



BSI Standards Publication

Industrial automation systems and integration — Parts library

Part 42: Description methodology: Methodology for structuring parts families

National foreword

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**Industrial automation systems and
integration — Parts library —**

**Part 42:
Description methodology: Methodology
for structuring parts families**

*Systèmes d'automatisation industrielle et intégration — Bibliothèque
de composants —*

*Partie 42: Méthodologie descriptive: Méthodologie appliquée à
la structuration des familles de pièces*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13584-42 was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data*.

This second edition of ISO 13584-42 constitutes a technical revision of ISO 13584-42:1998, which is provisionally retained in order to support continued use and maintenance of implementations based on it and to satisfy the normative references of other parts of ISO 13584. This second edition of ISO 13584-42 also incorporates the Technical Corrigendum ISO 13584-42:1998/Cor.1:2003.

ISO 13584 consists of the following parts, under the general title *Industrial automation systems and integration — Parts library*:

- *Part 1: Overview and fundamental principles*
- *Part 20: Logical resource: Logical model of expressions*
- *Part 24: Logical resource: Logical model of supplier library*
- *Part 25: Logical resource: Logical model of supplier library with aggregate values and explicit content*
- *Part 26: Logical resource: Information supplier identification*
- *Part 31: Implementation resources: Geometric programming interface*
- *Part 32: Implementation resources: OntoML: Product ontology markup language*
- *Part 35: Implementation resources: Spreadsheet interface for parts library [Technical Specification]*
- *Part 42: Description methodology: Methodology for structuring parts families*
- *Part 101: Geometrical view exchange protocol by parametric program*
- *Part 102: View exchange protocol by ISO 10303 conforming specification*
- *Part 501: Reference dictionary for measuring instruments — Registration procedure*
- *Part 511: Mechanical systems and components for general use — Reference dictionary for fasteners*

The structure of ISO 13584 is described in ISO 13584-1. The numbering of the parts of ISO 13584 reflects its structure:

- *Parts 10 to 19 specify the conceptual descriptions;*
- *Parts 20 to 29 specify the logical resources;*
- *Parts 30 to 39 specify the implementation resources;*
- *Parts 40 to 49 specify the description methodology;*
- *Parts 100 to 199 specify the view exchange protocols;*
- *Parts 500 to 599 specify the reference dictionaries.*

A complete list of parts of ISO 13584 is available from the following URL:

http://www.tc184-sc4.org/Titles/PLIB_Titles.htm

Introduction

ISO 13584 is a collection of International Standards for the computer-interpretable representation and exchange of parts library data. The objective is to provide a neutral mechanism capable of transferring parts library data, independent of any application that is using a parts library data system. The nature of this description makes it suitable not only for the exchange of files containing parts, but also as a basis for implementing and sharing databases of parts library data.

ISO 13584 is organized as a series of parts, each published separately. The parts of ISO 13584 fall into one of the following series: conceptual descriptions, logical resources, implementation resources, description methodology, view exchange protocol, and reference dictionaries. The series are described in ISO 13584-1. This part of ISO 13584 is a part of the description methodology series.

This part of ISO 13584 provides rules and guidelines for standardization committees and for other information suppliers to create product ontologies. These product ontologies consist of hierarchies of characterization classes of parts built according to a common methodology intended to enable multi-supplier consistency. These rules pertain to the following: the method for grouping parts into characterization classes of parts to form a hierarchy; the method for associating part properties to characterization classes of parts, the dictionary elements that describe the classes and properties of parts.

This part of ISO 13584 refers as a normative reference to the data model that specifies the exchange of dictionary data. This EXPRESS specification was developed as a common model for ISO 13584 and IEC 61360, and is intended to be published as IEC 61360-2. For convenience, this common model is provided in this part of ISO 13584 as an informative annex that duplicates the normative content of IEC 61360-2. This part of ISO 13584 also provides the mapping of the concepts described here onto the common model. To understand Annex F, which contains a description of this model, knowledge of the EXPRESS language is required. The EXPRESS language is defined in ISO 10303-11:1994. No particular knowledge is required to understand the normative clauses of this part of ISO 13584.

This second edition of this part of ISO 13584 introduces the following modelling capabilities:

- the capability to model constraints on properties by restricting their domain of values;
- the capability to model and distinguish characterization classes and categorization classes;
- the capability to model aggregation and composition using a single resource mechanism;
- the capability to describe strings that carry external references;
- the capability to connect classes that belong to different class hierarchies.

This second edition of this part of ISO 13584 has removed the following:

- the capability to specialize item classes as feature classes, component classes or material classes.

NOTE The following changes ensure that a dictionary conforming with the first edition of this part of ISO 13584 conforms to this edition: (1) replace **feature_class**, **component_class** and **material_class** by **item_class** throughout the reference dictionary; (2) add to each new **item_class** class the **instance_sharable** attribute, the value of which being true for **component_class** and **material_class**, and false for **feature_class**; (3) add the places of a number of additional attributes.

Industrial automation systems and integration — Parts library —

Part 42:

Description methodology: Methodology for structuring parts families

IMPORTANT This part of ISO 13584 provides a specification intended to be implemented in software. Incompatibilities may result in machine-to-machine communication in the case of software developed on the basis of translations of this part of ISO 13584 into languages other than the official ISO languages. It is accordingly strongly recommended that any implementations be developed only on the basis of the texts in the official ISO languages.

1 Scope

This part of ISO 13584 specifies the principles to be used for defining characterization classes of parts and properties of parts which provide for characterizing a part independently of any particular supplier-defined identification.

The rules and guidelines provided in this part of ISO 13584 are mandatory for the standardization committees responsible for creating standardized characterization hierarchies.

The use of these rules by suppliers and users is recommended as a methodology for building their own hierarchies.

The following are within the scope of this part of ISO 13584:

- the rules to group parts into leaf characterization classes of parts and non-leaf characterization classes of parts;
- the rules for the choice of the appropriate properties to be associated with the characterization classes of parts;
- the attributes to be provided by information suppliers to describe the characterization classes and properties of parts;
- the mechanisms for connecting characterization classes of parts to classification systems;
- the mechanisms for connecting characterization classes belonging to different characterization hierarchies;
- the specifications of those entities and attributes in the EXPRESS information model that provide for the exchange of such dictionary data.
- the description of any other object than part that can be characterized by a class belonging and a set of property-value pairs and to which the whole methodology defined in this part of ISO 13584 applies.

EXAMPLE Description by means of a dictionary compliant with this part of ISO 13584 can be used for describing any kind of products, as defined in Clause 3.

NOTE 1 The complete EXPRESS information model for the exchange of dictionary data, known as the common ISO13584/IEC61360 dictionary model, is defined in ISO 13584-25. Several levels of allowed implementations for the

common ISO13584/IEC61360 dictionary model, known as conformance classes, are also defined in ISO 13584-25. Conformance class 1 consists of the various schemes documented in this part of ISO 13584 (that duplicate information contained in IEC 61360-2), as well as the ISO13584_IEC61360_dictionary_aggregate_extension_schema documented in ISO 13584-25 (duplicated in IEC 61360-5). More advanced conformance classes, identified as conformance classes 2, 3 and 4, are documented in ISO 13584-25.

The following are outside the scope of this part of ISO 13584:

- properties of which values have an aggregate structure;

NOTE 2 An EXPRESS information model for the exchange of properties of which values have an aggregate structure is defined in ISO 13584-25.

- the description of the parts themselves;
- the descriptions of the functional models that can refer to some class of parts;
- the description of tables, program libraries and documents that can refer to some class of parts;

NOTE 3 EXPRESS resource constructs for the exchange of these information elements are defined in ISO 13584-24:2003.

- the description of the systems intended to manage parts libraries.

The structure of the information and the methodology defined in the ISO 13584 standard series enable the following:

- integration in the same data repository of different parts libraries originating from different information suppliers with uniform access mechanism provided by a dictionary;
- referencing another supplier library assumed to be available on the receiving system;
- referencing a standardized characterization hierarchy when such a hierarchy exists;
- definition by an end-user of a local categorization or search hierarchy, and the mapping of these hierarchies onto the supplier libraries available on its system.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8601, *Data elements and interchange formats — Information interchange — Representations of dates and times*

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

IEC 61360-2:—¹⁾, *Standard data element types with associated classification scheme for electric components — Part 2: EXPRESS dictionary schema*

1) To be published. (Revision of IEC 61360-2:2004)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

abstract class

class of which all members are also members of one of its subclasses

NOTE 1 Abstract classes are used when it is needed to group different kinds of objects in a class of a class inclusion hierarchy.

NOTE 2 In the common ISO13584/IEC61360 dictionary model, both abstract categorization classes and abstract characterization classes can be defined. The fact of being abstract is only a conceptual characteristic of a class. This characteristic is not explicitly represented in the model.

NOTE 3 Through inheritance, abstract characterization class allows to share, for example, some visible properties between different subclasses that correspond to different kinds of items.

3.2

applicable property of a class

applicable property necessarily possessed by each part that is member of a characterization class

NOTE 1 Each part that is member of a characterization class possesses an aspect corresponding to each applicable property of this characterization class.

NOTE 2 The above definition is conceptual, there is no requirement that all the applicable properties of a class should be used for describing each part of this class at the data model level.

NOTE 3 All the applicable properties of a superclass are also applicable properties for the subclasses of this superclass.

NOTE 4 Only properties defined or inherited as visible and imported properties of a class may be applicable properties.

NOTE 5 To facilitate integration of component libraries and electronic catalogues based on ISO 13584-24:2003 and ISO 13584-25, these parts of ISO 13584 request that only properties that are applicable to a class be used to characterize their instances in component libraries and electronic catalogues.

3.3

attribute

data element for the computer-sensible description of a property, a relation or a class

NOTE An attribute describes only one single detail of a property, of a class or of a relation.

EXAMPLE The name of a property, the code of a class, the measure unit in which values of a property are provided.

