INTERNATIONAL STANDARD

ISO 8000-110

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Data quality —

Part 110:
Master data: Exchange of characteristic data: Syntax, semantic encoding, and conformance to data specification

Qualité des données —

Partie 110: Données permanentes: Échange des données caractéristiques: Syntaxe, sémantique, encodage et conformité aux spécifications de données

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Contents

Page

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 8000-110:2009), which has been technically revised.

The main changes are as follows:

— removing broken Uniform Resource Locators;

— updating normative references, figures and tables;

— replacing the term "data value" with the term "value tuple";

— replacing the terms "property value" and "property value pair" with the term "property-value tuple";

— adding an Annex B referencing an example of a schema for exchanging master data that are characteristic data;

— editorial corrections to language, grammar and document layout.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Digital data deliver value by enhancing all aspects of organizational performance including:

— operational effectiveness and efficiency;

— safety;

— reputation with customers and the wider public;

— compliance with statutory regulations;

— innovation;

— consumer costs, revenues and stock prices.

In addition, many organizations are now addressing these considerations with reference to the United Nations Sustainable Development Goals[1]).

The influence on performance originates from data being the formalized representation of information. This information enables organizations to make reliable decisions. This decision making can be performed by human beings directly and also by automated data processing including artificial intelligence systems.

Through widespread adoption of digital computing and associated communication technologies, organizations become dependent on digital data. This dependency amplifies the negative consequences of lack of quality in these data. These consequences are the decrease of organizational performance.

The biggest impact of digital data comes from two key factors:

— the data having a structure that reflects the nature of the subject matter;

EXAMPLE 1   A research scientist writes a report using a software application for word processing. This report includes a table that uses a clear, logical layout to show results from an experiment. These results indicate how material properties vary with temperature. The report is read by a designer, who uses the results to create a product that works in a range of different operating temperatures.

— the data being computer processable (machine readable) rather than just being for a person to read and understand.

EXAMPLE 2   A research scientist uses a database system to store the results of experiments on a material. This system controls the format of different values in the data set. The system generates an output file of digital data. This file is processed by a software application for engineering analysis. The application determines the optimum geometry when using the material to make a product.

ISO 9000 explains that quality is not an abstract concept of absolute perfection. Quality is actually the conformance of characteristics to requirements. This actuality means that any item of data can be of high quality for one use but not for another. This difference occurs when the requirements are different between the two uses.

EXAMPLE 3   Time data are processed by calendar applications and also by control systems for propulsion units on spacecraft. These data include start times for meetings in a calendar application and activation times in a control system. These start times require less precision than the activation times.

The nature of digital data is fundamental to establishing requirements that are relevant to the specific decisions made by an organization.

EXAMPLE 4   ISO 8000-1 identifies that data have syntactic (format), semantic (meaning) and pragmatic (usefulness) characteristics.

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1)   https://sdgs.un.org/goals

To support the delivery of high-quality data, the ISO 8000 series addresses:

— data governance, data quality management and maturity assessment;

EXAMPLE 5   ISO 8000-61 specifies a process reference model for data quality management.

— creating and applying requirements for data and information;

EXAMPLE 6   This document specifies how to exchange characteristic data that are master data.

— monitoring and measuring data and information quality;

EXAMPLE 7   ISO 8000-8 specifies approaches to measuring data and information quality.

— improving data and, consequently, information quality;

EXAMPLE 8   ISO/TS 8000-81 specifies an approach to data profiling, which identifies opportunities to improve data quality.

— issues that are specific to the type of content in a data set.

EXAMPLE 9   ISO/TS 8000-311 specifies how to address quality considerations for product shape data.

Data quality management covers all aspects of data processing, including creating, collecting, storing, maintaining, transferring, exploiting and presenting data to deliver information.

Effective data quality management is systemic and systematic, requiring an understanding of the root causes of data quality issues. This understanding is the basis for not just correcting existing nonconformities but also implementing solutions that prevent future reoccurrence of those nonconformities.

EXAMPLE 10   If a data set includes dates in multiple formats including "yyyy-mm-dd", "mm-dd-yy" and "dd-mm-yy" then data cleansing can correct the consistency of the values. Such cleansing, however, requires additional information to resolve ambiguous entries (such as, "04-05-20"). The cleansing also cannot address any process issues and people issues, including training, that have caused the inconsistency.

As a contribution to this overall capability of the ISO 8000 series, this document supports the creation and exchange of high-quality data. This document contains requirements necessary but not sufficient to achieve data quality with respect to the exchange of master data. The requirements do not cover issues such as addressing the accuracy, provenance and completeness of master data. These issues need to be part of an overall data quality strategy adopted by each organization.

"Organization" does not necessarily mean a single, complete company or corporation. The organization can be a subdivision or branch that covers some distinct area of business operation.

When different business units of a company exchange master data or when a business unit exchanges master data with headquarters, these business units are organizations for the purposes of this document.

Organizations can use this document on its own or in conjunction with other parts of the ISO 8000 series.

This document supports activities that affect:

— one or more information systems;

— data flows within the organization and with external organizations;

— any phase of the data life cycle.

By implementing parts of the ISO 8000 series to improve organizational performance, an organization achieves the following benefits:

— objective validation of the foundations for digital transformation of the organization;

— a sustainable basis for data in digital form becoming a fundamental asset class the organization relies on to deliver value;

— securing evidence-based trust from other parties (including supply chain partners and regulators) about the repeatability and reliability of data and information processing in the organization;

— portability of data with resulting protection against loss of intellectual property and reusability across the organization and applications;

— effective and efficient interoperability between all parties in a supply chain to achieve traceability of data back to original sources;

— readiness to acquire or supply services where the other party expects to work with common understanding of explicit data requirements.

ISO 8000-1 provides a detailed explanation of the structure and scope of the whole ISO 8000 series.

ISO 8000-2[2] specifies the single, common vocabulary for the ISO 8000 series. This vocabulary is ideal reading material by which to understand the overall subject matter of data quality. ISO 8000-2 presents the vocabulary structured by a series of topic areas (for example, terms relating to quality and terms relating to data and information).

Annex A of this document contains an identifier that unambiguously identifies this document in an open information system.

Annex B of this document references an example of a schema to enable exchange of master data that are characteristic data.

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2)   The content is available on the ISO Online Browsing Platform: https://www.iso.org/obp

Data quality —

Part 110:
Master data: Exchange of characteristic data: Syntax, semantic encoding, and conformance to data specification

1 Scope

This document specifies requirements for the exchange of messages that contain master data consisting of characteristic data. These requirements can be checked by computer. The messages are suitable for exchange between organizations and between systems.

EXAMPLE 1   A supplier sends a message to a customer. The message contains characteristic data describing an item that the customer is considering buying.

The following are within the scope of this document:

— conformance of master data messages to a formal syntax;

— semantic encoding of master data messages;

— conformance of master data messages to data specifications;

— requirements on access to the data dictionaries that enable decoding of master data messages.

The following are outside the scope of this document:

— master data that are not characteristic data;

— data that are not in messages;

— messages that do not exchange master data between organizations or systems;

EXAMPLE 2   A merchant sends a message to a credit card company. The message represents a credit charge transaction and does not exchange master data between the organizations.

