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Data quality —

Part 140: Master data: Exchange of characteristic data: Completeness

Qualité des données —

Partie 140: Données permanentes: Échange de données caractéristiques: Complétude

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Foreword

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

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 184, Automation systems and integration, Subcommittee SC 4, Industrial data.

This first edition of ISO 8000-140 cancels and replaces ISO/TS 8000-140:2009, which has been technically revised.

ISO 8000 is organized as a series of parts, each published separately. The structure of ISO 8000 is described in ISO/TS 8000-1.

Each part of ISO 8000 is a member of one of the following series: general data quality, master data quality, transactional data quality, and product data quality. This part of ISO 8000 is a member of the master data quality series.

A list of all parts in the ISO 8000 series can be found on the ISO website.

Introduction

The ability to create, collect, store, maintain, transfer, process and present data to support business processes in a timely and cost effective manner requires both an understanding of the characteristics of the data that determine its quality, and an ability to measure, manage and report on data quality.

ISO 8000 defines characteristics that can be tested by any organization in the data supply chain to objectively determine conformance of the data to ISO 8000.

ISO 8000 provides frameworks for improving data quality for specific kinds of data. The frameworks can be used independently or in conjunction with quality management systems.

ISO 8000 covers industrial data quality characteristics throughout the product life cycle from conception to disposal. ISO 8000 addresses specific kinds of data including, but not limited to, master data, transaction data, and product data.

This part of ISO 8000 is an optional addition to ISO 8000-120 and specifies requirements for representation and exchange of information about completeness of master data that consists of characteristic data. ISO 8000-120 is an optional addition to ISO 8000-110 and specifies requirements for representation and exchange of information about provenance of master data that consists of characteristic data. ISO 8000-110 specifies basic requirements for representation and exchange of information about provenance of master data that consists of characteristic data, in particular, conformance to a formal syntax, semantic encoding, and conformance to a data specification.

Data quality —

Part 140:
Master data: Exchange of characteristic data: Completeness

1 Scope

This part of ISO 8000 is an optional addition to ISO 8000-120 and specifies requirements for representation and exchange of information about completeness of master data that consists of characteristic data.

NOTE 1 ISO 8000-110 specifies that such data be represented as property values. ISO 8000-120 provides additional requirements for property values when data provenance information needs to be captured.

This part of ISO 8000 does not specify a complete model for characteristic data, nor does it specify an exchange format for characteristic data with data completeness information.

NOTE 2 This is done in other standards that reference this part of ISO 8000, e.g. ISO/TS 22745-40.

The following are within the scope of this part of ISO 8000:

— requirements for capture and exchange of data completeness information in the form of statements and assertions of data completeness;

— conceptual data model for data completeness information in the form of statements and assertions of data completeness.

The following are outside the scope of this part of ISO 8000:

— requirements for data completeness;

NOTE 3 The requirements for data completeness depend on many factors, e.g. the kind of data, how the data are being used, industry, and needs of the partners exchanging the data. It is not possible to state general requirements for data completeness.

— exchange format for data completeness information;

— scheme for registering and resolving organization identifiers and person identifiers;

— completeness of data that are not characteristic data represented as property values;

— syntax of identifiers;

— resolution of identifiers.

Some of the requirements in this part of ISO 8000 can apply to exchange of data that is not master data which consists of characteristic data represented as property values.

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 8000-2, *Data quality — Part 2: Vocabulary*

ISO 8000-120, *Data quality — Part 120: Master data: Exchange of characteristic data: Provenance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8000-2 apply.

4 Abbreviated terms

UML	Unified Modeling Language
XML	Extensible Markup Language

5 General

A data provider may declare the completeness of data through either a statement (see Clause 7) or an assertion (see Clause 8).

6 Completeness data model

6.1 Referenced types and entities

The following types and entities are used by the completeness model:

— ISO_6523_identifier, defined in ISO 8000-120;

— date_and_time, defined in ISO 8000-120;

— property_value_assignment, defined in ISO 8000-120.

6.2 Diagram

The UML class diagram for the completeness model is given in Figure 1.

