IEC 61987-10

Edition 1.0 2009-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

**Industrial-process measurement and control – Data structures and elements in process equipment catalogues –
Part 10: Lists of Properties (LOPs) for Industrial-Process Measurement and Control for Electronic Data Exchange – Fundamentals**

**Mesure et commande des processus industriels – Structures de données et éléments dans les catalogues d'équipement de processus –
Partie 10: Liste de propriétés (LOP) pour l'échange électronique de données pour la mesure et le contrôle de processus industriels – Principes essentiels**

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

■ Catalogue of IEC publications: www.iec.ch/searchpub
The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, withdrawn and replaced publications.

■ IEC Just Published: www.iec.ch/online_news/justpub
Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

■ Electropedia: www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

■ Customer Service Centre: www.iec.ch/webstore/custserv
If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:
Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI
La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI
Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

■ Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm
Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,…). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

■ Just Published CEI: www.iec.ch/online_news/justpub
Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

■ Electropedia: www.electropedia.org
Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

■ Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:
Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

IEC 61987-10

Edition 1.0 2009-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

**Industrial-process measurement and control – Data structures and elements in process equipment catalogues –
Part 10: Lists of Properties (LOPs) for Industrial-Process Measurement and Control for Electronic Data Exchange – Fundamentals**

**Mesure et commande des processus industriels – Structures de données et éléments dans les catalogues d'équipement de processus –
Partie 10: Liste de propriétés (LOP) pour l'échange électronique de données pour la mesure et le contrôle de processus industriels – Principes essentiels**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX **X**

ICS 25.040.40; 35.100.20

ISBN 978-2-88912-273-8

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL – DATA STRUCTURES AND ELEMENTS IN PROCESS EQUIPMENT CATALOGUES –

Part 10: Lists of Properties (LOPs) for Industrial-Process Measurement and Control for Electronic Data Exchange – Fundamentals

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61987-10 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, controls and automation.

This bilingual version, published in 2010-12, corresponds to the English version.

The text of this standard is based on the following documents:

FDIS	Report on voting
65E/134/FDIS	65E/145/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part of IEC 61987 has to be read in conjunction with IEC 61987-1.

A list of all parts in the IEC 61987 series, under the general title *Industrial-process measurement and control – Data structures and elements in process equipment catalogues*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The contents of the corrigendum of May 2012 have been included in this copy.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The exchange of product data between companies, business systems, engineering tools and, in the future, control systems (electrical, measuring and control technology) can run smoothly only when both the information to be exchanged and the use of this information have been clearly defined.

In the past, requirements on process control devices and systems were specified by customers in various ways when suppliers or manufacturers were asked to quote for suitable equipment. The suppliers in their turn described the devices according to their own documentation schemes, often using different terms, structures and media (paper, databases, CDs, e-catalogues, etc.). The situation was similar in the planning and development process, with device information frequently being duplicated in a number of different information technology (IT) systems.

Any method that is capable of recording all existing information once only during the planning and ordering process and making it available for further processing gives all parties involved an opportunity to concentrate on the essentials. A precondition for this is the standardization of both the descriptions of the objects and the exchange of information.

IEC 61987-1 makes an important step towards this goal by defining a generic structure in which product features of industrial process measurement and control equipment with analogue or digital output can be arranged. This facilitates the understanding of product descriptions when they are transferred from one party to another. Part 1 of this series of standards applies to the production of catalogues of process measuring and control equipment in paper form supplied by the manufacturer of the product.

The objective of IEC 61987-10 is to make processes involving measuring and control devices more efficient. This means that in addition to the device catalogue data of IEC 61987-1, information on operational and environmental aspects of the device is required. These aspects should be described and expressed in a form that can also be exchanged electronically and handled automatically.

In IEC 61987-10, devices are specified by creating lists of properties (LOPs). The properties themselves are compiled into blocks that describe particular features of a device. By compiling blocks, it is possible to produce a list of properties that completely describe a particular device type or the surroundings in which the devices is or will be installed and operate.

This part of IEC 61987 deals with the following.

- It concerns both properties that may be used in an inquiry and a quotation. It also addresses detailed properties required for integration of a process control device in systems for other tasks, such as planning (for example in Computer Aided Engineering (CAE) systems), maintenance and Enterprise Resource Planning (ERP) systems.

