 Part_process_plan with proprietary_security_usage_information (6.13, 6.14, 6.15)
 ae2432 Part_process_plan with review_date_and_time (6.13, 6.14, 6.15)
 ae2433 Part_process_plan with version_description (6.13, 6.15)
 ae2434 Part_process_plan <substitutes for> zero Part_process_plan (6.13, 6.14, 6.15)
 ae2435 Part_process_plan <substitutes for> one Part_process_plan
 ae2436 Part_process_plan <substitutes for> many Part_process_plan
 ae2437 Part_process_plan <is previous part_process_plan in> zero Part_process_plan_version_relationship (6.13, 6.14, 6.15)
 ae2438 Part_process_plan <is previous part process plan in> one Part_process_plan_version_relationship
 ae2439 Part_process_plan <is previous part process plan in> many Part_process_plan_version_relationship
 ae2440 Part_process_plan <is next part_process_plan in> zero Part_process_plan_version_relationship (6.13, 6.14, 6.15)
 ae2441 Part_process_plan <is next part_process_plan in> one Part_process_plan_version_relationship
 ae2442 Part_process_plan <is next part_process_plan in> many Part_process_plan_version_relationship
 ae2443 Part_process_plan <is constrained by> zero Plant_constraint (6.13, 6.14, 6.15)
 ae2444 Part_process_plan <is constrained by> one Plant_constraint
 ae2445 Part_process_plan <is constrained by> many Plant_constraint
 ae2446 Part_process_plan <defines a series of> zero Process_operation (6.13, 6.14, 6.15)
 ae2447 Part_process_plan <defines a series of> one Process_operation
 ae2448 Part_process_plan <defines a series of> many Process_operation
 ae2449 Part_process_plan <defines manufacture of> zero Final_part_definition (6.13, 6.14, 6.15)
 ae2450 Part_process_plan <defines manufacture of> one Final_part_definition
 ae2451 Part_process_plan <defines manufacture of> many Final_part_definition
 ae2452 Part_process_plan <is substitute for> zero Part_process_plan (6.13, 6.14, 6.15)
 ae2453 Part_process_plan <is substitute for> one Part_process_plan
 ae2454 Part_process_plan <is substitute for> many Part_process_plan
 ae2455 Part_process_plan <has as a template> zero Part_process_plan_template (6.13, 6.14, 6.15)
 ae2456 Part_process_plan <has as a template> one Part_process_plan_template
 ae2457 Part_process_plan <has as a template> many Part_process_plan_template

4.1.46 Part_process_plan_template

ae2507 Part_process_plan_template
 ae2508 Part_process_plan_template <is the template for> zero Part_process_plan
 ae2509 Part_process_plan_template <is the template for> one Part_process_plan
 ae2510 Part_process_plan_template <is the template for> many Part_process_plan

4.1.47 Part_process_plan_version_relationship

ae2560 Part_process_plan_version_relationship
 ae2561 Part_process_plan_version_relationship with revision_reason
 ae2562 Part_process_plan_version_relationship <has as previous part_process_plan> zero Part_process_plan
 ae2563 Part_process_plan_version_relationship <has as previous part_process_plan> one Part_process_plan
 ae2564 Part_process_plan_version_relationship <has as previous part_process_plan> many Part_process_plan

ae2565 Part_process_plan_version_relationship <has as next part_process_plan> zero Part_process_plan
 ae2566 Part_process_plan_version_relationship <has as next part_process_plan> one Part_process_plan
 ae2567 Part_process_plan_version_relationship <has as next part_process_plan> many Part_process_plan

4.1.48 Part_shape_definition

ae2617 Part_shape_definition
 ae2618 Part_shape_definition <is called out by> zero Shape_tolerance
 ae2619 Part_shape_definition <is called out by> one Shape_tolerance
 ae2620 Part_shape_definition <is called out by> many Shape_tolerance

4.1.49 Physical_representation

ae2670 Physical_representation
 ae2671 Physical_representation with hard_aid_description
 ae2672 Physical_representation with hard_aid_identification
 ae2673 Physical_representation with hard_aid_type

4.1.50 Plant_constraint

ae2723 Plant_constraint (6.15)
 ae2724 Plant_constraint with constraint_description (6.15)
 ae2725 Plant_constraint with constraint_type (6.15)
 ae2726 Plant_constraint with constraint_value (6.15)
 ae2727 Plant_constraint with plant_identification (6.15)
 ae2728 Plant_constraint <constrains> zero Part_process_plan (6.15)
 ae2729 Plant_constraint <constrains> one Part_process_plan
 ae2730 Plant_constraint <constrains> many Part_process_plan

4.1.51 Position_orientation_representation

ae2780 Position_orientation_representation (6.4, 6.8, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.23)

4.1.52 Press_definition

ae2830 Press_definition (6.15)
 ae2831 Press_definition with automation_equipment (6.15)
 ae2832 Press_definition with press_forces (6.15)
 ae2833 Press_definition with press_identification (6.15)
 ae2834 Press_definition with press_line (6.15)
 ae2835 Press_definition with press_location (6.15)
 ae2836 Press_definition with press_size (6.15)
 ae2837 Press_definition with press_specification_reference (6.15)
 ae2838 Press_definition with press_type 96.15)
 ae2839 Press_definition <is alternate for> zero Press_definition
 ae2840 Press_definition <is alternate for> one Press_definition (6.15)
 ae2841 Press_definition <is alternate for> many Press_definition

ae2842 Press_definition <defines a press used for> zero Process_operation
 ae2843 Press_definition <defines a press used for> one Process_operation (6.15)
 ae2844 Press_definition <defines a press used for> many Process_operation
 ae2845 Press_definition <serves alternate for> zero Press_definition
 ae2846 Press_definition <serves alternate for> one Press_definition (6.15)
 ae2847 Press_definition <serves alternate for> many Press_definition

