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Industrial automation systems and integration — Parts library —

Part 101: Geometrical view exchange protocol by parametric program

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

Partie 101: Protocole d'échange de vues géométriques par programme paramétré

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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 13584-101 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

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 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;

— Parts 40 to 49 specify the description methodology;

— Parts 100 to 199 specify the view exchange protocols.

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

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, conformance testing, view exchange protocol, and standardized content. The series are described in ISO 13584-1. This part of ISO 13584 is a member of the view exchange protocol series.

A view exchange protocol specifies how a particular representation category of the items described in a parts library may be exchanged in a library exchange context. It defines the identification of the representation category, the means to be used to exchange representations that belong to this representation category, the implementation resources that shall be available on any implementation that claims conformance to this view exchange protocol, and the standard data that shall be recognized by any implementation that claims conformance to this view exchange protocol.

This part of ISO 13584 specifies how geometric representations of the items described in a parts library may be exchanged by means of parametric FORTRAN programs based on the application programming interface specified in ISO 13584-31:1999, or, by case of separate agreement between the sender and the receiver, by means of non-standardized parametric formats.

Industrial automation systems and integration – Parts library – Part 101: Geometrical view exchange protocol by parametric program

1 Scope

This part of ISO 13584 specifies a representation category called *basic_geometry*. This representation category captures the generic concepts of the shape of a part. This representation category may be associated with any of the items defined in a parts library. This part of ISO 13584 also defines how representations that belong to this representation category may be exchanged within a library exchange context by means of FORTRAN programs compliant with ISO 13584-31:1999.

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

— the definition of the *basic_geometry* representation category and the mechanisms to be used to reference it;

— the properties to be used to characterize a particular representation within the *basic_geometry* representation category;

— the exchange format to be used for the library external files that describe the *basic_geometry* representations of classes of items described in a parts library by means of FORTRAN programs based on the application programming interface specified in ISO 13584-31:1999;

— the mechanism to be used, by case of separate agreement between the sender and the receiver, to reference external files that describe the *basic_geometry* representations of classes of items described in a parts library by means of formats not specified in ISO 13584;

— the implementation resources to be supported on any implementation that claims conformance to this part of ISO 13584;

— the dictionary entries to be supported by any implementation that claims conformance to this part of ISO 13584;

— the standard data to be recognized by any implementation that claims conformance to this part of ISO 13584.

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

— the structure and exchange format of a library delivery file that includes references to the representation category defined in this part of ISO 13584, and/or to the library external files whose exchange format is specified.

NOTE 1 The structure of a library delivery file is defined by a library integrated information model specified in one of the logical resource series parts of ISO 13584.

NOTE 2 The **ISO13584_f_m_iim_schema**, documented in ISO 13584-24, is a library integrated information model that defines the structure of a library delivery file. Such a library delivery file may contain instance values that reference the representation category and/or the library external files 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.

ISO/IEC 8824-1: 1998, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 8859-1:1998, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

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

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

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

ISO 10303-42:2000, *Industrial automation systems and integration — Product data representation and exchange — Part 42: Integrated generic resources: Geometric and topological representation*

ISO/IEC 10646-1:2000, *Information technology — Universal Multiple-Octet Coded Character Set (UCS) — Part 1: Architecture and Basic Multilingual Plane*

ISO 13584-1:2001, *Industrial automation systems and integration — Parts library — Part 1: Overview and fundamental principles*

ISO 13584-24: —[1)], *Industrial automation systems and integration — Parts library — Part 24: Logical resource: Logical model of supplier library*

ISO 13584-26:2000, *Industrial automation systems and integration — Parts library — Part 26: Logical resource: Information supplier identification*

ISO 13584-31:1999, *Industrial automation systems and integration — Parts library — Part 31: Implementation resources: Geometric programming interface*

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

1) To be published.

3 Terms, definitions and abbreviated terms

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

— ISO 10303-1:1994;

— ISO 10303-11:1994;

— ISO 10303-31:1994;

— ISO 10303-42:2000;

— ISO 13584-1:2001;

— ISO 13584-24:—[1)];

— ISO 13584-31:1999;

— ISO 13584-42:1998.