— recording the provenance of master data;

EXAMPLE 3   ISO 8000-120 addresses the capture and exchange of data provenance information.

— accuracy of master data;

EXAMPLE 4   ISO 8000-130 addresses the representation and exchange of information about the accuracy of master data that consists of characteristic data.

— exchange of data that are not master data;

EXAMPLE 5   ISO 8000-140 addresses the representation and exchange of information about the completeness of master data that consists of characteristic data.

— management of master data internally within an organization;

EXAMPLE 6   Data within an organization's enterprise resource planning or product data management system is out of scope.

EXAMPLE 7   Making backup copies of data files containing master data is out of scope.

— quality of data dictionaries;

— a specific formal syntax for the exchange of master data.

EXAMPLE 8   The ISO 9735 series, the ISO 13584 series, the ISO 15926 series and the ISO 22745 series specify formats that enable exchange of master data.

The requirements in this document are considered necessary but not sufficient to achieve data quality with respect to exchange of master data. Issues such as the accuracy and provenance of master data also need to be addressed as part of an overall data quality strategy.

2   Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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*

3   Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4   Fundamental concepts and assumptions

While the bit is the fundamental building block of electronically stored data, the property-value tuple is the fundamental building block of electronically stored characteristic data.

A value tuple by itself lacks the context to ensure unambiguous understanding of what the value represents. The context can be represented by a property label.

EXAMPLE 1   ISO 3601-1 specifies the inside diameters, cross-sections, tolerances and designation codes for O-rings used in fluid power systems for general industrial and aerospace applications. O-rings are endless, ring-shaped sealing elements with a circular cross-section that are manufactured from elastomer materials or PTFE. The designation of an O-ring is derived from the dimensions of its inner diameter and cord width in millimetres, along with the name of the material and its Shore A hardness (e.g, "100,00x2,65. NBR 70").

In this example, the full textual description for the O-ring would be an O-ring, part number 100,00x2,65 NBR 70 having an inside diameter of 100 millimetres, a cross-section of 2,65 millimetres, with a shore A hardness of 70 on the durometer scale, manufactured using nitrile-butadiene rubber (NBR), coloured black, that can be used in an operating temperature range of −30 °C, to +70 °C. The O-ring sizes and tolerances conform to ISO 3601-1.

This natural language statement of the characteristic data can be decomposed into the elements shown in Table 1. The first column comprises the property labels; the second column comprises the value tuples.

Table 1 — Example characteristic data for an O-ring

Property label	Value tuple
INNER DIAMETER	100 MILLIMETRES
CROSS SECTION	2,65 MILLIMETRES
SHORE HARDNESS RATING	70 DUROMETER

Table 1 *(continued)*

Property label	Value tuple
MATERIAL	NITRILE-BUTADIENE RUBBER (NBR)
COLOUR	BLACK
OPERATING TEMPERATURE RANGE	-30 °C TO +100 °C
MANUFACTURER CODE	100,00X2,65 NBR 70
STANDARD	ISO 3601-1

Using property labels has the following disadvantages:

— the labels are in a single language, which can prevent understanding of the data by speakers of other languages;

— the labels are susceptible to variations in spelling, letter case, punctuation, etc., making it difficult for a computer application to understand the characteristic data;

— the labels are not defined, which can result in differing interpretations between the sender and receiver.

To address these problems, this document requires the use of property-value tuples when exchanging master data messages that contain characteristic data. Each property-value tuple consists of a value tuple and, to establish the context of that value, a reference to a data dictionary entry that specifies the property. The entry contains terms and definitions of the property in one or more languages.

It follows that, as property-value tuples are the fundamental building blocks of electronically stored information, the quality of the property-value tuples is one of the determinants of the quality of the information.

Semantic encoding produces messages that contain property-value tuples where each reference to a data dictionary entry is in the form of an unambiguous identifier.

Use of a data dictionary is the foundation for semantic encoding, which, in combination with identifying the applicable syntax for a data set, establishes that data as being portable. Portable data can pass from one system to another reliably because the receiver can guarantee being able to process the format and the meaning of the data.

To ensure data are portable without subsequent claims of ownership by third parties, organizations choose a data dictionary that has appropriate licence conditions.

The remainder of this document specifies how to create portable data that conform to applicable data specifications.

For the parts of the ISO 8000 series where those parts address master data, a foundational data architecture supports the exchange of data without loss of content or meaning (see Figure 1).
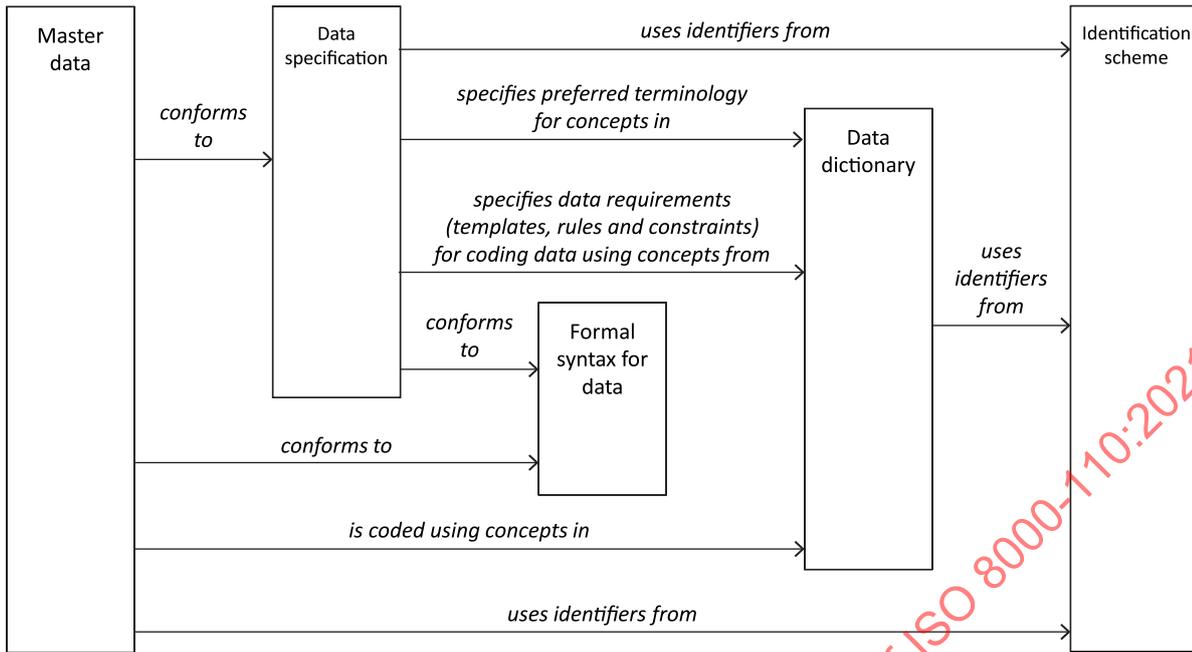
Figure 1 — Data architecture for master data as specified by the ISO 8000 series

The data architecture establishes the basis for consistent, high quality master data. This basis includes the data dictionary and data specifications as key elements.