4.1.53 Process_operation

ae2897 Process_operation (6.13, 6.15)
 ae2898 Process_operation with operation_description (6.13, 6.15)
 ae2899 Process_operation with operation_sequence_number (6.13, 6.15)
 ae2900 Process_operation with reference_specifications (6.13, 6.15)
 ae2901 Process_operation with required_shut_height (6.13, 6.15)
 ae2902 Process_operation with required_stamping_forces (6.13, 6.15)
 ae2903 Process_operation with scrap_percentage (6.13, 6.15)
 ae2904 Process_operation with units_per_operation (6.13, 6.15)
 ae2905 Process_operation <is alternate for> zero Process_operation (6.13, 6.15)
 ae2906 Process_operation <is alternate for> one Process_operation
 ae2907 Process_operation <is alternate for> many Process_operation
 ae2908 Process_operation <uses> zero Scrap_definition (6.13, 6.15)
 ae2909 Process_operation <uses> one Scrap_definition
 ae2910 Process_operation <uses> many Scrap_definition
 ae2911 Process_operation <produces> zero Scrap_definition (6.13, 6.15)
 ae2912 Process_operation <produces> one Scrap_definition
 ae2913 Process_operation <produces> many Scrap_definition
 ae2914 Process_operation <requires as tool(s) the die defined by> zero Die_definition (6.13, 6.15)
 ae2915 Process_operation <requires as tool(s) the die defined by> one Die_definition
 ae2916 Process_operation <requires as tool(s) the die defined by> many Die_definition
 ae2917 Process_operation <operates upon> zero In_process_part_definition (6.13, 6.15)
 ae2918 Process_operation <operates upon> one In_process_part_definition
 ae2919 Process_operation <operates upon> many In_process_part_definition
 ae2920 Process_operation <is defined by> zero Part_process_plan (6.13, 6.15)
 ae2921 Process_operation <is defined by> one Part_process_plan
 ae2922 Process_operation <is defined by> many Part_process_plan
 ae2923 Process_operation <uses> zero Press_definition (6.13, 6.15)
 ae2924 Process_operation <uses> one Press_definition
 ae2925 Process_operation <uses> many Press_definition
 ae2926 Process_operation <serves alternately fo> zero Process_operation (6.13, 6.14, 6.15)
 ae2927 Process_operation <serves alternately for> one Process_operation
 ae2928 Process_operation <serves alternately for> many Process_operation

4.1.54 Production_effectivity

ae2978 Production_effectivity (6.25)
 ae2979 Production_effectivity with date_and_time_effectivity (6.25)
 ae2980 Production_effectivity with effectivity_identification (6.25)
 ae2981 Production_effectivity with sequence_effectivity (6.25)
 ae2982 Production_effectivity <applies to> zero Part_on_product

ae2983 Production_effectivity <applies to> one Part_on_product (6.25)

ae2984 Production_effectivity <applies to> many Part_on_product

4.1.55 Purchased

ae3034 Purchased (6.7, 6.8, 6.9)

ae3035 Purchased with purchase_requirements (6.7, 6.8, 6.9)

4.1.56 Radius_size_dimension

ae3085 Radius_size_dimension

4.1.57 Representation_element

ae3135 Representation_element (6.8, 6.9, 6.10, 6.11, 6.12)

ae3136 Representation_element <represents> zero Shape_definition (6.8, 6.9, 6.10, 6.11, 6.12)

ae3137 Representation_element <represents> one Shape_definition (6.10)

ae3138 Representation_element <represents> many Shape_definition

4.1.58 Scrap_definition

ae3188 Scrap_definition

ae3189 Scrap_definition <is used by> zero Process_operation

ae3190 Scrap_definition <is used by> one Process_operation

ae3191 Scrap_definition <is used by> many Process_operation

ae3192 Scrap_definition <is produced by> zero Process_operation

ae3193 Scrap_definition <is produced by> one Process_operation

ae3194 Scrap_definition <is produced by> many Process_operation

4.1.59 Shape_definition

ae3244 Shape_definition (6.8, 6.9, 6.10, 6.11, 6.12)

ae3245 Shape_definition with shape_description (6.8, 6.9, 6.10, 6.11, 6.12)

ae3246 Shape_definition <is primary in> zero Shape_definition_relationship (6.8, 6.9, 6.11, 6.12)

ae3247 Shape_definition <is primary in> one Shape_definition_relationship (6.10)

ae3248 Shape_definition <is primary in> many Shape_definition_relationship

ae3249 Shape_definition <is secondary in> zero Shape_definition_relationship (6.8, 6.9, 6.11, 6.12)

ae3250 Shape_definition <is secondary in> one Shape_definition_relationship (6.10)

ae3251 Shape_definition <is secondary in> many Shape_definition_relationship

ae3252 Shape_definition <defines the shape of> zero Feature (6.8, 6.9, 6.10, 6.11, 6.12)

ae3253 Shape_definition <defines the shape of> one Feature (6.10)

ae3254 Shape_definition <defines the shape of> many Feature

ae3255 Shape_definition <characterizes shape of> zero Item_definition (6.8, 6.9, 6.10, 6.11, 6.12)

ae3256 Shape_definition <characterizes shape of> one Item_definition

ae3257 Shape_definition <characterizes shape of> many Item_definition

ae3258 Shape_definition <defines the shape of> zero Assembly_component_relationship (6.8, 6.9, 6.10, 6.11, 6.12)

ae3259 Shape_definition <defines the shape of> one Assembly_component_relationship

ae3260 Shape_definition <defines the shape of> many Assembly_component_relationship
 ae3261 Shape_definition <defines the shape of> zero Input_item_die_relationship (6.8, 6.9, 6.10, 6.11, 6.12)
 ae3262 Shape_definition <defines the shape of> one Input_item_die_relationship
 ae3263 Shape_definition <defines the shape of> many Input_item_die_relationship
 ae3264 Shape_definition <defines the shape of> zero Mating_relationship (6.8, 6.9, 6.10, 6.11, 6.12)
 ae3265 Shape_definition <defines the shape of> one Mating_relationship
 ae3266 Shape_definition <defines the shape of> many Mating_relationship
 ae3267 Shape_definition <is represented by> zero Representation_element (6.8, 6.9, 6.10, 6.11, 6.12)
 ae3268 Shape_definition <is represented by> one Representation_element (6.10)
 ae3269 Shape_definition <is represented by> many Representation_element
 ae3270 Shape_definition <has as default uncertainty> zero Coincidence_defaults (6.8, 6.9, 6.10, 6.11, 6.12)
 ae3271 Shape_definition <has as default uncertainty> one Coincidence_defaults
 ae3272 Shape_definition <has as default uncertainty> many Coincidence_defaults