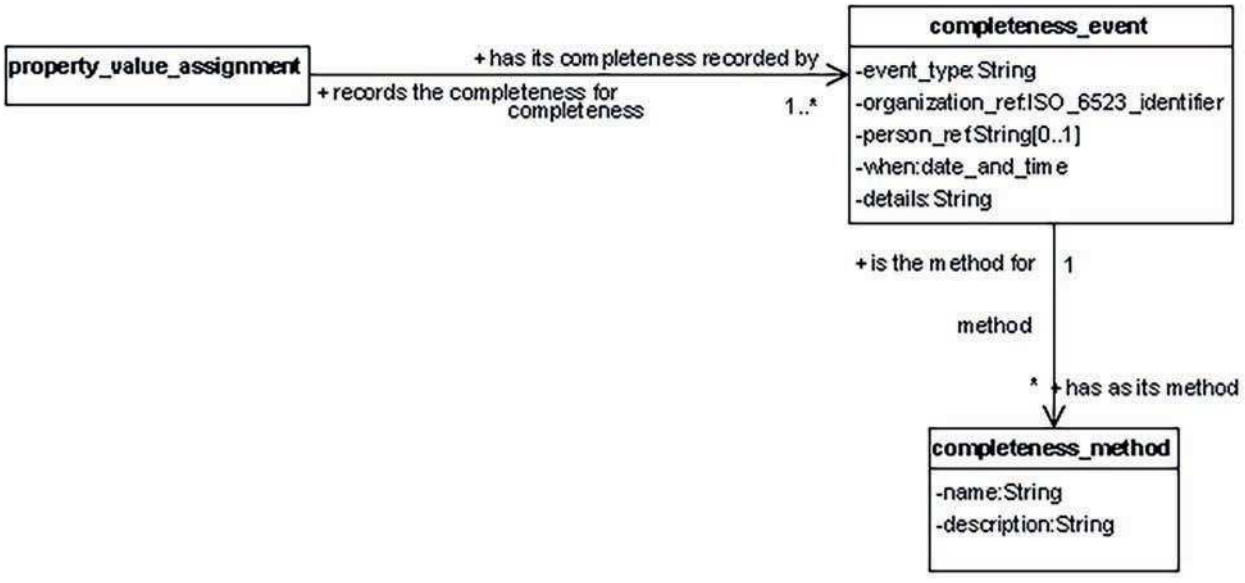

Figure 1 — UML class diagram for completeness

NOTE The entity property_value_assignment is the intersection point between this data model and the target data model: the model of data for which completeness information is to be recorded. When the data model in Clause 6 is integrated with the target data model, this entity needs to be replaced with the appropriate entity from the target data model.

6.3 completeness_event

A completeness_event is an event for which data completeness information is recorded.

Attribute definitions:

details: the details of the completeness_event.

NOTE 1 This could include the text of the statement or assertion of completeness.

event_type: the kind of completeness_event.

The value shall be one of the following:

— statement: a statement of completeness was provided for the property value;

— assertion: an assertion of completeness was provided for the property value.

method: completeness_method used to record the completeness for the completeness_event.

organization_ref: the unambiguous identifier of the organization and possibly the subdivison of the organization that performed the event, conforming to the structure defined in ISO/IEC 6523-1 and assigned in accordance with ISO/IEC 6523-2.

person_ref: the identifier assigned by the organization to the person who performed the event.

NOTE 2 The identifier need only be unique within the organization.

NOTE 3 The format of the identifier is not specified in this part of ISO 8000.

when: the point in time at which the event took place.

Assertions:

Each completeness_event has as its method zero, one, or many completeness_method objects. Each completeness_method is the method for exactly one completeness_event.

Each completeness_event records the completeness for exactly one property_value_assignment. Each property_value_assignment has its completeness recorded by one or many completeness_event objects.

6.4 completeness_method

A completeness_method is method used to record completeness.

EXAMPLE By percent, by real number between 0 to 1,0, by qualitative statement (excellent, good, mediocre, bad).

Attribute definitions:

description: human-readable string that characterizes the completeness_method.

name: word or phrase by which the completeness_method is known.

Assertions:

Each completeness_method is the method for exactly one completeness_event. Each completeness_event has as its method zero, one, or many completeness_method objects.

7 Statement of data completeness

A statement of data completeness is a statement of fact that enables the recipient to make a judgement as to whether the data meets its data completeness requirements.

A statement of data completeness may include:

— the process that generated the data;

NOTE 1 This could include:

— process steps;

— environment in which the process was executed;

— equipment used;

— calibration data.

EXAMPLE 1 ISO 10303-49 contains a data model for process.

EXAMPLE 2 ISO 18629 defines a neutral representation for manufacturing processes that supports automated reasoning.

