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Industrial automation systems and integration — Parts library —

Part 25: Logical resource: Logical model of supplier library with aggregate values and explicit content

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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 13584-25 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

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

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— *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 42: Description methodology: Methodology for structuring part families*

— *Part 101: Geometrical view exchange protocol by parametric program*

— *Part 102: View exchange protocol by ISO 10303 conforming specification*

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;

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— Parts 40 to 49 specify the description methodology;

— Parts 100 to 199 specify the view exchange protocol.

Should further parts of ISO 13584 be published, they will follow the same numbering pattern.

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Introduction

ISO 13584 is an International Standard 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 13854 fall into one of the following series: conceptual descriptions, logical resources, implementation resources, description methodology and view exchange protocol. The series are described in ISO 13584-1. This part of ISO 13584 is a member of the logical resources series.

This part of ISO 13584 specifies the generic resources needed for modelling supplier libraries that contain properties whose values may be aggregate-structured, and whose possible content is explicitly described as a set of instances. It also provides the EXPRESS integrated information models that permit the exchange of such supplier libraries. Knowledge of EXPRESS as defined in ISO 10303-11 is required to understand this part of ISO 13584. Basic knowledge of ISO 13584-24 and ISO 13584-42 is also required.

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The generic resources specified in this document were developed as a joint effort of ISO TC184/SC4/WG2 and IEC SC3D. They are intended to be documented both in this part of ISO 13584 and in IEC 61360-5. Both committees agreed not to change and/or modify the presented EXPRESS schemas independent of each other in order to guarantee the harmonization and the reusability of the work from both committees. Requests for amendments should therefore be sent to both committees. These requests should be adopted by both committees before modifying the EXPRESS schemas.

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Industrial automation systems and integration — Parts library —

Part 25: Logical resource: Logical model of supplier library with aggregate values and explicit content

1 Scope

This part of ISO 13584 provides generic EXPRESS resource constructs that support the description of aggregate data types and values occurring in supplier libraries. It also contains an integrated EXPRESS information model for representing supplier libraries for the purpose of exchange. This integrated information model integrates the above resource constructs with other EXPRESS resource constructs from different parts of ISO 13584 and ISO 10303 into one single schema. Supplier libraries may consist of definitions and of representations of families of parts. They may also define new representation categories. Supplier libraries may consist only of dictionary elements with or without aggregate data types, or they may also contain explicit specifications of the sets of permitted instances.

When used together with view exchange protocols, this integrated information model also permits the exchange of one or several representation categories for the parts defined in a parts library.

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

— generic resource constructs for representing aggregate data types. Aggregate data types and values are modeled according to the definition of aggregate data types of the EXPRESS language (ISO 10303-11);

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— generic resource constructs for representing aggregate values;

— generic resource constructs for representing of assembled parts that may contain an unlimited number of constituent components;

— a library integrated information model that provides for modeling and exchanging supplier libraries that contain properties whose values may be aggregate-structured, and whose possible class extensions are explicitly described as sets of instances.

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

— representation of expressions and variables;

— implicit description of the set of permitted instances of a class by means of constraints;

— specification of a software system able to manage supplier libraries represented according to the information models defined in this part of ISO 13584.

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.

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IEC 61360-2:1998, *Standard data element types with associated classification scheme for electric components — Part 2: EXPRESS dictionary schema*

ISO/IEC 8824-1, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

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

ISO 10303-21:2002, *Industrial automation systems and integration — Product data representation and exchange — Part 21: Implementation methods: Clear text encoding of the exchange structure*

ISO 10303-41:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 41: Integrated generic resource: Fundamentals of product description and support*

ISO 10303-42: 2003, *Industrial automation systems and integration — Product data representation and exchange — Part 42: Integrated generic resource: Geometric and topological representation*

ISO 10303-43: 2000, *Industrial automation systems: and integration — Product data representation and exchange — Part 43: Integrated generic resource: Representation structures*

ISO 13584-24:2003, *Industrial automation systems and integration — Parts library — Part 24: Logical resource: Logical model of supplier library*

ISO 13584-42:1998, *Industrial automation systems and integration — Parts library — Part 42: Description methodology: Methodology for structuring part families*

IAB RFC 2068, *Hypertext transfer protocol HTTP/1.1 (HTTP-1.1)*, Internet architecture board proposed standard protocol

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3 Terms, definitions and abbreviations

For the purposes of this document, the following terms and definitions apply. Some of these terms and definitions are repeated for convenience from:

— ISO 10303-1:1994;

— ISO 10303-11:1994;

— ISO 13584-1:2001;

— ISO 13584-24:2003;

— ISO 13584-42:1998.