EXAMPLE 2   A data dictionary can take many forms including: a concept dictionary (see ISO/TS 29002-6); an open technical dictionary (see ISO/TS 22745-10), a reference data library (see ISO/TS 15926-4) and; a parts library (see the ISO 13584 series). In the case of ISO/TS 15926-4 and the ISO 13584 series, the data dictionary includes elements of the data specification.

EXAMPLE 3   A data specification can take many forms including: an identification guide (see ISO/TS 22745-30); a reference data item (see ISO/TS 15926-4); a product characterization class (see ISO 13584-42) and; a class (see IEC 61360-4 DB).

In addition to the data dictionary and data specifications, exchange of master data requires a formal syntax and an identification scheme.

EXAMPLE 4   Formal syntaxes include: eXtensible Markup Language (XML) (see ISO/TS 29002-10); the clear text encoding specified by ISO 10303-21.

EXAMPLE 5   ISO/TS 29002-5 specifies an identification scheme in the form of an internationally recognized data identifier (IRDI). This identifier is a unique identifier that identifies administered items, each of which is either a concept or a concept information element. ISO/TS 29002-5 is specialized by ISO 22745-13, which uses the term "metadata object" to refer to administered items that are relevant to open technical dictionaries. ISO/TS 29002-5 enables interoperability between implementations of the ISO 13584 series for parts libraries and the ISO 22745 series for open technical dictionaries.

5   Objectives

Clauses 6 to 8 contain requirements that enable organizations to achieve the following objectives.

a)   The receiver of a master data message is able to determine the meaning of the message and the context in which the values in the message are valid.

b)   Using a computer, the receiver is able to check automatically the correctness of the master data message against each referenced formal syntax and each referenced data specification.

6 Syntax

Each master data message shall contain a reference to one or more formal syntaxes to which the master data message conforms. The reference shall be in the form of an unambiguous identifier for the specific version of the formal syntax that was used to encode the master data message. Each formal syntax shall be available to all interested parties. If the master data are offered to the public, all the formal syntax shall be publicly available. Each formal syntax should be available at a reasonable cost.

NOTE 1   Referencing more than one formal syntax is useful when one standard restricts the capability of the syntax defined in another standard while remaining compatible with the latter. In this case, users of both standards can decode the same master data message.

NOTE 2   It is not required that a formal syntax be free of charge.

NOTE 3   Valid syntaxes include those that use encryption to protect the confidentiality of content.

EXAMPLE 1   Examples of publicly-available formal syntaxes are given in Table 2.

EXAMPLE 2   A reference to the English language as the syntax does not satisfy the requirements of this clause.

EXAMPLE 3   For a message that conforms to ISO/TS 29002-10, the message includes a reference to the syntax using the following eXtensible Markup Language (XML) element:

```
<cat:catalogue xmlns:xsi="http://www.w3.org/2001/XMLSchema"
xmlns:cat="urn:iso:std:iso:ts:29002:-10:ed-1:tech:xml-schema:catalogue"
xmlns:val="urn:iso:std:iso:ts:29002:-10:ed-1:tech:xml-schema:value"
xmlns:bas="urn:iso:std:iso:ts:29002:-4:ed-1:tech:xml-schema:basic"
xmlns:id="urn:iso:std:iso:ts:29002:-5:ed-1:tech:xml-schema:identifier"
xsi:schemaLocation="urn:iso:std:iso:ts:29002:-10:ed-1:tech:xml-schema:catalogue catalogue.
xsd">
```

Table 2 — Examples of publicly-available formal syntaxes

Designation	Title
ISO 9735 (all parts)	Electronic data interchange for administration, commerce and transport (EDI-FACT) — Application level syntax rules
ISO 13584-25	Industrial automation systems and integration — Parts library — Part 25: Logical resource: Logical model of supplier library with aggregate values and explicit content
ISO/TS 13584-35	Industrial automation systems and integration — Parts library — Part 35: Implementation resources: Spreadsheet interface for parts library
ISO/TS 22745-40	Industrial automation systems and integration — Open technical dictionaries and their application to master data — Part 40: Master data representation

7 Semantic encoding

7.1 General requirements

7.1.1 Level 1 requirements

To achieve effective semantic encoding, each property-value tuple shall consist of a combination of references to data dictionary entries and of values, where the combination is sufficient to achieve unambiguous understanding of what the value tuple represents.

NOTE 1   In order to understand the meaning of a property-value tuple, it is necessary to know the data type of its value. This data type is represented in one of the following ways:

— explicitly in the property-value tuple;

— through reference to a data dictionary entry for a property, which includes a data type specification;

— through reference to a data dictionary entry for a data type;

— through reference to a data specification entry, which includes a data type specification.

Each reference shall preserve the integrity of the recipient's data in that the reference to the data dictionary entry can be integrated with the recipient's own data without the creation of a joint work.

NOTE 2   Identifiers within a data dictionary are subject to copyright. The use of an identifier within a document or master data can create a joint work in which the owner of the copyright in the identifier has equal rights to register and enforce the copyright in the work, regardless of how their shares in the work are divided. A data dictionary in which the identifiers are in the public domain will protect the recipient from the creation of a joint work. A data dictionary in which the identifiers are not in the public domain, but which specifically authorizes the use of the identifiers without the creation of a joint work is also acceptable.

The data dictionary shall be accessible in electronic form under the terms of its license in one of the following ways.

a)   For each data dictionary entry that contains a supporting definition for the property-value tuple, the entry is downloadable from the Internet.

b)   The data dictionary supports an application programming interface, available over the Internet, for resolution of an entity reference to the data dictionary entry that contains the supporting definitions. The reference shall be in the form of an unambiguous identifier.

EXAMPLE 1   A properly specified and implemented web services interface using Simple Object Access Protocol meets this requirement.

c)   The data dictionary entry that defines the supporting term is contained in the same data set as the property-value tuple.

EXAMPLE 2   Table 3 contains examples of published dictionaries, although this document makes no claim as to whether any of these dictionaries conform to the requirements of this document, including requirements for licensing in this clause.

Table 3 — Examples of published dictionaries

Designation	Description
ISO 7372	Trade data elements directory
ISO 13584-501	Reference dictionary for measuring instruments
ISO 13584-511	Reference dictionary for fasteners
ISO/TS 15926-4	Reference data for integration of life-cycle data for process plants including oil and gas production facilities
eOTD	Electronic Commerce Code Management Association (ECCMA) Open Technical Dictionary

7.1.2   Level 2 requirements

In addition to the requirements specified in 7.1.1, each data set claiming conformance to level 2 shall meet the following requirements.

— If 7.1.1 a) is chosen (i.e. the data dictionary is downloadable in its entirety from the Internet) then the data dictionary shall be downloadable free of charge under the term of its license.

— If 7.1.1 b) is chosen (i.e. the data dictionary supports an application programming interface for resolution) then the application programming interface shall be usable free of charge under the term of its license.

7.2   Requirements for all property-value tuples

Each property-value tuple includes an unambiguous identifier that refers to a data dictionary entry specifying the applicable property.