3.4

basic semantic unit

entity that provides an absolute and universally unique identification of a certain object of the application domain that is represented as a dictionary element

EXAMPLE 1 A dictionary compliant with this part of ISO 13584 provides for the identification of classes, properties, information sources and datatypes.

EXAMPLE 2 A dictionary compliant with ISO 13584-24:2003 provides for the identification of classes, properties, information sources, datatypes, tables, documents and program libraries.

EXAMPLE 3 In ISO 13584-511, the class of the hexagon head bolts is identified by a BSU, the property thread tolerance grade is also identified by a BSU.

NOTE The content of a basic semantic unit may also be represented as an IRDI.

3.5

characteristic of a product
product characteristic

invariable *property*, characteristic of a *product*, whose value is fixed once the product is defined

NOTE 1 Changing the value of a characteristic of a product would mean changing the product.

EXAMPLE For a ball bearing, the inner diameter and the outer diameter are product characteristics.

NOTE 2 Adapted from ISO 13584-24:2003, definition 3.12.

3.6

class
abstraction of a set of similar products

NOTE 1 A product that complies with the abstraction defined by a class is called a class member.

NOTE 2 A class is an intentional concept that can take different extensional meanings in different contexts.

EXAMPLE The set of products used by a particular enterprise and the set of all ISO-standardized products are two examples of contexts. In these two contexts (the particular enterprise and ISO), the set of products that are considered as members of the *single ball bearing* class can be different, in particular because employees of each enterprise ignore a number of existing single ball bearing products.

NOTE 3 Classes are structured by class inclusion relationships.

NOTE 4 A class of products is a general concept as defined in ISO 1087-1. Thus, it is advisable that the rules defined in ISO 704 be used for defining the designation and definition attributes of classes of products.

NOTE 5 In the context of the ISO 13584 series, a class is either a characterization class, associated with properties and usable for characterizing products, or a categorization class, not associated with properties and not usable for characterizing products.

3.7

class inclusion relationship
relationship between classes that means inclusion of class members: if A is a superclass of A1 this means that, in any context, any member of A1 is also member of A

EXAMPLE 1 The set of products used by a particular enterprise and the set of all ISO-standardized products are two examples of contexts.

EXAMPLE 2 In any context, the class *capacitor* includes the class *electrolytic capacitor*.

NOTE 1 Class inclusion defines a hierarchical structure between classes.

NOTE 2 Class inclusion is a conceptual relationship that does not prescribe anything at the data representation level. Consequently, it does not prescribe any particular database schema or data model.

NOTE 3 In the model defined in this part of ISO 13584, the “is-a” relationship ensures class inclusion. This part of ISO 13584 recommends that the “case-of” relationship also ensure class inclusion.

NOTE 4 The class inclusion relationship is also called subsumption.

3.8

class member
product that complies with the abstraction defined by a class

3.9

class valued property
property that has one single value for a whole characterization class of products

NOTE 1 The value of a class valued property is not defined individually for every single product of a characterization class, but globally for the class itself.

NOTE 2 When all products from a characterization class of products have the same value for a particular property, defining this property as a class valued property permits to avoid duplication of the value for each instance.

NOTE 3 Class valued properties can also be used to capture some commonality between different characterization classes when such a commonality is not captured by the hierarchy structure (see example of RULE 4b).

3.10

common ISO13584/IEC61360 dictionary model

data model for product ontology, using the information modeling language EXPRESS, resulting from a joint effort between ISO/TC 184/SC 4/WG 2 and IEC SC3D

NOTE 1 Several levels of allowed implementations, known as conformance classes, are defined for the common ISO13584/IEC61360 dictionary model. Conformance class 1 consists of the various schemes documented in this part of ISO 13584 (that duplicate information contained in IEC 61360-2), more the **ISO13584_IEC61360_dictionary_aggregate_extension_schema** documented in ISO 13584-25 (duplicated in IEC 61360-5). Other conformance classes are documented in ISO 13584-25 (conformance classes 2, 3 and 4).

NOTE 2 In the ISO 13584 standard series, each particular product ontology addressing a particular product domain and based on the common ISO13584/IEC61360 dictionary model is called a reference dictionary for that domain.

3.11

context dependent characteristic of product

property of a *product* whose value depends on some *context parameters*

NOTE 1 For a given product, a context dependent characteristic is mathematically defined as a function whose domain is defined by some context parameters that define the product environment.

EXAMPLE For a *ball bearing*, the *life-time* is a context dependent characteristic that depends on the *radial load*, the *axial load* and the *rotational speed*.

NOTE 2 Adapted from ISO 13584-24:2003, definition 3.22.

3.12

context parameter

variable whose value characterizes the context in which a *product* is inserted

EXAMPLE 1 The *dynamic-load* applied to a *bearing* is a context parameter for this *bearing*.

EXAMPLE 2 The *ambient temperature* in which the *resistance* of a *resistor* is measured is a context parameter for this *resistor*.

NOTE 1 This definition supersedes the definition given in ISO 13584-24:2003, that was the following: “a variable of which the value characterizes the context in which it is intended to insert a *product*”.

NOTE 2 In the ISO 13584 standard series, a property value is represented as a data element type.

3.13

data element type

unit of data for which the identification, description and value representation have been specified

NOTE In the ISO 13584 standard series, a property value is represented as a data element type.

3.14

dictionary data

set of data that represents product ontologies possibly associated with product categorizations

NOTE 1 It is advisable that dictionary data be exchanged using some conformance class of the common ISO/IEC dictionary model.

NOTE 2 This definition of dictionary data supersedes the previous definition from the first edition of this part of ISO 13584 that was the following: “the set of data that describes hierarchies of characterization classes of products and properties of these products”.

3.15

dictionary element

set of attributes that constitutes the dictionary description of certain objects of the application domain

EXAMPLE 1 A dictionary compliant with this part of ISO 13584 provides for the description of classes, properties, information sources and datatypes.

EXAMPLE 2 A dictionary compliant with ISO 13584-24:2003 provides for the description of classes, properties, information sources, datatypes, tables, documents and program libraries.

3.16

family of products

set of products represented by the same characterization class

NOTE This definition supersedes the definition given in ISO 13584-24:2003, that was the following: "a simple or generic family of parts".

3.17

feature

aspect of a product that can be described by a characterization class and a set of property-value pairs

NOTE 1 In the real world, a feature instance only exists embedded within the product of which it is an aspect.

EXAMPLE 1 The head of a screw is a feature described by a head class and a number of head properties, which depends upon the head class. A screw head only exists when it belongs to a screw.

NOTE 2 Features are represented by means of **item_class** whose the **instance_sharable** attribute equals *false*.

NOTE 3 The **instance_sharable** attribute allows to specify the conceptual status of an item: either a stand-alone item (**instance_sharable** = *true*), or a feature (**instance_sharable** = *false*). It does not imply any constraint at the data representation level. In the common ISO13584/IEC61360 dictionary model, representing several real world instances that share the same EXPRESS representation by a single EXPRESS entity, or by several EXPRESS entities is considered as implementation dependant. There exist no mechanism for specifying whether data value of a feature instance may or may not be shared.

EXAMPLE 2 The same instance of a screw head class can be referenced by several instances of a screw class. It means that there exists several screw heads, but that all these screw heads have the same characterization class and the same set of property values. The **instance_sharable** attribute allows to specify that changing this instance of the screw head class would change several instances of the screw class.

3.18

imported property

property defined in a class that is selected by another class of the same or of a different reference dictionary, by means of the case-of relationship, to become applicable to the latter class

NOTE 1 Only properties that are visible and/or applicable in a class can be imported from this class.

NOTE 2 Importation between classes of different reference dictionaries allows reusing properties, defined for example in a standard reference dictionary, without redefining them.

NOTE 3 Importation between classes of the same reference dictionary acknowledges the fact that some products can perform several functions, requiring the capability to import property from several higher level classes.

NOTE 4 When it is imported in a new class, a property keeps its original identifier, thus all the attributes do not need to be duplicated.

NOTE 5 An imported property is applicable for the class where it is imported.

3.19

information

facts, concepts or instructions

[ISO 10303-1:1994, definition 3.2.20]

3.20**information model**

formal model of a bounded set of facts, concepts or instructions to meet a specified requirement

[ISO 10303-1:1994, definition 3.2.21]

3.21**information supplier
supplier**

organization that delivers an ontology or a supplier library in the standard format defined in this ISO 13584 and that is responsible for its content

NOTE This definition of supplier supersedes the definition of information supplier from ISO 13584-1:2001 that was the following: “organization that delivers a supplier library in the standard format defined in this International Standard and is responsible for its content”.

3.22**international registration data identifier**

internationally unique identifier for a certain object of the application domain as defined in ISO/IEC 11179-5

NOTE 1 Only international registration data identifiers compliant with ISO/TS 29002-5 are used in the context of the ISO 13584 standard series.

NOTE 2 An international registration data identifier may be used for representing the content of a basic semantic unit that identifies a dictionary element as a string.

NOTE 3 An international registration data identifier may also be used for identifying the content of an attribute of a dictionary element.

EXAMPLE The unit of measure of a property, a value of a property or a constraint over a property may be identified by an IRDI.

3.23**is-a relationship**

class inclusion relationship associated with inheritance: if A1 *is-a* A, then each product belonging to A1 belongs to A, and all that is described in the context of A is automatically duplicated in the context of A1

NOTE 1 This mechanism is usually called “inheritance”.

NOTE 2 In the common ISO13584/IEC61360 dictionary model, the is-a relationship can only be defined between characterization classes. It is advisable that it defines a single hierarchy and it ensures that both visible and applicable properties are inherited.

3.24**is-case-of relationship
case-of**

property importation mechanism: if A1 is *case-of* A, then the definition of A products also covers A1 products, thus A1 can import any property from A

NOTE 1 The goal of the *case-of* relationship is to allow connecting together several class inclusion hierarchies while ensuring that referenced hierarchies can be updated independently.