- It provides a method for standardization that helps both suppliers and users of process control equipment and systems to optimize workflows, both within their own companies and in their exchanges with other companies. Depending on their role in the process, engineering, procurement and construction (EPC) contractors may be considered to be either users or suppliers.

- It ensures the clarity of the information provided, as the data and structures are described in unambiguous terms.

It should also be noted that the component data dictionary might also be used for other applications, for example the generation of parts lists. It is also possible to generate legacy specifications from the same source.

Layers of electronic date exchange
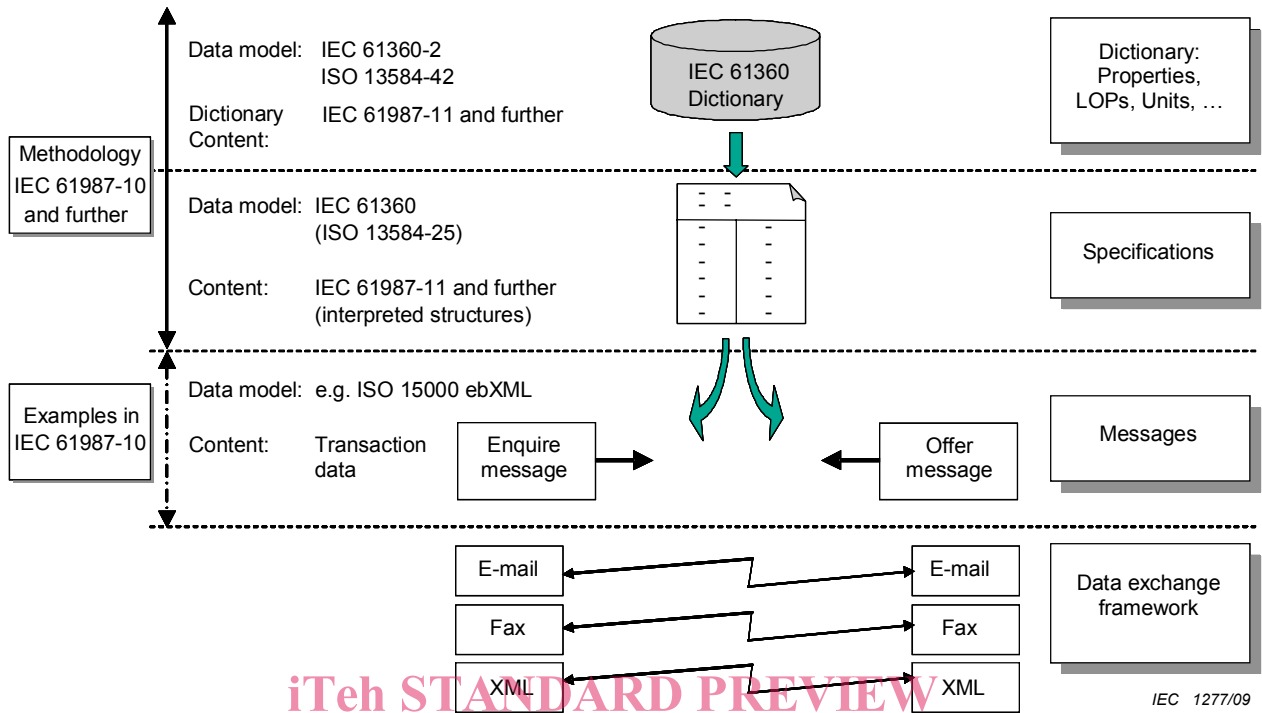
Figure 1 – Layers of electronic exchange procedures considered in this standard

The individual layers of data exchange considered in this part of IEC 61987 are described as follows (see also Figure 1).

Dictionary: To achieve standardized, distributed, common semantics of the devices, this standard describes a concept dictionary that captures terms, definitions and relationships of the devices. The basis is an IEC component data dictionary for industrial process measurement and control devices that uses the data models of IEC 61360-2 and ISO 13584-42. The dictionary content comprises the properties and blocks which will be defined in future IEC 61987-11, etc. The same standards also define lists of properties for process measurement and control devices.

NOTE 1   Not all devices will be included in the first edition of the dictionary, and it is possible that other devices will be added as new devices and technologies are developed.