EXAMPLE   A flat washer has a property value "material document ASTM A684/A684M", where the material document is the specification, standard, or manufacturer's reference document that identifies the material. This property value is represented by a property-value tuple consisting of the following components:

— an identifier that references the data dictionary entry for the property "material document";

— a value tuple representing the value "ASTM A684/A684M".

In a particular data dictionary, the data dictionary entry for "material document" has the identifier "0161-1#02-033785#1". The reference from the property-value tuple to the data dictionary entry is shown in Figure 2.

NOTE   Figure 2 represents the logical structure of a property-value tuple and its reference to a property definition in a data dictionary. This structure is not necessarily the most appropriate physical representation for the tuple. A property-value tuple and its relation to data dictionary entries can be represented in various forms, including ISO 10303-21, Extensible Markup Language (XML) or a spreadsheet. For example, Figure 3 shows a spreadsheet representation of a property-value tuple
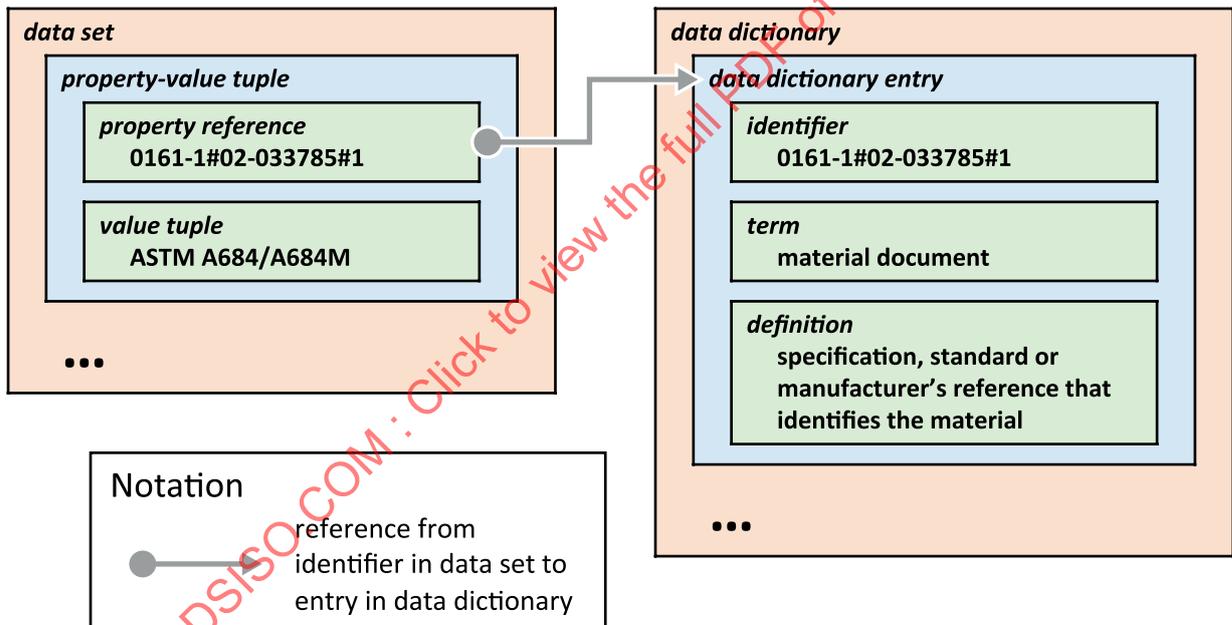

Figure 2 — Property-value tuple

7.3   Requirements for values of properties that are quantities

7.3.1   Scope of requirements

When a property-value tuple represents a quantity, the following requirements apply in addition to the requirements of 7.2:

— requirements when representing units of measurement (see 7.3.2);

— requirements when representing qualifiers of measurement (see 7.3.3).

7.3.2 Representation of units of measurement

To achieve clear and unambiguous specification, a unit of measurement shall be represented in one of the following ways.

a) The value tuple contains a reference to a data dictionary entry for the unit of measurement. The reference shall be in the form of an unambiguous identifier.

b) The value tuple contains a symbol for a unit of measurement as specified by the ISO 80000 series or the IEC 80000 series, with an optional prefix.

   EXAMPLE 1   "cm" for centimetres, "kg" for kilograms, "mV" for millivolts.

   NOTE 1   Prefixes represent multiplication by powers of 10, such as, "kilo", "centi", "milli".

   NOTE 2   The ISO 80000 series and the IEC 80000 series only include units of measurement from the International System of Units, which does not include units of measurement such as, "inch".

c) The unit of measurement is specified in the property definition as the single unit of measurement for the property value, or as the default unit of measurement from a choice of several units of measurement.

d) The value tuple references a unit of measurement that is specified by the property definition.
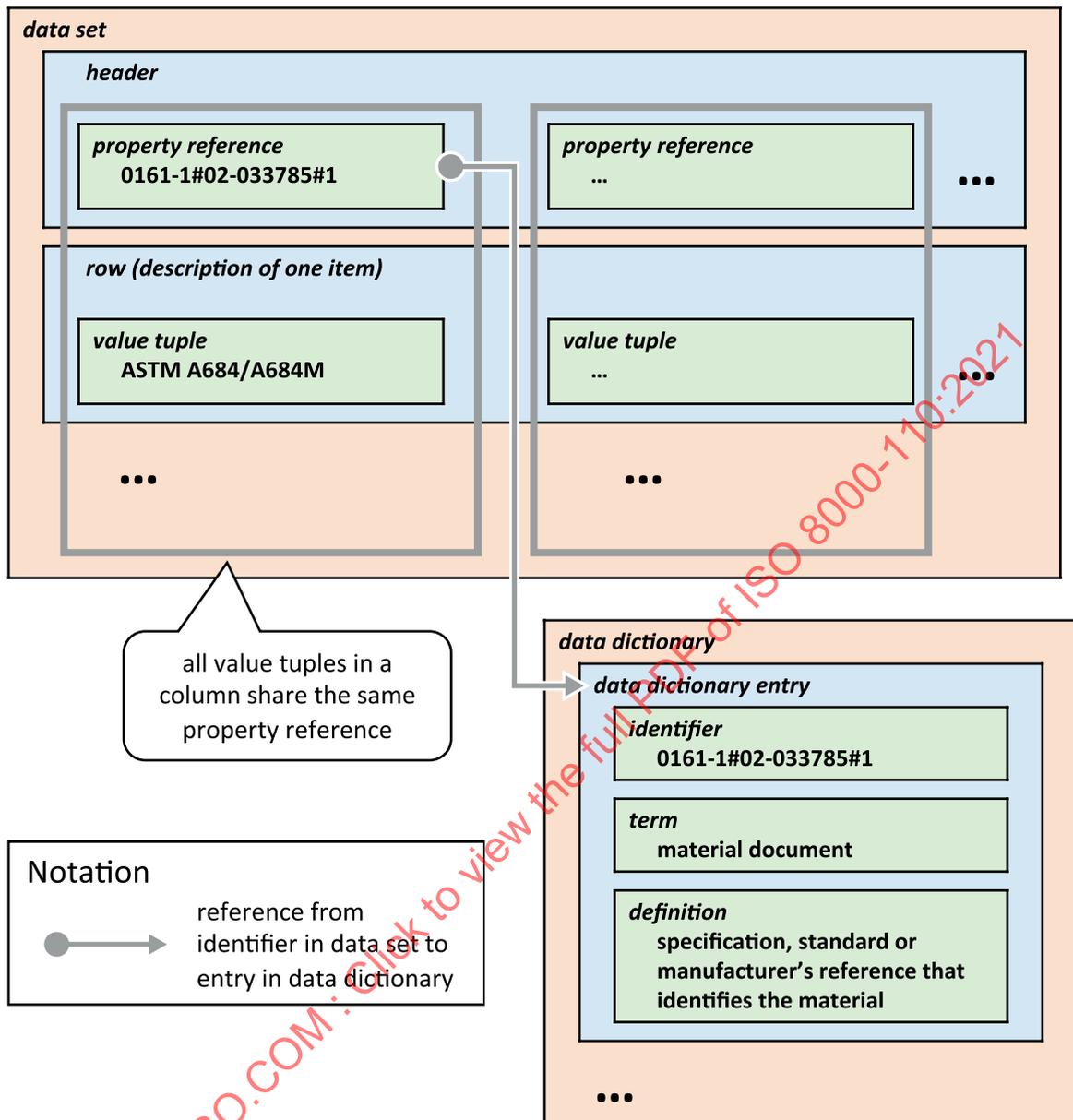
Figure 3 — Implementing a property-value tuple in tabular format