NOTE 2 There is no constraint that the case-of relationship is intended to define single hierarchies.

NOTE 3 In the common ISO13584/IEC61360 dictionary model, the case-of relationship can in particular be used in four cases: (1) to link a characterization class to a categorization class, (2) to import, in the context of some standardized reference dictionaries, some properties already defined in other standardized reference dictionaries, (3) to connect a user reference dictionary to one or several standardized reference dictionaries, (4) to describe a product using the properties of different classes: when products of class A1 fulfil two different functions, and are thus logically described by properties associated with two different classes, A and B, A1 can be connected by is-a to e. g., A, and by case-of to B.

NOTE 4 The EXPRESS resource constructs for modeling the case-of relationships are defined in Annex F of this part of ISO 13584.

3.25

item

thing that can be characterized by means of a characterization class to which it belongs and a set of property value pairs

NOTE 1 This definition supersedes the definition given in ISO 13584-24:2003, that was the following: “a thing that can be captured by a class structure and a set of properties”.

NOTE 2 In the ISO 13584 standard series, both products and features of products that correspond to composite properties are items.

3.26

leaf characterization class

characterization class that is not further specialized into more precise characterization classes

EXAMPLE *Countersunk flat head screw with cross recess (type Y) and hexagon socket head cap screw with metric fine pitch thread* are leaf characterization classes defined in ISO 13584-511 .

3.27

non-leaf characterization class

characterization class that is further specialized into more precise characterization classes

EXAMPLE *Externally-threaded component* and *metric threaded bolt/screw* are non-leaf characterization classes defined in ISO 13584-511 .

3.28

non-quantitative data element type

data element type that identifies or describes an object by means of codes, abbreviations, names, references or descriptions

3.29

part

material or functional product that is intended to constitute a component of different products

[ISO 13584-1:2001, definition 3.1.16]

3.30

parts library

computer-sensible product ontology and computer-sensible description of a set of products by means of references to this ontology

NOTE This definition supersedes the definition given in the first edition of this part of ISO 13584, which was the following: “identified set of data and possibly programs which can generate information about a set of parts”.

3.31

product

thing or substance produced by a natural or artificial process

NOTE In this part of ISO 13584, the term product is taken in its widest sense to include devices, systems and installations as well as materials, processes, software and services.

3.32

product categorization

part categorization

categorization

recursive partition of a set of products into subsets for a specific purpose

NOTE 1 Subsets which appear in a product categorization are called product categorization classes, or product categories.

NOTE 2 A product categorization is not a product ontology. It cannot be used for characterizing products.

NOTE 3 No property is associated with categorizations.

NOTE 4 Several categorizations of the same set of products are possible according to their target usage.

EXAMPLE The UNSPSC classification, defined by the United Nations, is an example of a product categorization that was developed for spend analysis.

NOTE 5 Using the *is-case-of* relationship, several product characterization class hierarchies can be connected to a categorization hierarchy to generate a single structure.

3.33

product categorization class

part categorization class

categorization class

class of products that constitutes an element of a categorization

EXAMPLE *Manufacturing Components and Supplies*, and *Industrial Optics* are examples of a product categorization class defined in the UNSPSC.

NOTE 1 No rule is given in this part of ISO 13584 about how to select categorization classes. This concept is introduced (1) to clarify its difference with characterization class, and (2) to explain that the same characterization class can be connected to any number of categorization classes.

NOTE 2 There is no property associated with a categorization class.

3.34

product characterization

part characterization

description of a product by means of a product characterization class to which it belongs and a set of property value pairs

EXAMPLE *Hexagon_head_bolts_ISO_4014 (Product grades = A, thread_type=M, length= 50, Diameter = 8)* is an example of a product characterization.

3.35

product characterization class

part characterization class

characterization class

class of products that fulfil the same function and that share common properties

NOTE Product characterization classes can be defined at various levels of details, thus defining a class inclusion hierarchy.

EXAMPLE *Metric threaded bolt/screw* and *hexagon head bolt* are examples of product characterization classes defined in ISO 13584-511. The first characterization class is included in the second one. *Transistor* and *bipolar power transistor* are examples of product characterization classes defined in IEC 61360-4-DB. The second one is included in the first one.

3.36

product ontology

part ontology

ontology

model of product knowledge, done by a formal and consensual representation of the concepts of a product domain in terms of identified characterization classes, of class relations and of identified properties

NOTE 1 Product ontologies are based on a class-instance model that allows one to recognize and to designate the sets of products, called characterization classes, that have a similar function (e.g., *ball bearing*, *capacitor*), but also to discriminate within a class the various subsets of products, called instances, that are considered as identical. It is advisable that the rules defined in ISO 1087-1 be used for formulating designation and definitions of characterization classes. Instances have no definitions. They are designated by the class to which they belong, and a set of property-value pairs.

NOTE 2 Ontologies are not concerned with words but with concepts, independent of any particular language.

NOTE 3 “Consensual” means that the conceptualization is agreed upon in some community.

NOTE 4 “Formal” means that the ontology is intended to be machine interpretable. Some level of machine reasoning is logically possible over ontology, e.g., consistency checking, making inferences.

NOTE 5 “Identified” means that each ontology characterization class and properties are associated with a globally unique identifier allowing one to reference this concept from any context.

NOTE 6 The data model for ontology recommended in this part of ISO 13584 is the common ISO13584/IEC61360 dictionary model, whose simplest version is documented in this part of ISO 13584. More complete versions are documented in ISO 13584-25 and IEC 61360-5 (conformance classes 1, 2, 3 and 4 of both documents).

NOTE 7 In this part of ISO 13584, each product ontology addressing a particular product domain compliant with the common ISO13584/IEC61360 dictionary model is called a reference dictionary for that domain.

EXAMPLE The reference dictionary for electric components, which is defined in IEC 61360-4-DB, is a product ontology for electric components compliant with the common ISO13584/IEC61360 dictionary model. It is agreed upon by all member bodies of IEC SC3D. A corporate reference dictionary is agreed upon by experts designated by management on behalf of the company.

3.37

property

defined parameter suitable for the description and differentiation of products

NOTE 1 A property describes one aspect of a given object.

NOTE 2 A property is defined by the totality of its associated attributes. The types and number of attributes that describe a property with high accuracy are documented in this part of ISO 13584.

NOTE 3 This part of ISO 13584 has identified three different kinds of properties: product characteristics, context parameters and context-dependent product characteristics.

NOTE 4 This definition of property supersedes the previous definition from the first edition of this part of ISO 13584 that was the following: “an information that can be represented by a data element type”.

NOTE 5 In the ISO 13584 standard series, a property value is represented as a data element type.

3.38

property data type

allowed set of values of a property

3.39

property definition class

product characterization class in the context of which a product property is defined

NOTE In the common ISO13584/IEC61360 dictionary model, each product property has one property definition class that defines its domain of application. The property is only meaningful for this class, and all its subclasses, and it is said to be *visible* over this domain.

EXAMPLE In ISO 13584-511, *wrenching height* has *nut* as its property definition class and *major diameter of external thread* has *metric external thread* as its property definition class.

3.40

quantitative data element type

data element type with a numerical value representing a physical quantity, a quantity of information or a count of objects

3.41

reference dictionary

product ontology compliant with the common ISO13584/IEC61360 dictionary model

NOTE In the ISO 13584 standard series, a product ontology that addresses a particular product domain, based on the common ISO13584/IEC61360 dictionary model, is called a reference dictionary for that domain.

3.42**resource construct**

collection of EXPRESS language entities, types, functions, rules and references that together define a valid description of data

[ISO 13584-1:2001, definition 3.1.21]

NOTE This definition is adapted from the definition of resource construct in ISO 10303-1:1994, i.e., “the collection of EXPRESS language entities, types, functions, rules and references that together define a valid description of product data”.

3.43**subclass**

class that is one step below another class in a class inclusion hierarchy

NOTE In the common ISO13584/IEC61360 dictionary model, class inclusion hierarchies are defined by the *is-a* relationship. They can also be established by the *case-of* relationships.

3.44**superclass**

class that is one step above another class in a class inclusion hierarchy

NOTE 1 In the common ISO13584/IEC61360 dictionary model, class inclusion hierarchies are defined by the *is-a* relationship. They can also be established by the *case-of* relationships.

NOTE 2 In the common ISO13584/IEC61360 dictionary model, a class has at most one superclass specified by means of an *is-a* relationship.

3.45**supplier library**

parts library of which the information supplier is different from the library user

NOTE This definition supersedes the definition given in ISO 13584-1:2001, that was the following: “set of data, and possibly of programs, for which the supplier is defined and that describes in the standard format defined in this International Standard a set of products and/or a set of representation of products”.

3.46**visible property**

property that has a definition meaningful in the scope of a given characterization class, but that does not necessarily apply to the various products belonging to this class

NOTE 1 Meaningful in the scope of a given characterization class means that a human observer is able to determine, for any product of the characterization class, whether the property applies, and, if it applies, to which product aspect it corresponds.

NOTE 2 The concept of a visible property allows sharing the definition of a property among product characterization classes where this property does not necessarily apply.

EXAMPLE The *non-threaded length* property is meaningful for any class of *screw* but it applies only to those screws that have a non-threaded part. It can be defined as visible at the *screw* level, while becoming applicable only in some subclasses.

NOTE 3 All the visible properties of a superclass that is a product characterization class are also visible properties for its subclasses.

NOTE 4 To facilitate integration of component libraries and electronic catalogues based on ISO 13584-24:2003 and ISO 13584-25, these parts of ISO 13584 request that only properties that are applicable to a class be used to characterize their instances in component libraries and electronic catalogues.

NOTE 5 This definition of a visible property supersedes the previous definition from ISO 13584-24:2003 that was the following: “a property that is defined for some class of products and that does not necessarily apply to the different products of this class of products”.