EXAMPLE 3 ISO/TS 14048 contains a data format for environmental data.

— the process used to verify the completeness of the master data message or of the underlying data from which it was extracted;

NOTE 2 See the examples under item (a) for data models and formats.

— data completeness test results;

EXAMPLE 4ISO 10303-59 can be used to exchange information about the quality of product shape data.

EXAMPLE 5 The X12 863 transaction set can be used to exchange test results.

— known incompletenesses.

8 Assertion of data completeness

An assertion of data completeness is a declaration that a property value meets some objective measure of data completeness.

An assertion of data completeness shall be in writing.

An assertion of data completeness shall include:

— the measure of data completeness that is being claimed;

— the claim process;

— the registered address for obtaining service;

— what the provider will do if the property value fails to meet the specified measure of data completeness.

NOTE This can include providing revised data, or providing monetary compensation.

An assertion of data completeness may include limitations.

EXAMPLE Limitations on the length of the period for which service will be provided. These might include:

— date the assertion goes into effect;

— date the assertion expires.

9 Data completeness record

The data completeness record for a property value is the record of the ultimate derivation and passage of the property value through its various owners or custodians.

The data completeness record for a property value shall be either:

— included in the structure that represents property value;
EXAMPLE 1 The following is an XML code fragment in which the data completeness record is included in the XML structure that represents property value.

Coded:

```
<property-value property-ref=”0161-1#02-015007#1”>
  <controlled-value value-ref=”0161-1#07-000435#1”/>
    <!– Include provenance-event elements here.
    (ISO 8000-120 requires that each property value has at least one provenance event.) –>
...
  <completeness-event event-type=”assertion” organization-ref=”0161-ABCDE
  date=”2008-10-29T10:03:15.195””>
    ABC Company asserts that this data is complete...
  </completeness-event>
</property-value>
```

Decoded:

```
<property-value property-ref=”0161-1#02-015007#1”>
  <controlled-value value-ref=”0161-1#07-000435#1”/>
  <!– Include provenance-event elements here.
  (ISO 8000-120 requires that each property value has at least one provenance event.) –>
...
  <completeness-event event-type=”assertion” organization-ref=”ABC Company
  date=”2008-10-29T10:03:15.195””>
    ABC Company asserts that this data is complete...
  </completeness-event>
</property-value>
```

— stored separately and referenced from the structure that represents property value.

EXAMPLE 2 The following is an XML code fragment in which the data completeness record is referenced from the XML structure that represents property value.

Coded:

```
<property-value property-ref=”0161-1#02-015007#1” completeness-ref=”p2263”>
```

<controlled-value value-ref="0161-1#07-000435#1"/>

</property-value>

…

<!– Include provenance-record element here.

(ISO 8000-120 requires that each property value has at least one provenance event. The provenance events form the content of the provenance-record.) –>

…

<completeness-record id="p2263">

<completeness-event event-type="assertion" organization-ref="0161-ABCDE

date="2008-10-29T10:03:15.195"">

ABC Company asserts that this data is complete…

</completeness-event>

</completeness-record>

Decoded:

<property-value property-ref="0161-1#02-015007#1" completeness-ref="p2263">

<controlled-value value-ref="0161-1#07-000435#1"/>

</property-value>

…

<!– Include provenance-record element here.

(ISO 8000-120 requires that each property value has at least one provenance event. The provenance events form the content of the provenance-record.) –>

…

<completeness-record id="p2263">

<completeness-event event-type="assertion" organization-ref="ABC Company

date="2008-10-29T10:03:15.195"">

ABC Company asserts that this data is complete…

</completeness-event>

</completeness-record>

NOTE 1 The above examples include data provenance records, since the requirements of ISO 8000-120 for data provenance information are incorporated by reference into this part of ISO 8000. See ISO 8000-120 for the requirements for the data provenance record.

NOTE 2 See Annex C for the meaning of the codes used in the examples above.

NOTE 3 This part of ISO 8000 does not require that a master data message use the specific structures shown in the examples above, or that it use XML syntax at all.

NOTE 4 In the examples above, data are given in coded form followed by decoded form for clarity. An actual master data message is required to be in coded form (see ISO 8000-110).

The data completeness record for a property value shall include a statement or an assertion of data completeness.