If the unit of measurement is specified by the property definition then the unit of measurement is specified either textually or within a formal structure.

EXAMPLE 2   In the ISO 13584 series, each property in a dictionary is associated with a data type, represented by entity data type `data_type`. Two subtypes of entity data type `data_type` are provided for representing quantities: `real_measure_type` and `int_measure_type`. Both of these entity data types are associated with a default unit of measurement and, possibly, with alternative units of measurement. Units of measurement are represented using the `measure_schema` from ISO 10303-41. Within the `measure_schema`, the entity data type `derived_unit` allows the definition of a unit of measurement in terms of other units of measurement, in a computer-interpretable format. Examples of derived units of measurement that can be defined in computer-interpretable form using the `measure_schema` include:

— "inch", converted as being equal to 25,4 mm;

— "metres per second".

7.3.3 Representation of qualifiers of measurement

To achieve clear and unambiguous specification, a qualifier of measurement shall be represented in one of the following ways.

a) The value tuple contains a reference to a data dictionary entry for the qualifier of measurement. The reference shall be in the form of an unambiguous identifier.

EXAMPLE 1   A flat washer has a property value "bolt thread diameter for which designed = 10 mm nominal", where the bolt thread diameter for which designed is the length of a straight line that passes through the centre of the threaded portion of the bolt and terminates at the circumference. This property value is represented by a property-value tuple consisting of the following components:

— an identifier that references the data dictionary entry for "bolt thread diameter for which designed";

— a value tuple representing the value "10 mm nominal".

The value is represented by a tuple consisting of (see Figure 4):

— the number 10;

— reference to the data dictionary entry for "millimetre";

— reference to the data dictionary entry for "nominal".

In a particular data dictionary, the data dictionary entry for "bolt thread diameter for which designed" has identifier "0161-1#02-001648#1", the data dictionary entry for "millimetre" has identifier "0161-1#05-000845#1" and the data dictionary entry for "nominal" has identifier "0161-1#06-000001#1".

b) The value tuple contains a symbol for the qualifier.

EXAMPLE 2   The value "10 mm nominal" is represented by a tuple consisting of (see Figure 5):

— number 10;

— symbol "mm";

— symbol "nominal".

EXAMPLE 3   The following are typical qualifiers of measurement:

— nominal;

— minimum;

— maximum;

— typical.

c) The property definition specifies the applicable qualifier.