4 Abbreviated terms

BSU	Basic Semantic Unit
DET	Data Element Type
ICS	International Classification of Standards
IRDI	International Registration Data Identifier
MathML	XML schema for mathematical notations
SI	Système International d'Unités (International System of Units)
UNSPSC	United Nations Standard Products and Services Code

5 Description of a hierarchy of characterization classes of products

5.1 Relationships between product categorization and product ontologies

This part of ISO 13584 provides the resource constructs for developing two kinds of product hierarchies:

- product categorizations, often called classifications, where sets of products are recursively split into subsets for organization purpose, such hierarchies are not associated with properties, and
- product ontologies, where characterization classes of products are specialized into more precise characterization classes for product characterization purposes, such classes are associated with properties.

Product categorizations are never used for characterizing products. Thus, changes in product categorizations do not affect product characterizations as they might be recorded in product structure or in a database. Contrariwise, changes in product ontologies affect all existing product characterizations. Product categorizations and product ontologies have a quite different life cycle. Product ontologies should be very stable when product categorizations may change over time, over space and over kinds of users without any consequence for product characterizations.

As a consequence, product categorizations and product ontologies shall never be mixed, nor connected by is-a relationships. When it proves useful to organize various ontologies into a single structure, or into several searching structures, characterization classes may be connected to categorization classes using the case-of relationship.

5.2 Relationships between classes

5.2.1 Class inclusion relationship

In object-oriented analysis, class inclusion relationship, also called subsumption, constitutes a basic operation of modeling domain knowledge. A class A1 is said to be subsumed by a class A if, in any context, every object belonging to A1 also belongs to A.

In most object-oriented languages, class inclusion relationship is represented by inheritance: if A subsumes A1, not only all instances of A1 belong to A, but also all properties defined for A also apply to A1. Moreover, this inheritance mechanism is the only mechanism which allows two classes to share the same properties. This identification of class inclusion and inheritance, which often leads to multiple inheritance, makes object-oriented models not modular and poorly reusable in contexts slightly different from the ones where they were designed for. To provide for modularity of product ontologies, two different representations of the class inclusion relationship are defined for the ontology model defined in the ISO 13584 series of standards.

- The usual is-a relationship, defined in this part of ISO 13584, allows single groups or organizations to build single subsumption hierarchies, either product ontologies or product categorizations, with simple inheritance of properties for *product ontologies*.
- The case-of relationship, whose EXPRESS resource constructs are defined in Annex F of this part of ISO 13584, provides for modularity of ontologies. It does not imply any automatic inheritance, but it allows the subsumed class to explicitly import some or all of the properties which are visible and/or applicable for the subsuming class. This relationship allows in particular: (1) to link a characterization class to one or several categorization classes, (2) to import in the context of some standardized characterization hierarchies some properties already defined in other standardized characterization hierarchies, (3) to connect a user dictionary to one or several standardized characterization hierarchies (see Annex J), (4) to describe a product using the properties of different classes. When products of a class A1 fulfil two different functions, and thus should be described by properties associated with two different classes, A and B, A1 may be connected by is-a to e; g., A, and by case-of to B.

Note that class inclusion relationship may be used both for grouping several subclasses, that represent different kinds of objects, within a common abstract superclass, and for defining several specialization of a kind of object, defined by a particular superclass, into more specialized kinds of the same object, defined by specialized subclasses. In both cases, is-a relationship is used if inheritance is implied, case-of is used when no inheritance is implied.

5.2.2 Aggregation and composition

Products may be assemblies of other products. For instance a bolted assembly may consist of a bolt, a washer and a nut. Such a relationship is often called *aggregation*.

Some products may also be difficult to characterize using simple properties. They may be more easily described by several features of the product, each one described both by referencing a characterization class and by property-value pairs. Such a relationship between a characterization class and each of its feature classes is often called a *composition* relationship.

EXAMPLE 1 A screw is more easily characterized by separately specifying its head (belonging e. g., to *hexagonal head class*, with a *height* and a *distance across flats*), its thread (belonging e. g., to *metric thread class*) and its driving feature. The relationship between the screw class and each of its feature classes is a *composition* relationship.

Aggregation and composition need to be conceptually distinguished. Aggregation applies when a product that is included in another product may exist independently of the latter. The assembly has not necessarily the same life cycle as its components, and it is possible that a component changes without control of the assembly. Contrariwise, composition applies for features that have exactly the same life cycle as their embedding products, that may not exist without their embedding product and that may not change without changing the product to which they belong. Thus, distinction between composition and aggregation, and between feature and stand-alone product is clearly defined at the conceptual level.

But this conceptual difference should not necessarily be reflected at the data representation level.

EXAMPLE 2 An ISO-standardized screw thread can only exist as part of a screw. Thus, at the conceptual level, it is considered as a property of screws (composition). Nevertheless, ISO-standardized screw threads only exist in a limited set of dimensions. Thus, For an efficient data storage and exchange, it should be possible at the data level:

- to consider ISO-standardized screw threads as a set of predefined instances that may be e. g., stored in a table,
- to exchange this set of instances independently of any screw, and
- to describe a screw without embedding its thread property values, but just referencing a thread instance, possibly exchanged separately.

In the common ISO13584/IEC61360 dictionary model, composition and aggregation are considered as a conceptual difference without particular requirements on data representation. Both products and feature shall be modeled as **item_classes**, and both composition and aggregation relationships are represented by means of a property. The conceptual difference is established by a particular Boolean attribute of **item_class** called **instance_sharable**. An **item_class** of which **instance_sharable** equals *true* represents a stand-alone product that exists independently of any aggregation relationship. The same real world instance of such a

class may be referenced by any number of other real world instances. An **item_class** of which **instance_sharable** equals *false* is a feature class that represents a composite property. A real world instance of such a class may only exist when embedded in exactly one product. Nevertheless, it is implementation dependent to decide whether several real world instances of features modeled by the same set of property-values pairs are represented by several EXPRESS pieces of data or by the same piece of data in the data exchange file.

5.3 Simultaneous description of characterization classes of products and products properties

A characterization hierarchy shall be organized as one or several tree-structures with single inheritance. At each level of the hierarchy, the subclasses of a characterization class of products should be mutually exclusive, whenever possible.

- Roots of each hierarchy shall be a characterization class of products that includes all the products that are intended to be characterized by the characterization hierarchy.
- Below a root, each non-leaf characterization class shall be split into non-leaf characterization subclasses until leaf characterization classes of products are obtained. In choosing these characterization classes, the instantiation rule (RULE 3) is important. Each of these characterization classes may be used for product characterization purpose.

It is often recommended to start from the leaf characterization classes that correspond to those families of products which are currently of widespread use in the domain and such that for each class all its instances may be described by the same properties. Then non-leaf characterization classes are created progressively above these classes using the instantiation rule criterion defined in 6.1.3.

Both the standardized characterization hierarchies and any particular supplier hierarchy shall simultaneously define the following:

- (hierarchical) characterization classes of products;
- (non hierarchical) properties.

The meaning of each characterization class of products and of each property shall be such that a human observer shall be able to determine, for a given product:

- those characterization classes of products to which it belongs and those to which it does not belong;
- that aspect of the product to which every applicable property corresponds.

The simultaneous definition of characterization classes of products and of properties related to every characterization class of products improves their definition. The extent of a characterization class of products becomes clearer through the properties that apply to its products; the meaning of a property is explained by the characterization class of products defining its field of possible application.

By defining characterization classes of products through a hierarchy with inheritance, the definition of each property can be factored to the highest characterization class level for which this property is meaningful and may be applicable in various subclasses.

5.4 Applicable and visible properties

Thus, for defining a precise characterization hierarchy, two kinds of requirements shall be addressed.

- The precise definition of a property requires to refer in its definition to the kind of products for which the property is meaningful.
- The precise definition of a class requires to provide criteria for class membership.

In the ISO 13584 standard series, these two requirements are represented by means of two of class- property relationships.

- The domain for which a property is meaningful is specified by means of a class that constitutes its *property definition class*. The textual definition of the property contains in general references to this class. Thus, only products that are member of the property definition class of a property, or of any class included in that class, may have an aspect that can be mapped unambiguously onto the property. The property is said to be *visible*, i.e., meaningful, for this class and all its subclasses.

EXAMPLE 1 The *relubrication feature* defined within the *bearing* class as "device which allows lubricant to reach the rolling or sliding surface of a bearing" is clearly defined for any bearing. But it cannot be used unambiguously for characterizing any product that is not a *bearing*.

- The criteria for class membership is specified by means of a set of properties. Only those products that have an aspect corresponding to each of these properties are members of the class. All these properties that are criteria for class membership are said to be *applicable* to this class.

EXAMPLE 2 The *bore diameter* and the *outside diameter* are properties of a *rolling bearing*. A product for which such characteristics do not exist is not a *rolling bearing*.

All the products of a subclass being members of its superclasses, applicability is inherited through a class inclusion hierarchy.

EXAMPLE 3 The *bore diameter* and the *outside diameter* are properties that necessarily exist for all products belonging to a subclass of *rolling bearing* such that: *ball bearing* and *roller bearing*.

When a property *P* is defined with a class *C* as its property definition class, it may arrive that some products in *C* have no aspect that corresponds to *P*. Thus not all the visible properties of a class are necessarily applicable properties for that class. It is the reason why visible properties and applicable properties need to be distinguished.

EXAMPLE 4 A *relubrication feature* does not exist for sealed bearings for which lubrication is done one and for all. Nevertheless, sealed bearings are *bearings*.

The root of the tree where a property is visible is to be selected when the property is defined because a property definition shall include the specification of the property definition class. Applicable properties shall be defined when a characterization class is defined. There exist two mechanisms for creating an applicable property in a characterization class:

- the first one is to turn on as applicable a property that is already specified as visible for this class, possibly through inheritance;
- the second one is to import the property from another class, possibly belonging to another hierarchy, through the case-of class to class relationship. The case-of relationship expressing the fact that the definition of the referenced class also covers the referencing class products, properties of the referenced class are meaningful for product of the referencing class.