NOTE Definitions copied verbatim from other standards are followed by a reference to the source standard in brackets. Definitions that have been adapted from other standards are followed by an explanatory note.

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3.1

applicable property
a property that is defined for some family of parts and that shall apply to any part that belongs to this family of parts
[ISO 13584-24:2003]

EXAMPLE For a screw generic family of parts, the threaded diameter is an applicable property: this characteristic applies to any screw.

3.2

basic semantic unit
BSU
the entity that provides an absolute and universal identification of certain objects of the application domain (e.g. classes, data element types)
[ISO 13584-42:1998]

3.3

class extension
set of all the different possible instances conforming to the specification defined by a class
[ISO 13584-24:2003]

3.4

common dictionary schema
the information model for a dictionary, using the EXPRESS modeling language, resulting from a joint effort between ISO TC184/SC4/WG2 and IEC SC3D
[ISO 13584-42:1998]

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NOTE The common dictionary schema is formally named ISO13584_IEC61360_dictionary_schema and is specified in IEC 61360-2. This schema is duplicated in Annex D of ISO 13584-42:1998.

3.5

conformance class
a subset of a standard for which conformance may be claimed
[ISO 13584-24:2003]

3.6

conformance requirement
a precise, text definition of a characteristic required to be present in a conforming implementation
[ISO 10303-1:1994]

3.7

dictionary element
the set of attributes that constitutes the dictionary description of certain objects of the application domain (e.g. classes, data element types)
[ISO 13584-42:1998]

3.8

data element type
DET
unit of data for which the identification, the description and value representation have been specified
[ISO 13584-42:1998]

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3.9

data type
a domain of values
[ISO 10303-11:1994]

3.10

family of parts
a simple or generic family of parts
[ISO 13584-24:2003]

3.11

functional model of a part
the library data that represent one representation category of a part in an integrated library
[ISO 13584-1:2001]

3.12

functional view of a part
the data that represent one representation category of a part in product data
[ISO 13584-1:2001]

NOTE The structure of a functional view does not depend on the part it represents.

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3.13

general model of a part
the library data that carries the definition and identity of a part in an integrated library
[ISO 13584-1:2001]

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3.14

generic family of parts
a grouping of simple or generic families of parts done for purposes of classification or for factoring common information
[ISO 13584-24:2003]

3.15

library delivery file
a population of EXPRESS entity instances conforming to a library integrated information model and represented according to one of the implementation methods specified in ISO 10303
[ISO 13584-24:2003]

NOTE A library delivery file specifies the structure and the content of a supplier library. It may reference library external files.

3.16

library part
a part associated with a set of data that represents it in a library
[ISO 13584-1:2001]

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3.17

library part data
the data that represent a part in a library
[ISO 13584-1:2001]

3.18

library exchange context
the set of one library delivery file and zero, one or several library external files that represent together a supplier library
[ISO 13584-24:2003]

3.19

library external file
a file, referenced from a library delivery file, that contributes to the definition of a supplier library
[ISO 13584-24:2003]

NOTE The structure and the format of a library external file is specified in the library delivery file that references it.

3.20

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library integrated information model
LIIM
an EXPRESS schema that integrates resource constructs from different EXPRESS schemas for representing supplier libraries for the purpose of exchange and that is associated with conformance requirements
[ISO 13584-24:2003]

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3.21

library specification of a class
explicit representation of a class extension in a supplier library
[ISO 13584-24:2003]

NOTE 1 In the ISO 13584 series, every class is intentionally defined through a dictionary element. Only those classes of which the supplier desires to represent explicitly the possible instances are associated with a library specification.

NOTE 2 In this part of ISO 13584, the library specification of a class consists of a set that contains all the different possible instances.