4.1.60 Shape_definition_relationship

ae3322 Shape_definition_relationship (6.10)
 ae3323 Shape_definition_relationship with relationship_description (6.10)
 ae3324 Shape_definition_relationship <has as primary> zero Shape_definition
 ae3325 Shape_definition_relationship <has as primary> one Shape_definition
 ae3326 Shape_definition_relationship <has as primary> many Shape_definition (6.10)
 ae3327 Shape_definition_relationship <has as secondary> zero Shape_definition
 ae3328 Shape_definition_relationship <has as secondary> one Shape_definition
 ae3329 Shape_definition_relationship <has as secondary> many Shape_definition (6.10)

4.1.61 Shape_tolerance

ae3379 Shape_tolerance
 ae3380 Shape_tolerance with tolerance_condition = REGARDLESS_OF_FEATURE_SIZE
 ae3381 Shape_tolerance with tolerance_condition = MAXIMUM_MATERIAL_CONDITION
 ae3382 Shape_tolerance with tolerance_condition = LEAST_MATERIAL_CONDITION
 ae3383 Shape_tolerance with tolerance_datum
 ae3384 Shape_tolerance with tolerance_type
 ae3385 Shape_tolerance <is associated with> zero Die_shape_definition
 ae3386 Shape_tolerance <is associated with> one Die_shape_definition
 ae3387 Shape_tolerance <is associated with> many Die_shape_definition
 ae3388 Shape_tolerance <is associated with> zero Feature_shape_definition
 ae3389 Shape_tolerance <is associated with> one Feature_shape_definition
 ae3390 Shape_tolerance <is associated with> many Feature_shape_definition
 ae3391 Shape_tolerance <is associated with> zero Material_shape_definition
 ae3392 Shape_tolerance <is associated with> one Material_shape_definition
 ae3393 Shape_tolerance <is associated with> many Material_shape_definition
 ae3394 Shape_tolerance <is associated with> zero Part_shape_definition
 ae3395 Shape_tolerance <is associated with> one Part_shape_definition
 ae3396 Shape_tolerance <is associated with> many Part_shape_definition
 ae3397 Shape_tolerance <is bounded by> zero Tolerance_bound
 ae3398 Shape_tolerance <is bounded by> one Tolerance_bound

ae3399 Shape_tolerance <is bounded by> many Tolerance_bound

4.1.62 Similarity_relationship

ae3449 Similarity_relationship (6.16)

4.1.63 Size_dimension

ae3499 Size_dimension

4.1.64 Solid_representation

ae3549 Solid_representation (6.11, 6.12)

ae3550 Solid_representation with B_rep (6.11, 6.12)

ae3551 Solid_representation with CSG

4.1.65 Specified_material_relationship

ae3601 Specified_material_relationship (6.20)

ae3602 Specified_material_relationship with material_quantity (6.20)

ae3603 Specified_material_relationship <substitutes for> zero Specified_material_relationship (6.20)

ae3604 Specified_material_relationship <substitutes for> one Specified_material_relationship

ae3605 Specified_material_relationship <substitutes for> many Specified_material_relationship

ae3606 Specified_material_relationship <is a substitute of> zero Specified_material_relationship (6.20)

ae3607 Specified_material_relationship <is a substitute of> one Specified_material_relationship

ae3608 Specified_material_relationship <is a substitute of> many Specified_material_relationship

4.1.66 Start_order

ae3658 Start_order (6.3, 6.23, 6.24)

ae3659 Start_order <is implemented by> zero External_order (6.3, 6.23, 6.24)

ae3660 Start_order <is implemented by> one External_order

ae3661 Start_order <is implemented by> many External_order

ae3662 Start_order <is initiated by> zero Work_item (6.3, 6.24)

ae3663 Start_order <is initiated by> one Work_item (6.23)

ae3664 Start_order <is initiated by> many Work_item

4.1.67 Start_request

ae3714 Start_request (6.1, 6.3, 6.23, 6.24)

ae3715 Start_request with request_description (6.1, 6.3, 6.23, 6.24)

ae3716 Start_request with request_justification (6.1, 6.3, 6.23, 6.24)

4.1.68 Surface_representation

ae3766 Surface_representation (6.9, 6.10)

ae3767 Surface_representation with surface_direction (6.9)

ae3768 Surface_representation with surface_thickness (6.9)

4.1.69 Symmetrical_item_relationship

ae3818 Symmetrical_item_relationship (6.17)

4.1.70 Tolerance_bound

ae3868 Tolerance_bound

ae3869 Tolerance_bound <bounds> zero Shape_tolerance

ae3870 Tolerance_bound <bounds> one Shape_tolerance

ae3871 Tolerance_bound <bounds> many Shape_tolerance

4.1.71 Tolerance_value

ae3921 Tolerance_value

ae3922 Tolerance_value with unit_of_measure

ae3923 Tolerance_value with value

ae3924 Tolerance_value <is lower limit for> zero Dimension_tolerance_range

ae3925 Tolerance_value <is lower limit for> one Dimension_tolerance_range

ae3926 Tolerance_value <is lower limit for> many Dimension_tolerance_range

ae3927 Tolerance_value <is upper limit for> zero Dimension_tolerance_range

ae3928 Tolerance_value <is upper limit for> one Dimension_tolerance_range

ae3929 Tolerance_value <is upper limit for> many Dimension_tolerance_range

4.1.72 Wireframe_representation

ae3979 Wireframe_representation (6.8)