NOTE 1 The main goal of the case-of relationship is to share properties across different hierarchies

NOTE 2 To facilitate integration of component libraries and electronic catalogues based on ISO 13584-24:2003 and ISO 13584-25, these parts of ISO 13584 request that only properties that are applicable to a class be used to characterize their instances in component libraries and electronic catalogues.

5.5 Purpose of a standardized characterization hierarchy

Due to the diversity of the real world, the characterization classes of products and the properties forming a standardized characterization hierarchy are not intended to exhaustively describe every product. They are only aimed at characterizing the various products of a domain by means of those characterization classes and those properties on which consensus has been reached. Among other capabilities, standardized characterization hierarchies should at least provide for:

- multi-supplier characterization;

- interchangeability between different products;
- multi-supplier search.

5.6 Use of the standardized characterization hierarchy

When describing his/her own products a user of the ISO 13584 standard series may choose:

- to make reference to standardized characterization classes of products and properties, when they are defined by the standardized characterization hierarchy;
- to define its own characterization hierarchy, and to connect it to one or several standardized characterization hierarchies using the case-of relationship defined in Annex F of this part of ISO 13584, importing from it all the properties that prove useful in its context.

In the latter case, the user shall connect each of his/her characterization classes of products to the lowest characterization class of the standardized characterization hierarchy that includes all the products of this characterization class. Then, the user may refine this characterization class with more specific classes as needed. The higher the level of the connection is, the less the user will be able to take advantage of the standardized characterization hierarchy and of the corresponding properties (see Annex J).

The first approach is simpler. The second approach allows to build a hierarchy more adapted to the particular needs of each particular user. Anyway, thanks to the importation mechanism defined by the case-of relationship, automatic integration of data from different sources may be performed for all those data that reference standard-defined properties.

5.7 Class valued property

Due to the diversity of the perspectives that may be adopted for a set of objects of the real world, different structures for a non-leaf characterization class of products may emerge (see example in section 6.1.4).

In this case, the structure that permits the maximum applicability of the factored properties shall be selected for the standardized characterization hierarchy. Each other perspective considered relevant is represented as a property that may only be assigned one single value to a characterization class of the tree. The assignment of the property to a characterization class may be defined at any level of the subtree. The value assigned this way is inherited by all the subclasses.

The data type of such a property is represented as a set of unique codes. Each code is associated with different human readable and translatable representations.

Querying particular values of this property at the level of some non-leaf characterization classes would allow to retrieve sets of subclasses of this class independently of the hierarchical decomposition of this class.

5.8 Compatibility between ISO 13584 and IEC 61360 standard series

The schemata presented in this part of ISO 13584 have been developed as a joint effort ISO TC184/SC4/WG2 and IEC SC3D to combine the requirements of IEC 61360 and ISO 13584 users. As explained in F.1.2, these schemata have been further extended to constitute the common ISO13584/IEC61360 dictionary model of which the schemata presented in this document are the simplest functional subset. This subset is documented both in IEC 61360-2 and in this part of ISO 13584, and it is allowed for use, both in the context of ISO 13584 and in the context of IEC 61360, for exchanging simple dictionary data.

The schemata presented in this document contain a number of entities defined as abstract supertypes without any subtype defined. These resources are mechanisms that provide for latter extensions. As specified by the ISO 10303-11:1994 entities defined as abstract supertypes cannot be directly used.

Two attributes defined in the schema documented in this part of ISO 13584 were specifically designed to address IEC 61360 particular requirements. These extensions are as follows:

- a) in the **item_class** entity, the optional **value_code** attribute;
- b) in the **value_domain** entity, the optional **terms** attribute.

These optional attributes are not recommended for use by ISO users. Nevertheless these attributes are part of the common ISO13584/IEC61360 dictionary model and they shall be processed by any implementation that claim conformance to either standard to ensure full interoperability between ISO 13584 and IEC 61360 dictionary data.

6 Rules for creating hierarchies of characterization classes of products

To simplify the analysis when creating standardized characterization hierarchies or supplier hierarchies, the following rules, that allow the splitting of the analysis into two phases, should be applied. The first set of rules refers to the choice of the characterization class hierarchy. The second set of rules refers to the association of properties with characterization classes of products. In fact the process should be iterative. Identification of new properties might lead to reconsidering some design choices done during class hierarchy development, and vice versa.

6.1 Choice of characterization class hierarchy

6.1.1 Field of application

RULE 1 – Field covered by the hierarchy.

The definition of the root class of a characterization hierarchy shall clearly identify all the products that may be characterized using this characterization hierarchy.

It is recommended to develop standardized characterization hierarchies for each product domain addressed by ISO or IEC standards.

The root of such hierarchies, and/or possibly some other nodes, may be connected with the International Classification of Standards (ICS) to clarify the domain covered by the hierarchy.

NOTE Connection with the ICS, and possibly with other categorizations may be formally expressed using the case-of relationship defined in Annex F of this part of ISO 13584.

6.1.2 Upper section of the class hierarchy

RULE 2 – Organization of a product domain.

The role of the upper section of a standardized characterization hierarchy is to organize the various aspects of a product domain using class inclusion relationships and to factorize properties. This may lead to define abstract classes that gather items that are different in nature, such that products classes and feature classes provided that some visible properties need to be shared at these levels. Such classes are said to be abstract because all members of such classes are necessarily also members of some of their subclasses.

When there is no need to share some properties across items that are different in nature, such that products classes and feature classes, separate hierarchies may be defined.

6.1.3 Lower section of the class hierarchy

RULE 3 – Instantiation rule.

Below the upper section of the hierarchy, a characterization class of products shall be created only:

- when it is possible and advisable to order or to search for a product by characterizing it as a member of this characterization class, or

- when a user could reasonably choose a product of such a characterization class to represent a significant state (phase) of his design process.

EXAMPLE To group screws for metal, wood and sheet metal within one characterization class "screws", is contradictory to the rule of instantiation. During a design process a designer would never select a screw without knowing if this screw was a machine screw or a wood screw. Therefore, it is necessary to define below the upper section "bolts/screws/studs" different characterization classes of products for the different types of screws.

6.1.4 Multiple perspectives on the class hierarchy

It may appear that at some point in the class hierarchy, several point of views can be used to define a substructure for that hierarchy.

RULE 4a – Maximum applicability

When the application of the instantiation rule (RULE 3) leads to different possible structures of some characterization classes depending upon a point of view, the structure that enables the maximum applicability of the factorized properties shall be selected.

RULE 4b – Class valued properties

The other points of views considered essential for selection purposes – not selected however for the structure according to the maximum applicability rule (RULE 4a) – shall be represented by means of class valued properties (cf. paragraph 5.7). Those are intended to be queried by the user to select a set of characterization classes that correspond to the other points of view.

RULE 4c – Class valued assignment level

A class valued property shall be assigned a value at the level of a characterization class where that property value applies for *every* leaf characterization class of the corresponding subtree and does not apply for the immediate parent characterization class.

EXAMPLE The characterization class of circular bearings may split up into ball, needle and conical bearings or into sealed bearings and non-sealed bearings. The first perspective is selected for structuring purposes (RULE 4a). A class valued property, named "is_sealed", that is intended to take a constant BOOLEAN value in the lower characterization classes is defined as class valued property at the circular bearing characterization class level (RULE 4b). That property is assigned a value in all the classes whose all bearings are either sealed (*is_sealed* = *TRUE*) or unsealed (*is_sealed* = *FALSE*).

6.2 Association of properties

6.2.1 Properties to be considered

RULE 5 – Choice of properties.

As a minimum, those properties that characterize a non-leaf characterization class of products and that can be used when searching products for every sub-class of this non-leaf characterization class of products, shall be associated as visible or as visible and applicable as appropriate with the standardized characterization hierarchy.

Those properties that are not used (or rarely used) for searching purposes can be added as appropriate.

6.2.2 Semantic identification of properties

The following rule gives two criteria for deciding when two properties have the same semantics.

RULE 6 – Semantic identification

Two characteristic properties of two different products shall be factored to a higher level of the hierarchy, if and only if, they are considered to have the same semantic meaning. Such a decision shall be justified by satisfying one of the two following criteria:

- interchangeability criterion: the two products can, in some circumstances, be interchangeable and when interchanged the two characteristic properties shall have identical values;
- criterion of homogeneity in processing: the two properties play an identical role with respect to some process, automatic or non automatic, that might be performed over a set of products.

Otherwise, two different properties shall be defined.

EXAMPLE 1 The properties thread diameter of hexagon head screws and cylindrical head screws fit the interchangeability criterion.

EXAMPLE 2 The properties mass (calculation of the total mass of a product), designation (for part lists), diameter of conical attachment of tools (for automatic tool exchange) or the outside diameter of cylindrical electronic components (for automatic placement) fit the criterion of homogeneity in automatic processing.

EXAMPLE 3 A thread diameter of a screw for wood or of a screw for metal is characteristic properties that are not represented as the same property.

6.2.3 Factoring rule

It is not possible in every case to define a hierarchy in which:

- every property having the same semantics in several subclasses is factorized (i.e. defined only once and inherited) as a unique property at the level of the ascendant characterization class;
- any property defined at the level of a non-leaf characterization class of products applies actually (i.e. has a value) to every product in every sub-class.

To create an intermediate characterization class in order to factorize a property may be prevented by the instantiation rule (RULE 3) that is used for defining the characterization class hierarchy.

The following rule provides guidelines for systematically factorizing of properties having the same semantics while maintaining the instantiation rule.

RULE 7 – Applicability of inherited properties.