10 Conformance requirements

Any property value for which conformance to this part of ISO 8000 is claimed shall:

— conform to ISO 8000-120;

NOTE ISO 8000-120 requires conformance to ISO 8000-110.

— have a data completeness record that satisfies the requirements of Clause 9.

This part of ISO 8000 provides for a number of options that may be supported by an implementation. These options have been grouped into the following conformance classes:

— free decoding;

— fee-based decoding.

Conformance to the free decoding conformance class requires conformance to the free decoding conformance class of ISO 8000-120.

Conformance to the fee-based decoding conformance class requires conformance to the fee-based decoding conformance class of ISO 8000-120.

Annex A
(normative)

Document identification

To provide for unambiguous identification of an information object in an open system, the object identifier

{ iso standard 8000 part (140) version (1) }

is assigned to this part of ISO 8000. The meaning of this value is defined in ISO/IEC 8824-1, and is described in ISO 10303-1.

Annex B
(informative)

Information to support implementations

Additional information may be provided to support implementations.

Annex C
(informative)

Codes used in examples

This annex contains codes used in examples illustrating the coding of data completeness information for property values. In accordance with ISO 8000-110, master data messages are coded using concepts from a data dictionary. Table C.1 lists the concept identifiers that are used in this annex and their meanings.

Table C.1 — Concepts used

Identifier	Type	Name
0161-1#02-015007#1	Property	enclosure material
0161-1#07-000435#1	value of property	ceramic
0161-1#07-185586#1	value of property	resin

NOTE 1 This annex uses concept identifiers from the ECCMA Open Technical Dictionary (eOTD). Any dictionary that met the requirements of ISO 8000-110 could have been used.

Table C.2 lists the organizations that are referenced in this annex with their identifiers.

Table C.2 — Organizations referenced

Identifier	Type	Role
0161-XYZQW	IM1	Manager of catalogue of items of supply
0161-ABCDE	ABC Company	Manufacturer of microcircuits
0161-BCDEF	XYZ Company	Data aggregator

NOTE 2 This annex uses organization identifiers from eOTD. Any ISO/IEC 6523 compliant organization identification scheme could have been used.

NOTE 3 See ISO/IEC 6523-1 for the specification of the elements of an organization identifier.

IM1 maintains master data for items of supply in IOS-MS (Item of Supply Management System).

Table C.3 lists the persons who are referenced in this annex with their identifiers.

Table C.3 — Persons referenced

Identifier	Name	Company	Role
JPS3642	John P. Smith	IM1	Cataloguer
ROLLINS1	William F. Rollins	ABC Company	Engineer
BAKER2	Catherine A. Baker	ABC Company	Engineer
DOE1	Jane E. Doe	ABC Company	Customer service representative

NOTE 4 The codes “0161-ABCDE”, “0161-BCDEF” and “0161-XYZQW” are dummy codes used for illustration purposes.

In this annex, times are given to the day, e.g. 1998-12-01, for simplicity. This part of ISO 8000 allows times to be given to any finer level of precision, e.g. 1998-12-01T08:41:36.118.

Data is given in coded and decoded form, using the notation in the Introduction. An actual master data message conforming to this part of ISO 8000 would have data in coded form.

Bibliography

[1] ISO 3534-2, *Statistics — Vocabulary and symbols — Part 2: Applied statistics*

[2] ISO/TS 8000-1, *Data quality — Part 1: Overview*

[3] ISO 8000-100, *Data quality — Part 100: Master data: Exchange of characteristic data: Overview*

[4] ISO 8000-110, *Data quality — Part 110: Master data: Exchange of characteristic data: Syntax, semantic encoding, and conformance to data specification*

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

[6] ISO 10303-49, *Industrial automation systems and integration — Product data representation and exchange — Part 49: Integrated generic resources: Process structure and properties*

[7] ISO 10303-59, *Industrial automation systems and integration — Product data representation and exchange — Part 59: Integrated generic resource — Quality of product shape data*

[8] ISO/TS 14048, *Environmental management — Life cycle assessment — Data documentation format*

[9] ISO 18629 (all parts), *Industrial automation systems and integration — Process specification language*

[10] ISO/TS 22745-40, *Industrial automation systems and integration — Open technical dictionaries and their application to master data — Part 40: Master data representation*

[11] ISO/IEC 6523 (all parts), *Information technology — Structure for the identification of organizations and organization parts*

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

[13] ASC X12*Electronic data interchange standard. Data Interchange Standards Association*

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