Specifications: A process engineer planning a particular area in a plant uses an electronic specification sheet which draws its content from the component data dictionary. Similarly, a manufacturer quoting for an industrial process measuring device that fulfils the conditions defined in the specification sheet defines his device according to another specification sheet, which again draws its content from the component data dictionary. In interpretation of the specifications, the patterns of cardinality or polymorphism are evaluated.

Messages: Communication messages containing information about sender, receiver and transport protocol are generated from specifications.

NOTE 2   The generation of messages is not in the scope of this standard.

Data exchange framework: The messages are sent from one business partner to the other using data exchange frameworks. These can be conventional (e-mail, fax) using templates as described in Annex C of this standard, or XML message based distribution frameworks.

EXAMPLE: One example of a XML message distribution framework is ISO 15000 (ebXML).

The methodology to create these specifications and the description of the mechanisms that are required to compile meaningful data into such specifications are defined in this standard. Several aspects of the devices are also the subject of standardisation in this standard. For example, one aspect describes the operating environment at the installation point, that is the conditions under which a process measuring device must operate, and another describes the device specification which meets these conditions.

The properties contained in the component data dictionary however, may also serve other purposes, for example, the precise location of the production unit or control loop might form part of administrative and commercial exchanges. Similarly, more precise engineering data such as the designation of terminals or device calibration data might also be exchanged by means of additional specification sheets or by supplementing the device specification sheets.

Beyond the scope of this standard is the specification of transactional data required to exchange electronic specification sheets between companies, as shown in the messages layer of Figure 1. Similarly, no particular framework for data exchange is specified.

Each device type is defined by an LOP containing the properties that apply to it. This is a basic requirement for exchanging device information between different information technology (IT) systems.

The use of the LOPs therefore supports data exchange between systems in a business-to-business relationship and between systems within an organization, for example, CAE or ERP systems (see Figure 2). This standard also makes provision for the storage of device data as LOPs in process control systems or field devices.
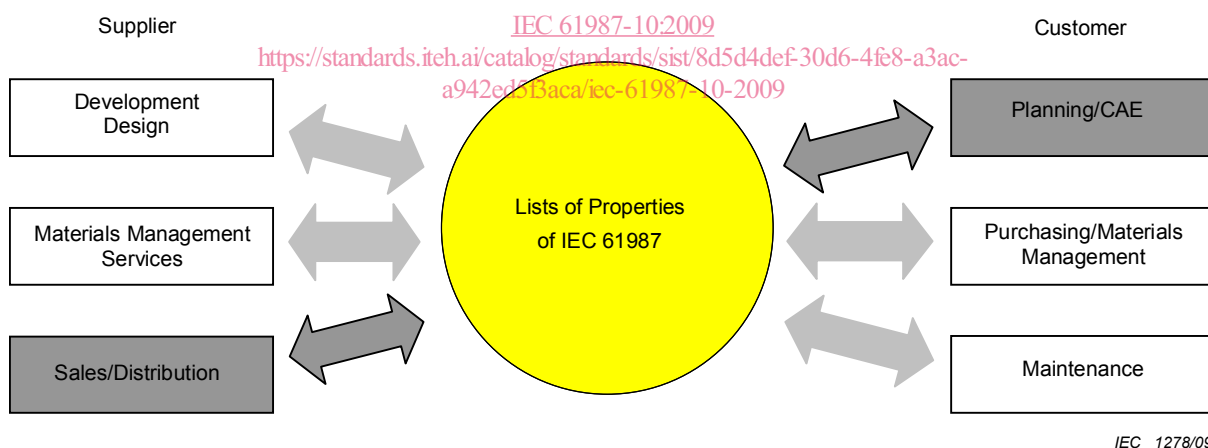
**Figure 2 – Support for business-to-business relationships
through the use of Lists of Properties**

IEC 61987-10, IEC 61987-11 and further

IEC 61987-10 defines the approach for structuring lists of properties for electrical and process control equipment, for example measuring devices, actuators, motors, low-voltage switchgear, etc., in order to facilitate fully automatic engineering workflows in the planning and maintenance of industrial plants and to allow both the customers and the suppliers of the devices to optimize their processes and workflows.

Future IEC 61987-11 will contain lists of properties for measuring device types commonly used in the process industry.