Two properties having the same semantics (RULE 6) in two characterization classes shall be factorized as a unique property defined at the level of the common ascendant characterization class. If this property does not apply to some subclasses, it shall be defined as a visible property. This property may be specified as applicable in the various subclasses where it is visible. When a property is specified as applicable, its definition shall be such that for any sub-class there is no doubt about its applicability, and when it applies, there is no doubt about the product aspect it corresponds to.

EXAMPLE 1 The property "material", the definition of which would be "material from which the product is made" cannot be factored; we do not know for example to which property it corresponds for a turning tool with carbide brazed tip.

EXAMPLE 2 The property "single material", whose definition would be "property only applicable to products made from one single material; the value of this property is the code of the single material", corresponds with the semantic identification rule (RULE 7).

7 Dictionary elements that describe properties of products

Properties of a product are classified into:

- product characteristics;
- context dependent characteristics;
- context parameters.

7.1 Mapping of properties onto the common ISO13584/IEC61360 dictionary model

In the common ISO13584/IEC61360 dictionary model, a property is mapped onto a **property_BSU** that carries its identification and a **property_DET** that provides its description. Note that **property_DET** is abstract, thus its subtypes have to be used.

A product characteristic is mapped onto the **non_dependent_P_DET** subtype of **property_DET**, a context dependent characteristic is mapped onto the **dependent_P_DET** subtype of **property_DET** and a context parameter is mapped onto the **condition_DET** subtype of **property_DET**. NOTE Context parameters and context dependent characteristic shall be represented at least when they prove useful for selection purposes.

The characterization class that defines the visibility of a property is mapped onto the **property_BSU.name_scope** attribute. The applicability of a property is defined by the class(es) to which it is applicable through the **class.described_by** attribute of this(these) class(es).

In this section, the main attributes linked directly or indirectly to a property are described.

7.2 Attributes

Each product property is described by a dictionary element that contains the following attributes:

- code;
- definition class;
- data type;
- preferred name;
- short name;
- preferred letter symbol;
- synonymous letter symbols;
- synonymous name;
- property type classification;
- definition;
- source document of definition;
- note;
- remark;
- unit;
- condition;
- formula;

- value format;
- date of original definition;
- date of current version;
- date of current revision;
- version number;
- revision number;
- is deprecated;
- is deprecated interpretation;
- administrative data.

The entry for each attribute is structured in the following way (entries may be omitted if not applicable):

- Name of the attribute;
- Obj: Objective;
- Descr: Description;
- Oblig: Obligation;
- Trans: Need for translation;
- For: Representation format or maximal number and type of characters if it is a string;
- Mapp: Mapping onto the attributes used in the common ISO13584/IEC61360 dictionary model;
- Expl: Example.

NOTE For internal purposes within a company, other attributes and/or other codes for some attributes can be defined but they cannot be used for exchange purposes.

7.2.1 Code

- Obj: To identify a property within a characterization class of products and to allow an absolute identification within the data dictionary when it is associated with the information supplier code and with a version number.
- Descr: A basic semantic unit associated with the property.
- Oblig: Mandatory.
- Trans: No translation.
- Mapp: **property_DET\dictionary_element.identified_by\basic_semantic_unit.code**

7.2.2 Definition Class

- Obj: To specify for which characterization class the property is defined.
- Descr: The code of the characterization class that is the root of the tree where this property is visible.
- Oblig: Mandatory.
- Trans: No translation.

Mapp: **property_DET\dictionary_element.identified_by\property_BSU.name_scope**

7.2.3 Data Type

Obj: To specify the data type of the property. The data type describes the set of values that may be assigned to a property.

Descr: A type conforming to the type system specified in the common ISO13584/IEC61360 dictionary model that specifies the data type of the property.

Oblig: Mandatory.

Trans: No translation.

Mapp: **property_DET.domain**

NOTE **property_DET.domain** refers to **data_type** which again will be subtyped for the various possible data types. Thus, the data type is directly attached to the property. However, an identification mechanism using a **named_type** and a **data_type_BSU** is also available for the cases where the same data type is intended to be used for different properties. When a **data_type** is intended to be used by different properties, the definition of this **data_type** as a **named_type** provides for separate up-dating of the data-type and of the properties that refer to it.

7.2.4 Preferred Name

Obj: To give a name of the property (in full length where possible). It is used for communication and understanding.

Descr: The preferred name is identical to the name that is used in International Standards if available. If the preferred name in the International Standard is longer than the maximum length allowed for this attribute it shall be meaningfully abbreviated.

Oblig: Mandatory.

Trans: To be translated.

For: 255, alphanumeric.

Mapp: **property_DET\class_and_property_elements.names\item_names.preferred_name**

Expl: Threaded diameter

7.2.5 Short Name

Obj: To give a name of the property for representation in limited space.

Descr: It is a meaningful abbreviation of the preferred name. If standardized abbreviations exist they should be used. It can be identical to the preferred name or letter symbol.

Oblig: Optional.

Trans: To be translated, in the case that the short name is identical to the letter symbol, it shall be the same in all languages.

For: 30, alphanumeric.

Mapp: **property_DET\class_and_property_elements.names\item_names.short_name**

Expl: thread_diam.

7.2.6 Preferred Letter Symbol

Obj: To allow a shorter name of the property. When it exists, it is used in place of the short name for representation in tables, formula, drawings etc...

Descr: The letter symbol is unique within a characterization class of products. It shall be derived from International Standards. The preferred letter symbol is always provided in a text representation. It may also be provided in a MathML-Text representation.

EXAMPLE ISO 80000/IEC 80000 (formerly ISO 31), IEC 60027 , IEC 60748 and product standard may be source of letter symbols.

Oblig: Optional.

Trans: No translation.

For: Alphanumeric and MathML format (if provided).

Mapp: **property_DET.preferred_symbol**

7.2.7 Synonymous Letter Symbol

Obj: To allow further shorter name of the property. It is used for representation in tables, formula, drawings etc...

Descr: The letter symbol is unique within a characterization class of products. It shall be derived from International Standards.

EXAMPLE Examples of such standards are ISO 80000/IEC 80000 (formerly ISO 31), IEC 60027 , IEC 60748 or product standards.

None, one or more synonym letter symbols are allowed. The synonym letter symbol is always provided in a text representation. It may also be provided in an MathML representation.

Oblig: Optional.

Trans: No translation.

For: Alphanumeric and MathML format (if provided).

Mapp: **property_DET.synonymous_symbols**

7.2.8 Synonymous Name

Obj: Synonyms to the preferred name may be provided to facilitate transition from names used for local or historical reasons.

Descr: Alternative designation that differs from the given preferred name but represents the same concept. None, one or more synonymous names are allowed.

Oblig: Optional.

Trans: To be translated.

For: 255, alphanumeric.

Mapp: **property_DET\class_and_property_elements.names\item_names
.synonymous_names**

7.2.9 Property Type Classification

Obj:	To classify the different properties defined in order to make large collections of property definitions more manageable.
Descr:	The whole set of properties are divided into subsets according to the categories defined in ISO 80000/IEC 80000 (formerly ISO 31). The property type classification attribute is the reference to the ISO 80000/IEC 80000 category that is relevant for the property.
Oblig:	Optional.
Trans:	No translation.
For:	One capital letter and two digits.
Mapp:	property_DET.DET_Classification

NOTE A survey of the main classes and categories of properties in ISO 80000/IEC 80000 is given in Annex A. The ISO 80000/IEC 80000 classification of quantitative measure is given in Annex H. The ISO 80000/IEC 80000 classification of non quantitative properties, also called identifications and indicators, is given in Annex A.

7.2.10 Definition

Obj:	To describe the meaning of the property.
Descr:	Statement that describes the meaning of the property and permits its differentiation from all other properties. It shall be a definition in the sense that it shall be complete and unambiguous. All significant words are free from homonym and synonymy.
Oblig:	Mandatory.
Trans:	To be translated.
For:	Unlimited alphanumeric string.
Mapp:	property_DET\class_and_property_elements.definition

7.2.11 Source Document of Definition

Obj:	A reference to the source document from which the property definition was derived.
Descr:	As a minimum the reference shall be given with the document number and date of issue of the document.
Oblig:	Optional.
Trans:	To be translated.

NOTE When the document is represented as an identified_document. The name of the document may be provided in various languages. In an exchange conforming to ISO 13584-25 or to ISO 13584-35 (OntoML) the documents themselves may be exchanged in various languages.

For:	Alphanumeric. An identifier of the document.
Mapp:	property_DET\class_and_property_elements.source_doc_of_definition\identified_document.document_identifier

7.2.12 Note

Obj:	To provide further information on any part of the definition, which is essential for the understanding of that definition.
Descr:	It shall be copied from the definition in the source document into the definition of the property.
Oblig:	Optional.
Trans:	To be translated.
For:	Unlimited alphanumeric string.
Map:	property_DET\class_and_property_elements.note

7.2.13 Remark

Obj:	Explanatory text to further clarify the meaning of the usage of the property.
Descr:	Free text remarks. It shall not influence the meaning.
Oblig:	Optional.
Trans:	To be translated.
For:	Unlimited alphanumeric string.
Map:	property_DET\class_and_property_elements.remark

7.2.14 Unit

Obj:	Prescription of the default unit, and possibly of alternative units in which the value of a quantitative property is expressed.
Descr:	A formal model of one or several units, and/or one or several references to a dictionary of units from which the formal model of units may be obtained.

NOTE 1 Identifiers providing for referencing a dictionary of units allow to download the formal model from a resolution service compliant with ISO/TS 29002-20 .

