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

Part 42:

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

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de composants —*

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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.

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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

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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.

<https://standards.iteh.ai/catalog/standards/sist/a06fe7b8-ae27-4110-b740-77aa6139f058/iso-13584-42>

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.