4.1.73 Work_item

ae4029 Work_item 96.23)

ae4030 Work_item with applicable_standards

ae4031 Work_item with approval (6.23)

ae4032 Work_item with completion_date_and_time (6.23)

ae4033 Work_item with order_date_and_time (6.23)

ae4034 Work_item with preliminary_review_date_and_time (6.23)

ae4035 Work_item with priority

ae4036 Work_item with start_date_and_time (6.23)

ae4037 Work_item with work_description

ae4038 Work_item with work_requirements

ae4039 Work_item <initiates> zero Start_order

ae4040 Work_item <initiates> one Start_order (6.23)

ae4041 Work_item <initiates> many Start_order

ae4042 Work_item <is the subject of> zero Change_order (6.23)

ae4043 Work_item <is the subject of> one Change_order

ae4044 Work_item <is the subject of> many Change_order

ae4045 Work_item <is the resultant of> zero Change_order (6.23)

ae4046 Work_item <is the resultant of> one Change_order

ae4047 Work_item <is the resultant of> many Change_order

4.1.74 Work_order

ae4097 Work_order (6.3, 6.4, 6.23, 6.24)
 ae4098 Work_order with applicable_standards (6.3, 6.4)
 ae4099 Work_order with approval (6.3, 6.4, 6.23, 6.24)
 ae4100 Work_order with completion_date_and_time (6.3, 6.4)
 ae4101 Work_order with order_date_and_time (6.3, 6.4)
 ae4102 Work_order with preliminary_review_date_and_time (6.3, 6.4)
 ae4103 Work_order with priority (6.3, 6.4, 6.23, 6.24)
 ae4104 Work_order with production_volume (6.3, 6.4)
 ae4105 Work_order with start_date_and_time (6.3, 6.4)
 ae4106 Work_order with work_description (6.3, 6.4, 6.23, 6.24)
 ae4107 Work_order with work_order_number (6.3, 6.4, 6.23, 6.24)
 ae4108 Work_order with work_requirements
 ae4109 Work_order <is primary in> zero Work_order_relationship (6.3, 6.4, 6.23, 6.24)
 ae4110 Work_order <is primary in> one Work_order_relationship (6.24)
 ae4111 Work_order <is primary in> many Work_order_relationship
 ae4112 Work_order <is secondary in> zero Work_order_relationship (6.3, 6.4, 6.23, 6.24)
 ae4113 Work_order <is secondary in> one Work_order_relationship (6.24)
 ae4114 Work_order <is secondary in> many Work_order_relationship
 ae4115 Work_order <is carried out by> zero Work_order_responsibility (6.3, 6.4, 6.23, 6.24)
 ae4116 Work_order <is carried out by> one Work_order_responsibility
 ae4117 Work_order <is carried out by> many Work_order_responsibility
 ae4118 Work_order <results from> zero Work_request (6.3, 6.4, 6.23, 6.24)
 ae4119 Work_order <results from> one Work_request
 ae4120 Work_order <results from> many Work_request

4.1.75 Work_order_relationship

ae4170 Work_order_relationship (6.24)
 ae4171 Work_order_relationship with description (6.24)
 ae4172 Work_order_relationship <has as primary> zero Work_order
 ae4173 Work_order_relationship <has as primary> one Work_order
 ae4174 Work_order_relationship <has as primary> many Work_order (6.24)
 ae4175 Work_order_relationship <has as secondary> zero Work_order
 ae4176 Work_order_relationship <has as secondary> one Work_order
 ae4177 Work_order_relationship <has as secondary> many Work_order (6.24)

4.1.76 Work_order_responsibility

ae4227 Work_order_responsibility (6.4)
 ae4228 Work_order_responsibility with role (6.4)
 ae4229 Work_order_responsibility <is responsible for> zero Work_order (6.4)
 ae4230 Work_order_responsibility <is responsible for> one Work_order
 ae4231 Work_order_responsibility <is responsible for> many Work_order

4.1.77 Work_request

ae4281 Work_request (6.1, 6.2, 6.3 6.4, 6.23, 6.24)
 ae4282 Work_request with date_and_time_of_request (6.1, 6.2, 6.4, 6.23, 6.24)
 ae4283 Work_request with requestor (6.1, 6.2, 6.3, 6.4, 6.23, 6.24)
 ae4284 Work_request with work_request_identification (6.1, 6.2, 6.3, 6.4, 6.23, 6.24)
 ae4285 Work_request <results in> zero Work_order (6.1, 6.2, 6.3, 6.4, 6.23, 6.24)
 ae4286 Work_request <results in> one Work_order
 ae4287 Work_request <results in> many Work_order

4.2 AIM test purposes

AIM test purposes are identified by the prefix “aim” in the test purpose identifier. Each test purpose derived from the AIM EXPRESS shall be interpreted as given in the following statement: the postprocessor shall accept the input in accordance with the AIM EXPRESS structure corresponding to this test purpose. This implies that the semantics of the application element represented by the AIM element are preserved by the IUT between the input and output of a test according to the reference path specified in the mapping table of the AP. This also implies no violations of any constraints (e.g., where rules or global rules) that apply to the AIM element. AIM test purposes apply to the input specifications of postprocessor test cases only. AIM test purposes are derived directly from the expanded EXPRESS listing contained in annex A of ISO 10303-207 as follows:

- AIM entities. A test purpose derived from an AIM entity is a simple statement of the entity name.
- AIM entity attributes. A test purpose derived from an AIM entity attribute is a statement of the AIM entity with a given attribute.

Each AIM entity test purpose is grouped with its attribute test purposes. Excluded test purposes can be found in Annex D.