Oblig:	Mandatory (for quantitative data).
Trans:	No translation.
For:	Units are represented as specified in ISO 10303-41 using, if required, the extensions specified in the common ISO13584/IEC61360 dictionary model. Mathematical strings may also be provided. A mathematical string is always provided in a text representation. It may also be provided in MathML representation. Reference to a dictionary of units is done by identifiers compliant with ISO 29002 standard series.
Map:	property_DET.domain\int_measure_type.unit or property_DET.domain\real_measure_type.unit or property_DET.domain\rational_measure_type.unit and/or property_DET.domain\int_measure_type.unit_id or property_DET.domain\real_measure_type.unit_id or property_DET.domain\rational_measure_type.unit_id and/or property_DET.domain\int_measure_type.alternative_units or property_DET.domain\real_measure_type.alternative_units or property_DET.domain\rational_measure_type.alternative_units and/or property_DET.domain\int_measure_type.alternative_unit_ids or

property_DET.domain\real_measure_type.alternative_unit_ids or
property_DET.domain\rational_measure_type.alternative_unit_ids

NOTE 2 The data model allows alternative units, but when alternative units are allowed, they are listed in the property definition and each property value represented according to one alternative unit is associated with its corresponding unit.

7.2.15 Condition

Obj: To formally identify the context parameter on which a context dependent characteristic depends.

Descr: To give the code(s) of the adequate context parameter(s).

Oblig: Mandatory for context dependent characteristics.

Trans: No translation.

For: A reference to a set of basic semantic units.

Mapp: **property_DET\dependent_P_DET.depends_on**

7.2.16 Formula

Obj: Rule or statement in mathematical form expressing semantics of a quantitative property. A formula shall not change any essential information of the meaning of that definition.

Descr: It is a mathematical expression of the property definition.

Oblig: Optional.

Trans: No translation.

For: A mathematical string (a mathematical string is always provided in a text representation; it may also be provided in a MathML text representation).

Mapp: **property_DET.formula**

7.2.17 Value Format

Obj: Specification of the length and pattern of the recommended presentation for displaying the value of a property whose data type is either **string_type** or any of its subtype, a **number_type** or any of its subtype or a collection of such values defined either by a **level_type** or an aggregate data type: **list_type**, **set_type**, **bag_type**, **array_type** or **set_with_subset_constraint_type**. If present this attribute provides for guidance to the system about how string and numeric values should be displayed. This guidance shall not contradict the data type and the possible constraints on the property value. The value of this attribute should be compatible with the data type of the property: it should not change this data type, else it should be ignored. The value of this attribute should also be compatible with the possible property constraints defined on the property values by means of the constraint schema provided in this edition of this part of ISO 13584, else it should be ignored.

NOTE 1 **list_type**, **set_type**, **bag_type**, **array_type** and **set_with_subset_constraint_type** are defined in ISO 13584-25.

Descr: When specified, the value format shall be defined according one of the height definitions below. The syntax of these formats is defined in Annex D using a subset of the Extended Backus-Naur Form (EBNF) defined in ISO/IEC 14977.

- a) Non-quantitative data value formats: five definitions. They are intended for properties having a non-quantitative type data-type, i. e., **string_type** or one of its subtype, or collections of such values.

Alphabetic Value Format (A),

Mixed Characters Value Format (M),

Number Value Format (N),

Mixed Alphanumeric or Numeric Characters Value Format (X),

Binary Value Format (B).

- b) Quantitative data value formats: three definitions. They are intended for properties having numeric values, i.e., **number_type** or one of its subtype, or collections of such values.

Integer Value Format (NR1);

Real Numbers with Decimal-Mark Value Format (NR2),

Real numbers with Decimal-Mark and Exponent-Mark Value Format (NR3),

Rational Value Format (NR4).

Oblig: Optional.

Trans: No translation.

For: 80, alphanumeric.

Mapp: **property_DET.domain\simple_type.value_format**

NOTE 2 In case of named types, the value format refers to the value of the data type referenced by the **referred_type** attribute of this **named_type**.

7.2.18 Date of Original Definition

Obj: To show when the property was defined by the information supplier and thus when it was declared as valid by this supplier. This date will never be changed and can be used for verification purpose.

Descr: The entry shall be in accordance with ISO 8601.

Oblig: Optional.

Trans: No translation.

For: 10, alphanumeric.

Mapp: **property_DET\dictionary_element.time_stamps\dates.date_of_original_definition**

Expl: 1967-08-20.

7.2.19 Date of Current Version

Obj: To show the date when the current version was defined.

Descr: The entry shall be in accordance with ISO 8601.

Oblig: Optional.

Trans: No translation.

For: 10, alphanumeric.

Mapp: **property_DET\dictionary_element.time_stamps\dates.date_of_current_version**

7.2.20 Date of Current Revision

Obj: To show the date of the last revision number change.

Descr: The entry shall be in accordance with ISO 8601.

Oblig: Optional

Trans: No translation.

For: 10, alphanumeric.

Mapp: **property_DET\dictionary_element.time_stamps\dates.date_of_current_revision**

7.2.21 Version Number

Obj: To characterise each version of a property. A new version number of a property shall be created whenever a change in some attribute that describes this property influences its use.

NOTE 1 No change is allowed that affects the meaning of a property.

NOTE 2 The changes in a property that affect its version number are defined in Clause 9.

Descr: A string that contains a natural number to indicate the different versions of a property during the life cycle. Version numbers shall be issued in ascending order. A new version of the property shall be generated according to the rules given in Clause 9.

Oblig: Mandatory.

For: 10, numerical.

Trans: No translation.

Mapp : **property_DET\dictionary_element.identified_by\basic_semantic_unit.version**

7.2.22 Revision Number

Obj: To characterise each revision of the same version of a property. A new revision number of a property shall be created when a change in some attribute that describes this property influence neither its meaning nor its use.

NOTE 1 No change is allowed that affects the meaning of a property.

NOTE 2 The changes in a property that affect its revision number are defined in Clause 9.

Descr: A string that contains a natural number used for administrative control of a property. Consecutive revision numbers shall be issued in ascending order for each value of the version of a property. Per property, unique by its identifier, only one revision number is current at any time. A new revision number of the property shall be generated according to the definitions given in Clause 9. When a new version is issued, the revision is set to '0'.

Oblig: Mandatory.

For: 3, numerical.

Trans: No translation.

Mapp: **property_DET\dictionary_element.revision**

7.2.23 Is Deprecated

Obj: To specify whether a property may still be used or shall no longer be used for new characterizations.

NOTE 1 Deprecated properties may be maintained in a reference dictionary to allow users to interpret characterizations defined with previous versions of this dictionary.

Descr: An optional Boolean that specifies, when true, that a particular property has possibly been used in the past but shall no longer be used for new characterizations.

NOTE 2 When this attribute does not exist, the property is not deprecated.

Oblig: Optional.

For: A Boolean value.

Trans: No translation.

Mapp: **property_DET\dictionary_element.is_deprecated**

7.2.24 Is Deprecated Interpretation

Obj: To specify for a deprecated property the deprecation rationale and how instance values of the deprecated property should be interpreted.

Descr: A note that is mandatory when a property is deprecated.

Oblig: Optional.

For: A translatable text.

Trans: To be translated.

Mapp: **property_DET\dictionary_element.is_deprecated_interpretation**

7.2.25 Administrative data

Obj: To record information about the life cycle of a property.

Descr: An entity that represents the source language in which a property description was defined, the list of languages in which the property description is translated and the possible status that defines the life cycle state of the property.

Oblig: Optional.

For: An **administrative_data** entity.

Trans: No translation.

Mapp: **property_DET\dictionary_element.administration**

8 Dictionary elements that describe classes of products

8.1 Mapping of classes onto the common ISO13584/IEC61360 dictionary model

A characterization class is mapped in the common ISO13584/IEC61360 dictionary model onto a **class_BSU** that carries its identification and an **item_class** dictionary element that provides its description. Both instances of products and aspects of products are mapped onto **item_class**.

EXAMPLE 1 The head of a screw is a feature. In ISO 13584-511, it is described by means of the *head* **item_class**.

The **item_class** entity includes an **instance_sharable** attribute that specifies the conceptual status of an item: either a stand-alone item (**instance_sharable** = *true*), or a feature (**instance_sharable** = *false*). Value of this attribute does not imply any constraint at the data representation level.

EXAMPLE 2 The same instance of a screw head class may be referenced by several instances of a screw class. It means that there exists several screw heads, but that all these screw heads have the same characterization class and the same set of property values.

NOTE 1 Two subtypes of **item_class**, named **component_class** and **material_class**, were defined within the dictionary model of the first edition of this part of ISO 13584 and IEC 61360-2. These subtypes are deprecated, and they are removed from this edition of this part of ISO 13584.

NOTE 2 The following changes ensure that a dictionary conforming with the first edition of this part of ISO 13584 conforms to this edition: (1) replace **component_class** and **material_class** by **item_class** throughout the reference dictionary; (2) add to each new **item_class** class the **instance_sharable** attribute, the value of which being *true*.

NOTE 3 Another subtype of **item_class**, named **feature_class**, was provided in ISO 13584-24:2003. This subtype is also deprecated and its usage is not recommended in new implementations of this part of ISO 13584 and IEC 61360-2.

NOTE 4 The following changes ensure that a dictionary conforming with the first edition of this part of ISO 13584 conforms to this edition: (1) replace **feature_class** by **item_class** throughout the reference dictionary; (2) add to each new **item_class** class the **instance_sharable** attribute, the value of which being *false*.

A categorization class is mapped in the common ISO13584/IEC61360 dictionary model onto a **class_BSU** that carries its identification and a **categorization_class** dictionary element that provides its description. Only a subset of the attributes of characterization classes is also used for categorization class. A particular attribute to categorization class, called **categorization_superclasses**, allows to specify its superclasses in the case-of class inclusion hierarchy.

NOTE 5 The case-of relationship for characterization classes also allows to import properties into the case-of class. Thus, this relationship is represented by means of a different attribute. This is defined in Annex F of this part of ISO 13584.

In this section, the main attributes linked directly or indirectly to a class are described.

8.2 Attributes

Each characterization class of products is described by a dictionary element that contains the following attributes:

- code;
- superclass;
- preferred name;
- short name;
- synonymous name;
- visible types;

- applicable types;
- class valued properties;
- visible properties;
- applicable properties;
- class value assignment;
- definition;
- source document of definition;
- note;
- remark;
- simplified drawing;
- date of original definition;
- date of current version;
- date of current revision;
- version number;
- revision number;
- constraints;
- is deprecated;
- is deprecated interpretation;
- administrative data.