EXAMPLE 4   The property definition indicates the unit of measurement is millimetre and the qualifier of measurement is nominal. The value is represented by a tuple consisting only of the number 10 (see Figure 6).
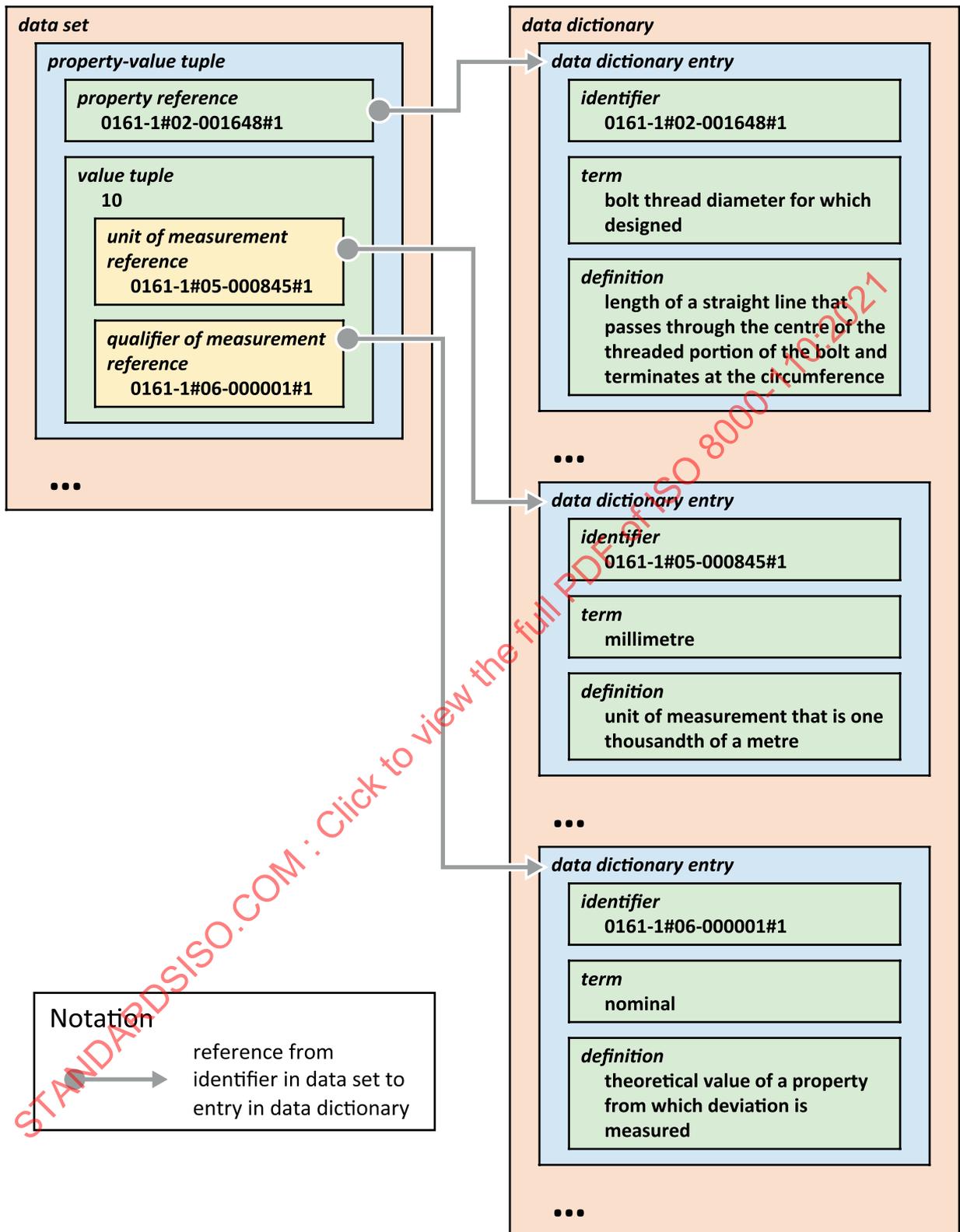
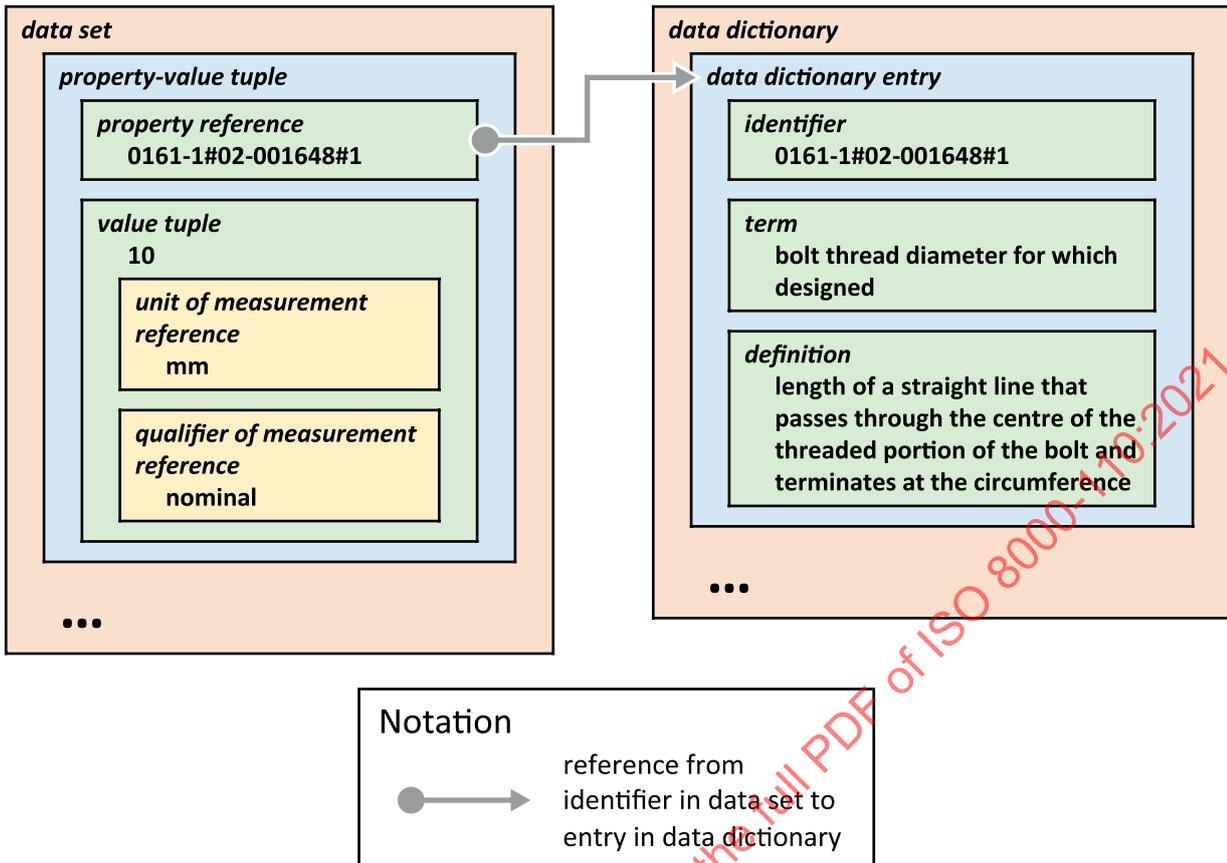**Figure 4 — Representing a quantity by referencing the unit of measurement and qualifier in the data dictionary**

data set

property-value tuple

property reference
0161-1#02-001648#1

value tuple
10

unit of measurement reference
mm

qualifier of measurement reference
nominal

...

data dictionary

data dictionary entry

identifier
0161-1#02-001648#1

term
bolt thread diameter for which designed

definition
length of a straight line that passes through the centre of the threaded portion of the bolt and terminates at the circumference

...

Notation

reference from identifier in data set to entry in data dictionary

Figure 5 — Representing a quantity by symbols for the unit of measurement and qualifier

data set

property-value tuple

property reference
0161-1#02-002759#1

value tuple
10

...

data dictionary

data dictionary entry

identifier
0161-1#02-002759#1

term
nominal bolt thread diameter for which designed, in mm

definition
nominal length of a straight line that passes through the centre of the threaded portion of the bolt and terminates at the circumference, given in millimetres

...

Notation

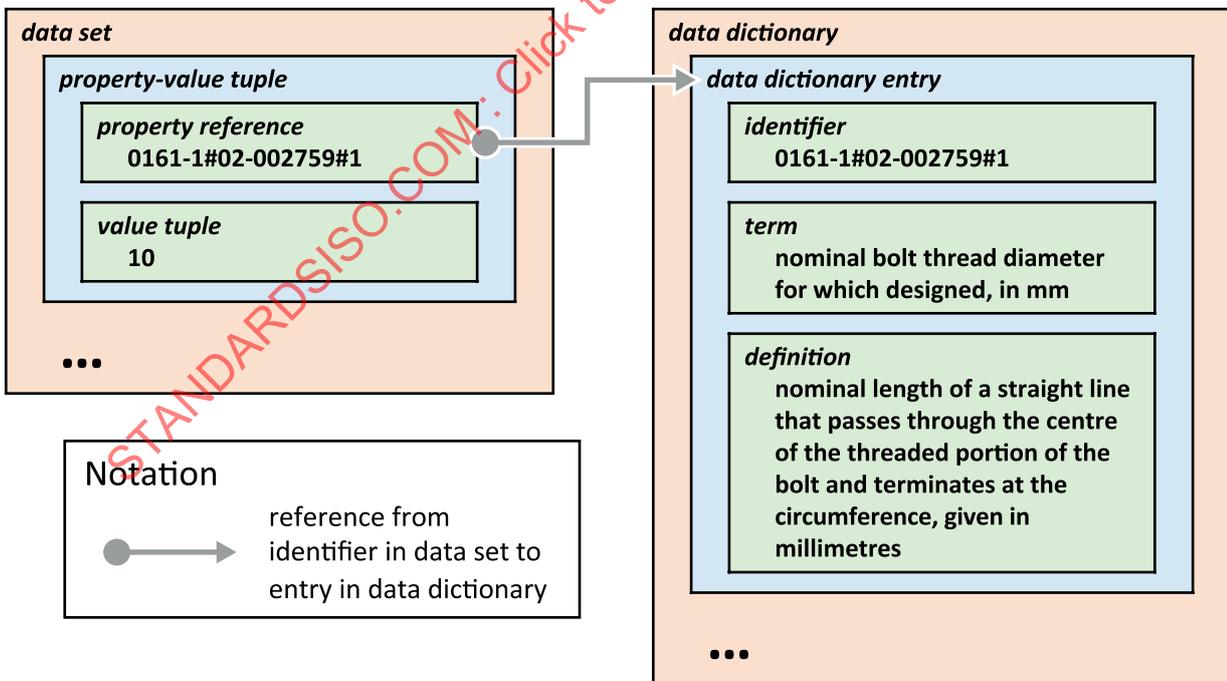reference from identifier in data set to entry in data dictionary

Figure 6 — Representing a quantity by including the unit of measurement and qualifier in the property definition

7.4 Requirements for currency amounts

In addition to the requirements of 7.2, if a property-value tuple is a currency amount then the value shall satisfy the following requirements.