3.1

application programming interface
API
set of functions that may be triggered by a program
[ISO 13584-24: —[1)]]

3.2

basic semantic unit
entity that provides an absolute and universally unique identification of certain objects of the application domain
[ISO 13584-42:1998, definition 3.4.1]

3.3

binding
description of the concrete syntax that shall be used in a particular programming language to trigger the different functions that constitute an application programming interface
[ISO 13584-31:1999, definition 3.2.3]

3.4

computer aided design system
CAD system
kind of computer modelling system that generates and manages product data

3.5

conformance class
subset of a standard for which conformance may be claimed
[ISO 13584-24: —[1)]]

1) To be published.

3.6

conformance requirement
precise, text definition of a characteristic required to be present in a conforming implementation
[ISO 10303-1:1994, definition 2.1.14]

3.7

conforming implementation
implementation which satisfies the conformance requirements defined by one or several conformance classes of a standard
[ISO 13584-24: —[1)]]

3.8

conformity; conformance
fulfilment by an implementation of all requirements specified
[ISO 10303-31:1994, definition 3.2.25]

3.9

constructive solid geometry
CSG
type of geometric modelling in which a solid is defined as the result of a sequence of regularized Boolean operations operating on solid models
[ISO 10303-42:2000, definition 3.1.11]

3.10

entity data type instance
named unit of data which represents a unit of information within the class defined by an entity. It is a member of the domain established by an entity data type
[ISO 10303-11:1994, definition 3.2.7]

3.11

entity
class of information defined by common properties
[ISO 10303-11:1994, definition 3.2.5]

3.12

entity data type
representation of an entity. An entity data type establishes a domain of values defined by common attributes and constraints
[ISO 10303-11:1994, definition 3.2.6]

3.13

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

1) To be published.

EXAMPLE A functional model of a precisely defined screw may consist of parametric programs which may be used to generate different geometric functional views of the screw in a CAD system database.

3.14

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

EXAMPLE The structure of a functional view corresponding to geometry is not dependent on the part to be represented. This structure is specified as a functional view class.

3.15

implementation
software development in a given programming environment

3.16

implementation method
technique used by computer systems to exchange data that is described using the EXPRESS data specification language
[ISO 13584-24:—[1)]]

3.17

implementation resources
capabilities of a software system that shall be available to claim conformance to a particular conformance class of a view exchange protocol or both view exchange protocol and library integrated information model
[ISO 13584-24: —[1)]]

3.18

information model
formal model of a bounded set of facts, concepts or instructions to meet a specified requirement
[ISO 10303-1:1994]

3.19

integrated library
operational system consisting of a Library Management System and a user library
[ISO 13584-1:2001]

3.20

library data supplier
organization that delivers a library in the standard format defined in ISO 13584 and is responsible for its content
[ISO 13584-1:2001]

1) To be published.

3.21

library delivery file
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:—[1)]]

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

3.22

library end user
user of an integrated library who:

— consults the data contained in the library;

— selects a given part;

— requests the transmission of a selected view of this part from the library system
[ISO 13584-1:2001]

3.23

library exchange context
set of one library delivery file and zero, one or several library external files that represent together a supplier library
[ISO 13584-24:—[1)]]

3.24

library external file
file, referenced from a library delivery file, that contributes to the definition of a supplier library
[ISO 13584-24:—[1)]]

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

3.25

library integrated information model
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:—[1)]]

NOTE Three library integrated information models are defined in ISO 13584-24 for representing different kinds of supplier libraries.

1) To be published.

3.26

library management system
LMS
software system enabling the library end-user to use the content of an integrated library
[ISO 13584-1:2001]

NOTE This software system is not standardized.

3.27

parts library
identified set of data and possibly programs which may generate information about a set of parts
[ISO 13584-1:2001]

3.28

reference coordinate system
underlying global rectangular Cartesian coordinate system to which all geometry refers

3.29

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

NOTE In the model defined in this International Standard, this distinction is formally expressed in terms of a view logical name and in terms of the view control variables.

3.30

standard data
requirement on a software system defined by means of EXPRESS entity data type instances that are supposed to be recognized by this software system
[ISO 13584-24:—[1)]]

3.31

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

3.32

user library
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]

1) To be published.