4.2.1 Action_Directive

aim2 Action_Directive (6.3, 6.4, 6.23, 6.24)
 aim3 Action_Directive with requests of one element (6.3, 6.23, 6.24)
 aim4 Action_Directive with requests of many elements

4.2.2 Action_Method_With_Associated_Documents

aim7 Action_Method_With_Associated_Documents (6.2, 6.3, 6.4, 6.13, 6.14, 6.15, 6.23, 6.24)
 aim8 Action_Method_With_Associated_Documents with documents of one element (6.2, 6.3, 6.4, 6.13, 6.14, 6.15, 6.23, 6.24)
 aim9 Action_Method_With_Associated_Documents with documents of many elements

4.2.3 Action_Property

aim10 Action_Property (6.3, 6.4, 6.13, 6.14, 6.15, 6.23, 6.24)
 aim11 Action_Property with definition as Action (6.4)
 aim12 Action_Property with definition as Action_Method (6.3, 6.13, 6.14, 6.15, 6.23, 6.24)
 aim13 Action_Property with definition as Action_Method_Relationship

aim14 Action_Property with definition as Action_Relationship

4.2.4 Action_Property_Representation

aim15 Action_Property_Representation (6.3, 6.4, 6.13, 6.14, 6.15, 6.23, 6.24)

4.2.5 Action_Relationship

aim16 Action_Relationship (6.13, 6.14, 6.15)

4.2.6 Action_Resource

aim18 Action_Resource (6.3, 6.4, 6.13, 6.14, 6.15, 6.23, 6.24)

aim19 Action_Resource with usage of one element (6.3, 6.4, 6.13, 6.14, 6.15, 6.23, 6.24)

aim20 Action_Resource with usage of many elements

aim21 Action_Resource with usage as Action_Directive

aim22 Action_Resource with usage as Action (6.3, 6.4, 6.23, 6.24)

aim23 Action_Resource with usage as Action_Method (6.13, 6.14, 6.15)

4.2.7 Action_Resource_Relationship

aim24 Action_Resource_Relationship

4.2.8 Action_Resource_Requirement_Relationship

aim32 Action_Resource_Requirement_Relationship

4.2.9 Action_Resource_Type

aim33 Action_Resource_Type (6.3, 6.4, 6.23, 6.24)

4.2.10 Advanced_Brep_Shape_Representation

aim34 Advanced_Brep_Shape_Representation (6.11, 6.12)

aim35 Advanced_Brep_Shape_Representation with items of one element (6.11)

aim36 Advanced_Brep_Shape_Representation with items of many elements

4.2.11 Advanced_Face

aim37 Advanced_Face (6.10, 6.11, 6.12)

aim38 Advanced_Face with bounds of one element (6.10)

aim39 Advanced_Face with bounds of many elements (6.11, 6.12)

aim40 Advanced_Face with same_sense = TRUE (6.10, 6.12)

aim41 Advanced_Face with same_sense = FALSE (6.11)

4.2.12 Angular_Location

aim42 Angular_Location
aim43 Angular_Location with angle_selection = equal
aim44 Angular_Location with angle_selection = large
aim45 Angular_Location with angle_selection = small

4.2.13 Application_Context

aim46 Application_Context (6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.25)

4.2.14 Application_Protocol_Definition

aim48 Application_Protocol_Definition

4.2.15 Approval

aim49 Approval (6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.23, 6.24, 6.25)

4.2.16 Approval_Date_Time

aim50 Approval_Date_Time (6.3, 6.4, 6.23, 6.24)
aim51 Approval_Date_Time with date_time as Date (6.3, 6.4)
aim52 Approval_Date_Time with date_time as Date_And_Time
aim53 Approval_Date_Time with date_time as Local_Time

4.2.17 Approval_Person_Organization

aim54 Approval_Person_Organization (6.4, 6.23, 6.24)
aim55 Approval_Person_Organization with person_organization as Organization
aim56 Approval_Person_Organization with person_organization as Person (6.4, 6.23, 6.24)
aim57 Approval_Person_Organization with person_organization as Person_And_Organization

4.2.18 Approval_Role

aim58 Approval_Role (6.3, 6.4, 6.23, 6.24)

4.2.19 Approval_Status

aim59 Approval_Status (6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.23, 6.24, 6.25)

4.2.20 Assembly_Component_Usage

aim60 Assembly_Component_Usage (6.25)

aim61 Assembly_Component_Usage with reference_designator (6.25)

aim62 Assembly_Component_Usage with reference_designator not present

4.2.21 Assembly_Component_Usage_Substitute

aim63 Assembly_Component_Usage_Substitute

4.2.22 Axis2_Placement_3d

aim70 Axis2_Placement_3d (6.9, 6.10, 6.11, 6.12)

aim71 Axis2_Placement_3d with axis (6.9, 6.10, 6.11, 6.12)

aim72 Axis2_Placement_3d with axis not present

aim73 Axis2_Placement_3d with ref_direction

aim74 Axis2_Placement_3d with ref_direction not present

4.2.23 B_Spline_Curve

aim75 B_Spline_Curve

aim76 B_Spline_Curve with control_points_list of many elements

aim77 B_Spline_Curve with curve_form = circular_arc

aim78 B_Spline_Curve with curve_form = elliptic_arc

aim79 B_Spline_Curve with curve_form = hyperbolic_arc

aim80 B_Spline_Curve with curve_form = parabolic_arc

aim81 B_Spline_Curve with curve_form = polyline_form

aim82 B_Spline_Curve with curve_form = unspecified

aim83 B_Spline_Curve with closed_curve = TRUE

aim84 B_Spline_Curve with closed_curve = FALSE

aim85 B_Spline_Curve with closed_curve = UNKNOWN

aim86 B_Spline_Curve with self_intersect = TRUE

aim87 B_Spline_Curve with self_intersect = FALSE

aim88 B_Spline_Curve with self_intersect = UNKNOWN

4.2.24 B_Spline_Curve_With_Knots

aim89 B_Spline_Curve_With_Knots

aim90 B_Spline_Curve_With_Knots with control_points_list of many elements

aim91 B_Spline_Curve_With_Knots with curve_form = circular_arc

aim92 B_Spline_Curve_With_Knots with curve_form = elliptic_arc

aim93 B_Spline_Curve_With_Knots with curve_form = hyperbolic_arc

aim94 B_Spline_Curve_With_Knots with curve_form = parabolic_arc

aim95 B_Spline_Curve_With_Knots with curve_form = polyline_form

aim96 B_Spline_Curve_With_Knots with curve_form = unspecified

aim97 B_Spline_Curve_With_Knots with closed_curve = TRUE

aim98 B_Spline_Curve_With_Knots with closed_curve = FALSE

aim99 B_Spline_Curve_With_Knots with closed_curve = UNKNOWN

aim100 B_Spline_Curve_With_Knots with self_intersect = TRUE

aim101 B_Spline_Curve_With_Knots with self_intersect = FALSE

aim102 B_Spline_Curve_With_Knots with self_intersect = UNKNOWN

aim103 B_Spline_Curve_With_Knots with knot_multiplicities of many elements
 aim104 B_Spline_Curve_With_Knots with knots of many elements
 aim105 B_Spline_Curve_With_Knots with knot_spec = piecewise_bezier_knots
 aim106 B_Spline_Curve_With_Knots with knot_spec = quasi_uniform_knots
 aim107 B_Spline_Curve_With_Knots with knot_spec = uniform_knots
 aim108 B_Spline_Curve_With_Knots with knot_spec = unspecified