The currency shall be given in one of the following ways.

a) The value tuple contains a reference to the data dictionary entry for the currency. The reference shall be in the form of an unambiguous identifier.

b) The value tuple contains a currency code defined in ISO 4217.

c) The currency is specified in the property definition.

EXAMPLE 1   A flat washer has a property value "unit price = EUR 42,36", where the unit price is the price of a single item. This property value is represented by a property-value tuple consisting of the following components:

— an identifier that references the data dictionary entry for "unit price";

— a value tuple that represents the value "EUR 42,36".

The value is represented by a tuple consisting of (see Figure 7):

— the number 42,36;

— a reference to the data dictionary entry for "euro".

In a particular data dictionary, the data dictionary entry for "unit price" has identifier "0161-1#02-033797#1" and the data dictionary entry for "euro" has identifier "0161-1#08-002455#1".

EXAMPLE 2   The value tuple "EUR 42,36" is represented by (see Figure 8):

— the number 42,36;

— the currency code "EUR".

EXAMPLE 3   The currency is incorporated into the property definition; the value is represented by a tuple consisting only of the number 42,36 (see Figure 9).
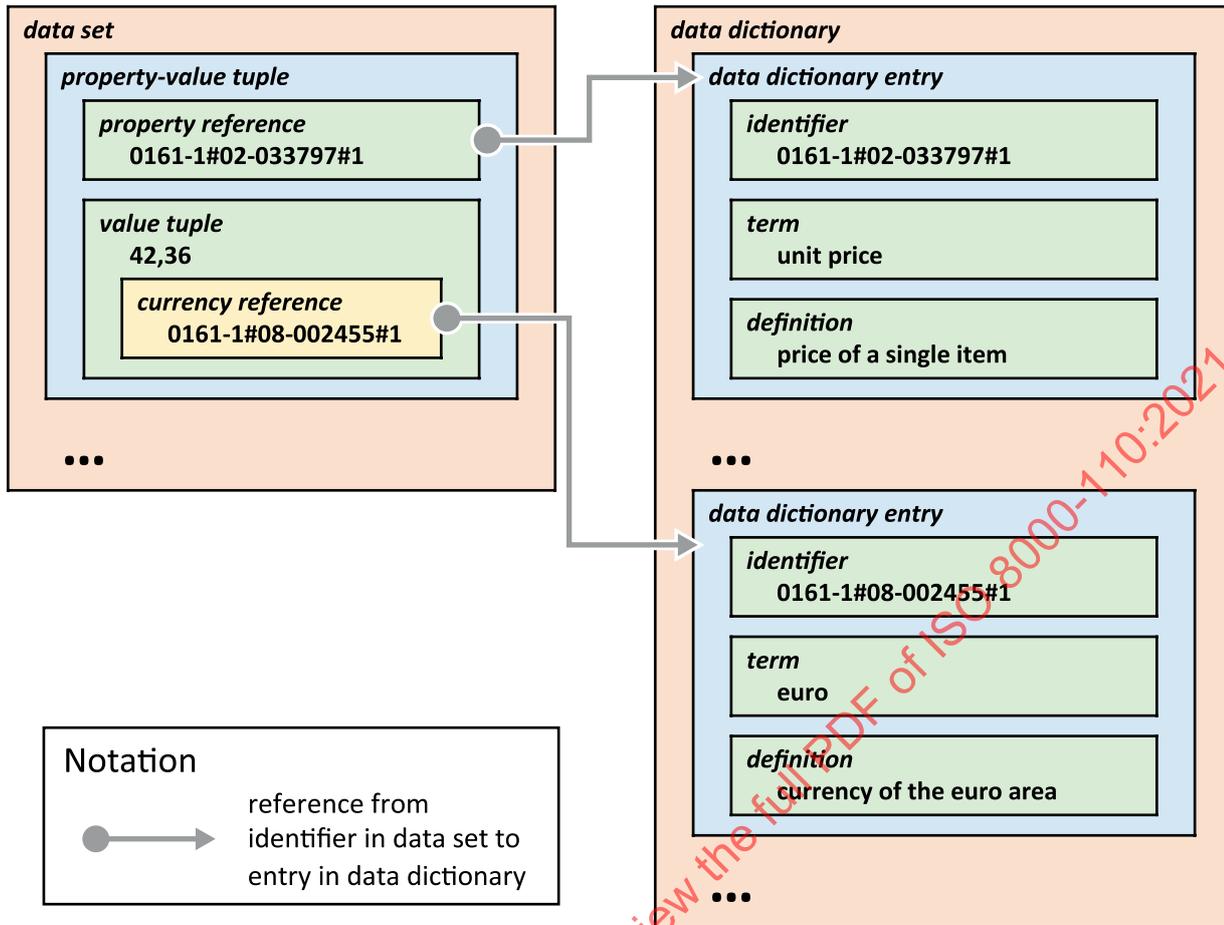
Figure 7 — Representing a currency amount by referencing the currency in the data dictionary

8 Conformance to the data specification

Each master data message shall contain a reference to the data specification or specifications to which the master data message conforms. Each reference shall be in the form of an unambiguous identifier for the specific version of the data specification that was used to encode the master data message. All referenced data specifications shall be available to all interested parties. If the master data are offered to the public then all referenced data specifications shall be publicly available. The data specifications should be available at a reasonable cost.

In order to enable automated checking by software tools that the master data message conforms with the applicable data specification, the specification shall:

— be in computer-processable format;

— contain a suitable set of rules about the format and content of the master data message.