Moreover, the dictionary element that describes a categorization class of products also contains the following attribute:

- **categorization_class_superclasses.**

The entry for each attribute is structured in the following way (entries may be omitted if not applicable):

- Name of the attribute;
- Obj: Objective;
- Descr: Description;
- Oblig: Obligation;
- Trans: Need for translation;
- For: Representation format or maximal number and type of characters if it is a string;
- Mapp: Mapping onto the resource constructs used in the common ISO13584/IEC61360 dictionary model;
- Expl: Example.

8.2.1 Code

Obj:	To identify a characterization class or a categorization class of products and to allow an absolute identification within the data dictionary when associated with the information supplier code and with a version number.
Descr:	A basic semantic unit associated with the characterization class of products.
Oblig:	Mandatory.
Trans:	No translation.
Mapp:	item_class\dictionary_element.identified_by\basic_semantic_unit.code

8.2.2 Superclass

Obj:	To reference the immediate unique parent characterization class by the is-a relationship of a characterization class.
Descr:	A basic semantic unit of the immediate parent characterization class of the current characterization class.
Oblig:	Optional (if it does not exist, the class has no superclass).
Trans:	No translation.
For:	A class basic semantic unit.
Mapp:	item_class\class.its_superclass

NOTE 1 When defining a standardized characterization hierarchy, one or several node(s) may have no superclass. These nodes are the root or roots of the hierarchy.

NOTE 2 It is a recommended practice that roots of standardized characterization hierarchies, and/or possibly some other nodes, reference some nodes of the ISO/IEC International Classification for Standards (ICS) predefined tree by the *case-of* relationship to clarify the target domain addressed by each characterization hierarchies, or sub-hierarchies. Other categorization hierarchies may be referenced by the same means as appropriate.

NOTE 3 When a class of the ICS is referenced, the class code to be used is the code defined for that class in the referenced ICS, where dots are replaced by underscores. The version of the class to be used equals '001'. As specified in ISO 13584-26, the supplier code to be used for the first edition of the ICS, published in 1992, is "112/1///_00_1", and the supplier code to be used for the sixth edition, published in 2005, is "112/1///_00_6". Dictionary data suppliers are encouraged to use the more recent editions of the ICS. Other editions are to be identified by a supplier code defined as "112/1///_00_<ICS edition number>", where <ICS edition number> is the integer edition number of the referenced ICS.

8.2.3 Preferred Name

Obj:	To give a meaningful description of a characterization class or a categorization class of products (in full length where possible). It is used for communication and understanding.
Descr:	The preferred name is identical to the name that is used in International Standards if available. If the preferred name in the International Standards is longer than the maximum length allowed for this attribute it shall be meaningfully abbreviated.
Oblig:	Mandatory.
Trans:	To be translated.
For:	255, alphanumeric.
Mapp:	class\class_and_property_elements.names\item_names.preferred_name
Expl:	Screw threads.

8.2.4 Short Name

Obj:	To give a name to a characterization class or a categorization class of products for representation in limited space.
Descr:	It is a meaningful abbreviation of the preferred name. If standardized abbreviations exist they should be used. It can be identical to the preferred name.
Oblig:	Optional.
Trans:	To be translated, in the case that the short name is identical to the letter symbol, it will be the same in all languages.
For:	30, alphanumeric.
Mapp:	class\class_and_property_elements.names\item_names.short_name

8.2.5 Synonymous Names

Obj:	Synonyms to the preferred name of a characterization class or a categorization class may be provided to facilitate transition from names used for local or historical reasons.
Descr:	Alternative designation that defers given preferred name but represents the same concept. None, one or more synonymous names are allowed.
Oblig:	Optional.
Trans:	To be translated.
For:	255, alphanumeric.
Mapp:	class\class_and_property_elements.names\item_names.synonymous_names

8.2.6 Visible Types

Obj:	To define the new named types that may be referred to, as their data type, by the visible properties of this characterization class, or of any of its subclasses (visible type).
Descr:	Different properties may have the same data type of values. EXAMPLE A set of codes that identify materials. Such data types may be defined as named types, independently of any property. They may be, later on, referred to as their data type by different properties. The definition of named type shall contain the code of the named type, the version number of the named type, and the data type of the named type specified by using the resource constructs of the common ISO13584/IEC61360 dictionary model. For the non_quantitative_code_type and non_quantitative_int_type the data type shall be specified as a set of dic_values each one consisting of an unique code and a set of names (possibly translated).
Oblig:	Optional.
Trans:	In case of non_quantitative_code_type and non_quantitative_int_type value names are to be translated
For:	data_type_BSUs and data_type_elements
Mapp:	item_class\dictionary_element.identified_by\class_BSU.added_visible_data_types

NOTE 1 Visible types are inherited.

NOTE 2 Visible types that are not also applicable types may only be referenced to define the data type of the visible properties of the characterization class (or of any of its subclasses).

EXAMPLE A **named_type** "material" may be defined at the level of some characterization class as a **non_quantitative_code_type**. The set of values of this named type consists of a set of codes associated with different (translated) names. This named type may be referenced in some (sub-) characterization class to define the data type of the property that corresponds to the material the products of the characterization class consist of. It may be referenced in some other (sub-) characterization class to define the data type of the property that corresponds to the coating of the products of the characterization class.

8.2.7 Applicable Types

Obj: To define which visible types are allowed as data type for the properties applicable to the characterization class (or any of its subclasses).

Descr: The list of the code of the defined or inherited visible types of the characterization class that become applicable types for the characterization class (and any of its subclasses).

Oblig: Optional.

Trans: No translation.

For: A list of **data_type_BSUs**.

Mapp: **item_class\class.defined_types**.

8.2.8 Class Valued Properties

Obj: To define which properties may be assigned a single value in the product characterization class where it is declared as class valued, or in any of its subclasses.

Descr: A class valued property enables representation of (1) different perspectives on the set of products that belongs to the current characterization class, and (2) properties that takes the same value for all products belonging to a particular class. When a class valued property is defined at the level of some characterization class, the dictionary user may query all the subclasses of this characterization class for which this class valued property is assigned some value.

Oblig: Optional.

Trans: No translation.

For: A list of **property_BSUs**.

Mapp: **item_class.sub_class_properties**

NOTE Class valued properties are inherited. They do not appear in the **sub_class_properties** list of any subclass.

8.2.9 Visible Properties

Obj: To specify the new properties that are defined at the level of this characterization class and may be thus specified as applicable to the characterization class or any of its subclasses (visible properties).

Descr: The new properties (with respect to inheritance) that the products belonging to the non-leaf or leaf characterization class of products may or may not possess according to the subclasses they belong to.

For: A set of **property_BSUs**.

Oblig: Mandatory (possibly empty).

Mapp: **item_class\dictionary_element.identified_by\class_BSU.added_visible_properties**

8.2.10 Applicable Properties

Obj: To specify the new properties that are specified as applicable for that characterization class and for any of its subclasses.

Descr: The new properties (with respect to inheritance) that the products belonging to the non-leaf or leaf characterization class of products shall possess. The properties of this list shall be visible for the characterization class, i.e., they shall be defined as visible either by this characterization class or by a characterization class higher in the hierarchy. The LIST order shall correspond to the default presentation order of the properties in any case where such an order shall be defined.

EXAMPLE To display the properties of some classes on a screen.

For: List of **property_BSUs**.

Oblig: Mandatory (possibly empty).

Mapp: **item_class\class.described_by**

8.2.11 Class Constant Values

Obj: To define the values assigned to some class valued properties declared in the characterization class or in any characterization class higher in the hierarchy.

Descr: Class valued properties are intended to be queried by the user to select a set of characterization classes for which such a property has a given value. Once a value is assigned to a class valued property, this value is inherited and shall not be redefined.

For: A set of **class_value_assignments**.

Oblig: Optional.

Mapp: **item_class.class_constant_values**

8.2.12 Definition

Obj: To clarify the meaning of a characterization class or a categorization class by giving its intention textually.

Descr: Statement that describes the meaning of the characterization class and permits its differentiation from all other characterization classes. It shall be a definition in the sense that it shall be complete and unambiguous. All significant words are free from homonymy (homonym) and synonymy.

Oblig: Mandatory.

Trans: To be translated.

For: **class\class_and_property_elements.definition**

8.2.13 Source Document of Definition

Obj:	A reference to the source document from which a characterization class or a categorization class definition was derived.
Descr:	As a minimum the reference shall be given with the document number and date of issue of the document.
Oblig:	Optional.
Trans:	No translation.
For:	Alphanumeric. An identifier of the document.
Mapp:	class\class_and_property_elements. source_doc_of_definition\identified_document.document_identifier

NOTE In an exchange conforming to ISO 13584-24:2003, the document itself may be exchanged.

8.2.14 Note

Obj:	To provide further information on any part of the definition, which is essential for the understanding of that definition.
Descr:	Free text statement.
Oblig:	Optional.
Trans:	To be translated.
For:	Unlimited alphanumeric string.
Mapp:	item_class\class_and_property_elements.note

8.2.15 Remark

Obj:	Explanatory text to further clarify the meaning of the usage of a characterization class or a categorization class of products.
Descr:	Free text remarks. It shall not influence the meaning.
Oblig:	Optional.
Trans:	To be translated.
For:	Unlimited alphanumeric string.
Mapp:	item_class\class_and_property_elements.remark

8.2.16 Simplified Drawing

Obj:	To provide a visualization, on request of the user, that shows an image of a characterization class or a categorization class of products.
Descr:	A drawing including at least the reference coordinate system of the product (that is to be used for all the representations of this product), and the letter symbols of the main applicable properties.
Oblig:	Optional.