4.2.25 B_Spline_Surface

aim109 B_Spline_Surface
 aim110 B_Spline_Surface with control_points_list of many elements
 aim111 B_Spline_Surface with surface_form = plane_surf
 aim112 B_Spline_Surface with surface_form = conical_surf
 aim113 B_Spline_Surface with surface_form = cylindrical_surf
 aim114 B_Spline_Surface with surface_form = generalised_cone
 aim115 B_Spline_Surface with surface_form = quadric_surf
 aim116 B_Spline_Surface with surface_form = ruled_surf
 aim117 B_Spline_Surface with surface_form = spherical_surf
 aim118 B_Spline_Surface with surface_form = surf_of_linear_extrusion
 aim119 B_Spline_Surface with surface_form = surf_of_revolution
 aim120 B_Spline_Surface with surface_form = toroidal_surf
 aim121 B_Spline_Surface with surface_form = unspecified
 aim122 B_Spline_Surface with u_closed = TRUE
 aim123 B_Spline_Surface with u_closed = FALSE
 aim124 B_Spline_Surface with u_closed = UNKNOWN
 aim125 B_Spline_Surface with v_closed = TRUE
 aim126 B_Spline_Surface with v_closed = FALSE
 aim127 B_Spline_Surface with v_closed = UNKNOWN
 aim128 B_Spline_Surface with self_intersect = TRUE
 aim129 B_Spline_Surface with self_intersect = FALSE
 aim130 B_Spline_Surface with self_intersect = UNKNOWN

4.2.26 B_Spline_Surface_With_Knots

aim131 B_Spline_Surface_With_Knots
 aim132 B_Spline_Surface_With_Knots with control_points_list of many elements
 aim133 B_Spline_Surface_With_Knots with surface_form = plane_surf
 aim134 B_Spline_Surface_With_Knots with surface_form = conical_surf
 aim135 B_Spline_Surface_With_Knots with surface_form = cylindrical_surf
 aim136 B_Spline_Surface_With_Knots with surface_form = generalised_cone
 aim137 B_Spline_Surface_With_Knots with surface_form = quadric_surf
 aim138 B_Spline_Surface_With_Knots with surface_form = ruled_surf
 aim139 B_Spline_Surface_With_Knots with surface_form = spherical_surf
 aim140 B_Spline_Surface_With_Knots with surface_form = surf_of_linear_extrusion
 aim141 B_Spline_Surface_With_Knots with surface_form = surf_of_revolution
 aim142 B_Spline_Surface_With_Knots with surface_form = toroidal_surf
 aim143 B_Spline_Surface_With_Knots with surface_form = unspecified
 aim144 B_Spline_Surface_With_Knots with u_closed = TRUE
 aim145 B_Spline_Surface_With_Knots with u_closed = FALSE

aim146 B_Spline_Surface_With_Knots with u_closed = UNKNOWN
 aim147 B_Spline_Surface_With_Knots with v_closed = TRUE
 aim148 B_Spline_Surface_With_Knots with v_closed = FALSE
 aim149 B_Spline_Surface_With_Knots with v_closed = UNKNOWN
 aim150 B_Spline_Surface_With_Knots with self_intersect = TRUE
 aim151 B_Spline_Surface_With_Knots with self_intersect = FALSE
 aim152 B_Spline_Surface_With_Knots with self_intersect = UNKNOWN
 aim153 B_Spline_Surface_With_Knots with u_multiplicities of many elements
 aim154 B_Spline_Surface_With_Knots with v_multiplicities of many elements
 aim155 B_Spline_Surface_With_Knots with u_knots of many elements
 aim156 B_Spline_Surface_With_Knots with v_knots of many elements
 aim157 B_Spline_Surface_With_Knots with knot_spec = piecewise_bezier_knots
 aim158 B_Spline_Surface_With_Knots with knot_spec = quasi_uniform_knots
 aim159 B_Spline_Surface_With_Knots with knot_spec = uniform_knots
 aim160 B_Spline_Surface_With_Knots with knot_spec = unspecified

4.2.27 Bezier_Curve

aim161 Bezier_Curve
 aim162 Bezier_Curve with control_points_list of many elements
 aim163 Bezier_Curve with curve_form = circular_arc
 aim164 Bezier_Curve with curve_form = elliptic_arc
 aim165 Bezier_Curve with curve_form = hyperbolic_arc
 aim166 Bezier_Curve with curve_form = parabolic_arc
 aim167 Bezier_Curve with curve_form = polyline_form
 aim168 Bezier_Curve with curve_form = unspecified
 aim169 Bezier_Curve with closed_curve = TRUE
 aim170 Bezier_Curve with closed_curve = FALSE
 aim171 Bezier_Curve with closed_curve = UNKNOWN
 aim172 Bezier_Curve with self_intersect = TRUE
 aim173 Bezier_Curve with self_intersect = FALSE
 aim174 Bezier_Curve with self_intersect = UNKNOWN