NOTE   It is not required that the data specifications be free of charge.
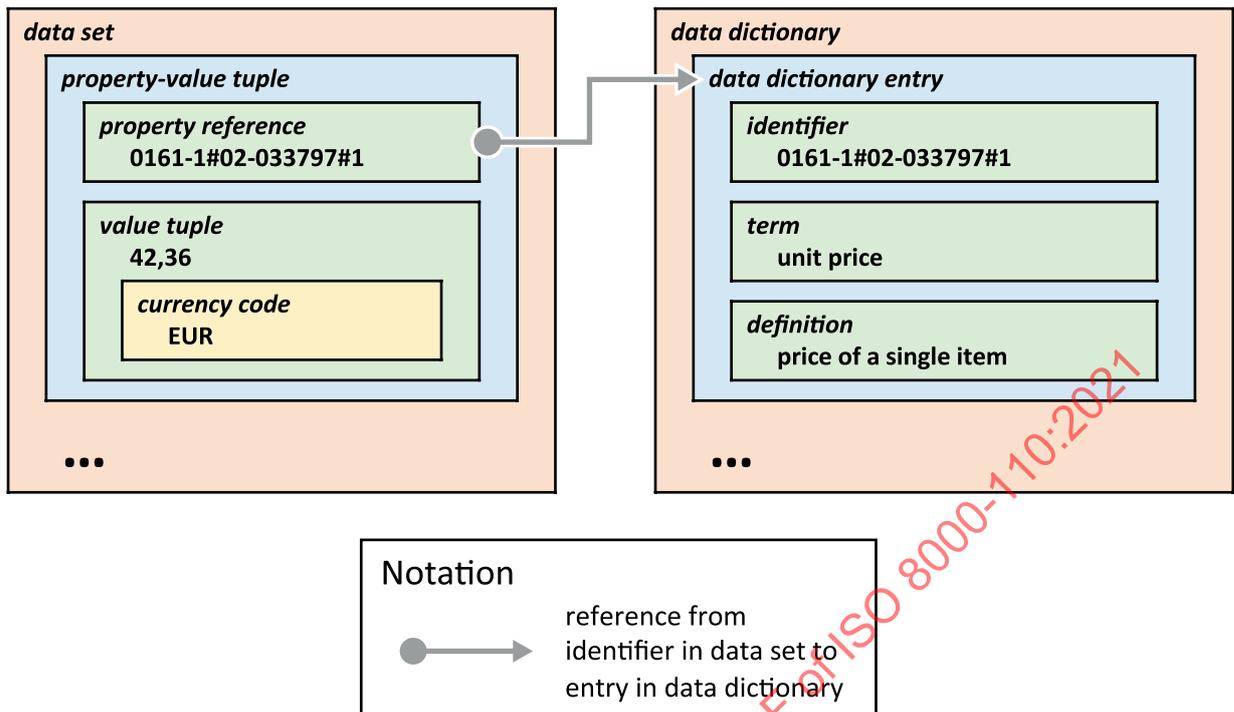
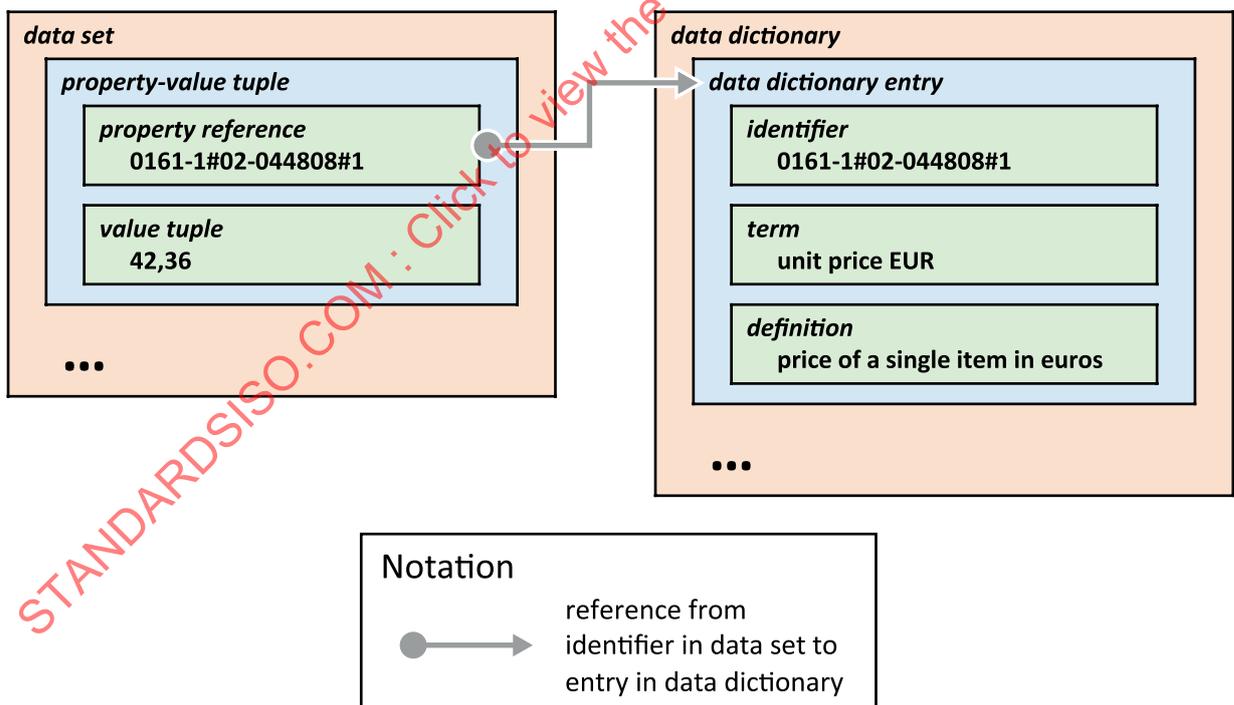**Figure 8 — Representing a currency amount by a currency code**

Figure 9 — Representing a currency amount by including the currency in the property definition

EXAMPLE 1   An example of referencing multiple data specifications is referencing a consortium-defined identification guide and a more restricted partner-to-partner specification.

EXAMPLE 2   Another example of referencing multiple data specifications is referencing both an ontology from the ISO 13584 series and a more precise identification guide that restricts the ontology.

EXAMPLE 3   Examples of published data specifications are given in Table 4.

EXAMPLE 4   A dictionary conforms to ISO 13584-25 and contains both a data dictionary and a data specification.

Table 4 — Examples of data specifications

Designation	Description of the content	Format of the data specification
ISO 13584-501	Reference dictionary for measuring instruments	ISO 13584-25
ISO 13584-511	Reference dictionary for fasteners	ISO 13584-25
ISO 21107	Rolling bearings and spherical plain bearings — Search structure for electronic media	ISO 13584-25
Natural Resources Industry Content Standardization Council (NRICSC)	Identification guide for machine bolts	ISO/TS 22745-30
Federal Item Identification Guide (FIIG) A003B	Identification guide for bolts and screws	US DoD 4100.39-M Volume 3

9 Conformance requirements

This document specifies multiple options that can be supported by an implementation. These options have been grouped into the following conformance classes:

a) free decoding;

b) fee-based decoding;

Conformance to the free decoding conformance class requires conformance to all requirements in Clauses 6, 7 and 8. Any claim of conformance to this conformance class shall be stated as: "ISO 8000-110" or "ISO 8000-110 free decoding".

Conformance to the fee-based decoding conformance class requires conformance to all requirements in Clauses 6, 7 (level 1 requirements only) and 8. Any claim of conformance to this conformance class shall be stated as: "ISO 8000-110 fee-based decoding".

If a claim of conformance to this document does not explicitly state the conformance class then that conformance shall be to the free decoding conformance class.