3.22

part
material or functional element that is intended to constitute a component of different products
[ISO 13584-1:2001]

3.23

property
an information that may be represented by a data element type
[ISO 13584-42:1998]

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3.24

representation category
an abstraction used to distinguish between different possible user requirements regarding a part representation
[ISO 13584-1:2001]

NOTE In the model defined in the ISO 13584 standard series, this distinction is formally expressed in terms of a view logical name and in terms of the view control variables.

3.25

resource construct
the collection of EXPRESS language entities, types, functions, rules and references that together define a valid description of data
[ISO 13584-24:2003]

3.26

simple family of parts
a set of parts of which each part may be described by the same group of properties
[ISO 13584-24:2003]

3.27

supplier library
a set of data, and possibly of programs, for which the supplier is defined and that describes in the standard format defined in ISO 13584 a set of parts and/or a set of representation of parts
[ISO 13584-1:2001]

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3.28

user library
the information that results from the integration of one or more supplier libraries by the library management system and possibly from a later adaptation performed by the user
[ISO 13584-1:2001]

3.29

view exchange protocol
VEP
a part of ISO 13584 that describes the use of resource constructs and of representation transmission interfaces that satisfy the information requirement for the exchange of one representation category of parts
[ISO 13584-24:2003]

3.30

visible property
a property that is defined for some family of parts and that may or not apply to the different parts of this family of parts
[ISO 13584-24:2003]

EXAMPLE For a generic family of screws, the non-threaded length is a visible property: it is clearly defined for any screw, but only those screws with a non-threaded part have a value for this property.

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NOTE The code of the class where a property is defined as visible is part of the identification of the data element type that represents this property.

4 Structure of ISO 13584-25

ISO 13584-25 has two main parts.

The generic resources part provides resource constructs for representing aggregate data types and values. Aggregate data types and values include those defined in the EXPRESS language.

Library integrated information model LIIM 25 gathers the above resource constructs with other generic resource constructs from other parts of ISO 13584 and from ISO 10303 into a single schema for representing supplier libraries. That schema includes aggregate data types and aggregate values and explicitly describes class extensions as sets of instances.

4.1 Generic resources

The generic resources consist of the following EXPRESS schemas:

— **ISO13584_IEC61360_dictionary_aggregate_extension_schema**;

— **ISO13584_aggregate_value_schema**.

These schemas provide resource constructs that are generic in nature. They may be used outside ISO 13584, and particularly in all the applications that use a data dictionary compliant with the IEC 61360 standard series.

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4.1.1 ISO13584_IEC61360_dictionary_aggregate_extension_schema

The **ISO13584_IEC61360_dictionary_aggregate_extension_schema** provides the resource constructs needed to describe data types corresponding to aggregate data types that include those defined in the EXPRESS language. It defines resources to describe array, bag, list, set and set of subsets data types. These data types extend the data types already defined in the **ISO13584_IEC61360_dictionary_schema** published in IEC 61360-2:1998 and whose content is duplicated in an informative Annex of ISO 13584-42:1998.

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4.1.2 ISO13584_aggregate_value_schema

The **ISO13584_aggregate_value_schema** provides the resource constructs needed to describe values of data types corresponding to aggregate data types as defined in the EXPRESS language. It defines resources to describe array, bag, list and set–structured values. These data values extend the data values already defined in the **ISO13584_instance_resource_schema** specified in ISO 13584-24.

4.2 Library integrated model

The library integrated information model specified in this part of ISO 13584, called LIIM 25, gathers the generic resource constructs defined in this part of ISO 13584 with other generic resource constructs from other parts of ISO 13584 and from ISO 10303 into a single schema for representing supplier libraries for the purpose of exchange. LIIM 25 enables the exchange of seven kinds of dictionaries or libraries and the exchange of a set of library instances without library structure, between a library data supplier and a library end-user.

— Dictionaries that define hierarchies of classes of items, that may be parts, materials or other items, with aggregate-structured properties using only the EXPRESS resource constructs defined in the ISO/IEC common dictionary schema or in the **ISO13584_IEC61360_dictionary_aggregate _extension_schema** defined in this part of ISO 13584 corresponds to conformance class 1;

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