4.2.28 Bezier_Surface

aim175 Bezier_Surface
 aim176 Bezier_Surface with control_points_list of many elements
 aim177 Bezier_Surface with surface_form = plane_surf
 aim178 Bezier_Surface with surface_form = conical_surf
 aim179 Bezier_Surface with surface_form = cylindrical_surf
 aim180 Bezier_Surface with surface_form = generalised_cone
 aim181 Bezier_Surface with surface_form = quadric_surf
 aim182 Bezier_Surface with surface_form = ruled_surf
 aim183 Bezier_Surface with surface_form = spherical_surf
 aim184 Bezier_Surface with surface_form = surf_of_linear_extrusion
 aim185 Bezier_Surface with surface_form = surf_of_revolution
 aim186 Bezier_Surface with surface_form = toroidal_surf
 aim187 Bezier_Surface with surface_form = unspecified
 aim188 Bezier_Surface with u_closed = TRUE

aim189 Bezier_Surface with u_closed = FALSE
aim190 Bezier_Surface with u_closed = UNKNOWN
aim191 Bezier_Surface with v_closed = TRUE
aim192 Bezier_Surface with v_closed = FALSE
aim193 Bezier_Surface with v_closed = UNKNOWN
aim194 Bezier_Surface with self_intersect = FALSE
aim195 Bezier_Surface with self_intersect = UNKNOWN

4.2.29 Block

aim196 Block

4.2.30 Boolean_Result

aim197 Boolean_Result
aim198 Boolean_Result with operator = difference
aim199 Boolean_Result with operator = intersection
aim200 Boolean_Result with operator = union
aim201 Boolean_Result with first_operand as Boolean_Result
aim202 Boolean_Result with first_operand as Csg_Primitive
aim203 Boolean_Result with first_operand as Half_Space_Solid
aim204 Boolean_Result with first_operand as Solid_Model
aim205 Boolean_Result with second_operand as Boolean_Result
aim206 Boolean_Result with second_operand as Csg_Primitive
aim207 Boolean_Result with second_operand as Half_Space_Solid
aim208 Boolean_Result with second_operand as Solid_Model

4.2.31 Bounded_Surface

aim216 Bounded_Surface

4.2.32 Box_Domain

aim217 Box_Domain

4.2.33 Boxed_Half_Space

aim218 Boxed_Half_Space
aim219 Boxed_Half_Space with agreement_flag = TRUE
aim220 Boxed_Half_Space with agreement_flag = FALSE

4.2.34 Brep_With_Voids

aim221 Brep_With_Voids
aim222 Brep_With_Voids with voids of one element
aim223 Brep_With_Voids with voids of many elements

4.2.35 Calendar_Date

aim224 Calendar_Date (6.1, 6.2, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.23, 6.24, 6.25)

4.2.36 Cartesian_Point

aim225 Cartesian_Point (6.8, 6.9, 6.10, 6.11, 6.12)

aim226 Cartesian_Point with coordinates of one element (6.8, 6.9, 6.10, 6.11, 6.12)

aim227 Cartesian_Point with coordinates of many elements

4.2.37 Cartesian_Transformation_Operator_3d

aim235 Cartesian_Transformation_Operator_3d

aim236 Cartesian_Transformation_Operator_3d with axis1

aim237 Cartesian_Transformation_Operator_3d with axis1 not present

aim238 Cartesian_Transformation_Operator_3d with axis2

aim239 Cartesian_Transformation_Operator_3d with axis2 not present

aim240 Cartesian_Transformation_Operator_3d with scale

aim241 Cartesian_Transformation_Operator_3d with scale not present

aim242 Cartesian_Transformation_Operator_3d with axis3

aim243 Cartesian_Transformation_Operator_3d with axis3 not present

4.2.38 Change_Order

aim244 Change_Order (6.3)

4.2.39 Circle

aim245 Circle (6.9, 6.11, 6.12)

aim247 Circle with position as Axis2_Placement_3d (6.9, 6.11, 6.12)

4.2.40 Composite_Curve_On_Surface

aim257 Composite_Curve_On_Surface

aim258 Composite_Curve_On_Surface with segments of one element

aim259 Composite_Curve_On_Surface with segments of many elements

aim260 Composite_Curve_On_Surface with self_intersect = TRUE

aim261 Composite_Curve_On_Surface with self_intersect = FALSE

aim262 Composite_Curve_On_Surface with self_intersect = UNKNOWN

4.2.41 Configuration_Item

aim271 Configuration_Item (6.25)

aim272 Configuration_Item with description

aim273 Configuration_Item with description not present (6.25)

aim274 Configuration_Item with purpose

aim275 Configuration_Item with purpose not present (6.25)

4.2.42 Conic

aim276 Conic

aim277 Conic with position as Axis2_Placement_2d

aim278 Conic with position as Axis2_Placement_3d

4.2.43 Conical_Surface

aim279 Conical_Surface (6.9, 6.12)

4.2.44 Connected_Edge_Set

aim280 Connected_Edge_Set

aim281 Connected_Edge_Set with ces_edges of one element

aim282 Connected_Edge_Set with ces_edges of many elements

4.2.45 Context_Dependent_Unit

aim286 Context_Dependent_Unit (6.3, 6.13, 6.14, 6.15, 6.18, 6.23, 6.24)

4.2.46 Contract

aim287 Contract (6.4, 6.7, 6.8, 6.9, 6.20)

4.2.47 Contract_Type

aim288 Contract_Type (6.4, 6.7, 6.8, 6.9)

4.2.48 Conversion_Based_Unit

aim289 Conversion_Based_Unit (6.9)

4.2.49 Coordinated_Universal_Time_Offset

aim290 Coordinated_Universal_Time_Offset (6.25)

aim291 Coordinated_Universal_Time_Offset with minute_offset

aim292 Coordinated_Universal_Time_Offset with minute_offset not present

aim293 Coordinated_Universal_Time_Offset with sense = ahead (6.25)

aim294 Coordinated_Universal_Time_Offset with sense = behind

4.2.50 Csg_Shape_Representation

aim295 Csg_Shape_Representation

aim296 Csg_Shape_Representation with items of one element

aim297 Csg_Shape_Representation with items of many elements

4.2.51 Csg_Solid

aim298 Csg_Solid

aim299 Csg_Solid with tree_root_expression as Boolean_Result

aim300 Csg_Solid with tree_root_expression as Csg_Primitive

4.2.52 Curve

aim301 Curve

aim302 Curve_Bounded_Surface (6.9)

aim303 Curve_Bounded_Surface with boundaries of one element (6.9)

aim304 Curve_Bounded_Surface with boundaries of many elements

aim305 Curve_Bounded_Surface with implicit_outer = TRUE

aim306 Curve_Bounded_Surface with implicit_outer = FALSE (6.9)

4.2.53 Curve_Replica

aim307 Curve_Replica

4.2.54 Cylindrical_Surface

aim308 Cylindrical_Surface (6.11, 6.12)

4.2.55 Date_And_Time

aim310 Date_And_Time (6.25)

4.2.56 Date_Role

aim311 Date_Role (6.1, 6.2, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.23, 6.24, 6.24)

4.2.57 Date_Time_Role

aim312 Date_Time_Role

4.2.58 Dated_Effectivity

aim313 Dated_Effectivity (6.25)

aim314 Dated_Effectivity with effectivity_end_date (6.25)

aim315 Dated_Effectivity with effectivity_end_date not present

4.2.59 Datum

aim316 Datum (6.9, 6.10)

aim317 Datum with product_definitional = TRUE (6.9, 6.10)

aim318 Datum with product_definitional = FALSE

aim319 Datum with product_definitional = UNKNOWN

4.2.60 Datum_Reference

aim320 Datum_Reference

4.2.61 Datum_Target

aim321 Datum_Target

aim322 Datum_Target with product_definitional = TRUE

aim323 Datum_Target with product_definitional = FALSE

aim324 Datum_Target with product_definitional = UNKNOWN

4.2.62 Definitional_Representation

aim325 Definitional_Representation

aim326 Definitional_Representation with items of one element

aim327 Definitional_Representation with items of many elements

4.2.63 Degenerate_Toroidal_Surface

aim329 Degenerate_Toroidal_Surface

aim330 Degenerate_Toroidal_Surface with select_outer = TRUE

aim331 Degenerate_Toroidal_Surface with select_outer = FALSE

4.2.64 Derived_Unit

aim332 Derived_Unit

aim333 Derived_Unit with elements of one element

aim334 Derived_Unit with elements of many elements

4.2.65 Derived_Unit_Element

aim335 Derived_Unit_Element

4.2.66 Descriptive_Representation_Item

aim336 Descriptive_Representation_Item

4.2.67 Die_Definition_Constraint_Relationship

aim337 Die_Definition_Constraint_Relationship

4.2.68 Dimensional_Characteristic_Representation

aim338 Dimensional_Characteristic_Representation (6.9, 6.10)

aim339 Dimensional_Characteristic_Representation with dimension as Dimensional_Location (6.9, 6.10)

aim340 Dimensional_Characteristic_Representation with dimension as Dimensional_Size

4.2.69 Dimensional_Exponents

aim341 Dimensional_Exponents (6.3, 6.4, 6.9, 6.11, 6.12, 6.13, 6.14, 6.15, 6.18, 6.20, 6.23, 6.24)

4.2.70 Dimensional_Location

aim342 Dimensional_Location (6.9, 6.10)

4.2.71 Dimensional_Location_With_Path

aim343 Dimensional_Location_With_Path

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aim344 Dimensional_Size

4.2.73 Directed_Action

aim345 Directed_Action (6.3, 6.4, 6.23, 6.24)

4.2.74 Direction

aim346 Direction (6.9, 6.10, 6.11, 6.12)

aim347 Direction with direction_ratios of many elements

4.2.75 Document

aim348 Document (6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.23, 6.24, 6.25)

4.2.76 Document_Type

aim349 Document_Type (6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.23, 6.24, 6.25)

4.2.77 Edge_Based_Wireframe_Model

aim351 Edge_Based_Wireframe_Model

aim352 Edge_Based_Wireframe_Model with ebwm_boundary of one element

aim353 Edge_Based_Wireframe_Model with ebwm_boundary of many elements

4.2.78 Edge_Based_Wireframe_Shape_Representation

aim354 Edge_Based_Wireframe_Shape_Representation

aim355 Edge_Based_Wireframe_Shape_Representation with items of one element

aim356 Edge_Based_Wireframe_Shape_Representation with items of many elements

4.2.79 Edge_Curve

aim357 Edge_Curve (6.10, 6.11, 6.12)

aim358 Edge_Curve with same_sense = TRUE (6.10, 6.11, 6.12)

aim359 Edge_Curve with same_sense = FALSE

4.2.80 Edge_Loop

aim360 Edge_Loop (6.10, 6.11, 6.12)

aim361 Edge_Loop with edge_list of one element (6.11, 6.12)

aim362 Edge_Loop with edge_list of many elements (6.10)

4.2.81 Effectivity

aim363 Effectivity

4.2.82 Ellipse

aim365 Ellipse

aim367 Ellipse with position as Axis2_Placement_3d

4.2.83 Evaluated_Degenerate_Pcurve

aim368 Evaluated_Degenerate_Pcurve

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aim369 Executed_Action (6.3, 6.23)

4.2.85 Extruded_Area_Solid

aim370 Extruded_Area_Solid

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aim371 Face

aim372 Face with bounds of one element

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4.2.87 Face_Outer_Bound

- aim377 Face_Outer_Bound (6.10, 6.11, 6.12)
aim378 Face_Outer_Bound with orientation = TRUE (6.10)
aim379 Face_Outer_Bound with orientation = FALSE (6.11, 6.12)

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- aim385 Faceted_Brep

4.2.89 Faceted_Brep_Shape_Representation

- aim386 Faceted_Brep_Shape_Representation
aim387 Faceted_Brep_Shape_Representation with items of one element
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- aim396 Geometric_Representation_Context (6.8, 6.9, 6.10, 6.11, 6.12)

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4.2.93 Geometric_Tolerance_elements

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aim406 Geometric_Tolerance_With_Datum_Reference with datum_system of one element
aim407 Geometric_Tolerance_With_Datum_Reference with datum_system of many elements

4.2.95 Geometrically_Bounded_Surface_Shape_Representation

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