Subsequent parts of IEC 61987 are already planned. These will contain lists of properties for other device families, such as actuators or signal conversion devices.

The properties themselves are to be found in the IEC Component Data Dictionary and follow the semantics and the structure of the IEC 61360 and ISO 13584 series of standards.

The concept of properties and structured lists is the subject of various standards. The data model described in the IEC 61360 and ISO 13584 series of standards is used in this standard. The structure defined for industrial-process measuring equipment in IEC 61987-1 is used, with some additions and modifications, to organise the contents of Device LOPs into blocks.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL – DATA STRUCTURES AND ELEMENTS IN PROCESS EQUIPMENT CATALOGUES –

Part 10: Lists of Properties (LOPs) for Industrial-Process Measurement and Control for Electronic Data Exchange – Fundamentals

1 Scope

This part of IEC 61987 provides a method of standardizing the descriptions of process control devices, instrumentation and auxiliary equipment as well as their operating environments and operating requirements (for example, measuring point specification data). The aims of this standard are

- to define a common language for customers and suppliers through the publication of Lists of Properties (LOPs),
- to optimize workflows between customers and suppliers as well as in processes such as engineering, development and purchasing within their own organizations,
- to reduce transaction costs.

The standard describes industrial-process device types and devices using structured lists of properties and makes the associated properties available in a component data dictionary.

The intention is to produce a reference dictionary which allows a description of the inquiry, offer, company internal and other descriptions of process control systems, instrumentation and auxiliary equipment based on list of properties.

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.

IEC 60529:1989,   *Degrees of protection provided by enclosures (IP Code)*
Amendment 1 (1999)

IEC 61346-1:1996, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic rules*

IEC 61360 (all parts),   *Standard data element types with associated classification scheme for electric components*

IEC 61360-1,   *Standard data element types with associated classification scheme for electric components – Part 1: Definitions – Principles and methods*

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

IEC 61987-1,   *Industrial-process measurement and control – Data structures and elements in process equipment catalogues – Part 1: Measuring equipment with analogue and digital output*

ISO 1000,   *SI units and recommendations for the use of their multiples and of certain other units*

ISO 13584 (all parts),   *Industrial automation systems and integration – Parts library*

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

3   Terms, definitions and abbreviations

3.1   Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
administrative list of properties
ALOP
list of properties describing the aspect concerning initiating, tracking and completing a transaction

NOTE 1   The administrative list of properties contains, for example, information about the type of document (for example, inquiry, quotation) and the issuing details (for example, contact data of the author) and may be placed at the head of the transaction document.

NOTE 2   An ALOP may apply to a transaction of multiple instances of one or more device types, and will seldom be related to only a single device type.

3.1.2
aspect
specific way of selecting information on or describing a system or an object of a system

[IEC 61346-1, 3.3]

3.1.3
attribute
characteristic of an object or entity

[ISO/IEC 11179-1:2004, 3.1.1]

EXAMPLE: Properties, blocks, LOPs, units of measure etc. are entities.

3.1.4
block of properties
collection of properties relating to (describing) one concept of the device type being considered, for example device output, environmental conditions, operating conditions, device dimensions

NOTE 1   A block may also comprise other blocks of properties.

NOTE 2   A block of properties is a feature class in the sense of the series of standards IEC 61360 and ISO 13584.

3.1.5
cardinality
pattern defining the number of times a concept reoccurs within a description

NOTE 1   In IEC 61987-10 and future parts of IEC 61987, cardinality is used to indicate the repetition of blocks of properties or LOPs.

NOTE 2   In structural data cardinality defines the fact that the block may be repeated, whereas in transactional data the cardinality defines the number of times the block is repeated.

NOTE 3   Cardinality may be zero.

NOTE 4   Cardinality allows a block of properties contained in a list of properties to be used more than once for a particular transaction in order to describe, for example, a device with several different outputs or more than one process cases in describing the requirements for a device.

NOTE 5   Cardinality is mapped to IEC 61360 data model by means of a property that is placed directly before the block or property which can be repeated. The repeated block or property occurs in the structural data only once but in the transaction data as many times as the value of the cardinality property defines.

3.1.6
characteristic
abstraction of a property of an object or of a set of objects

[ISO 1087-1:2000, 3.2.4]

NOTE 1   Characteristics are used for describing concepts.

NOTE 2   This standard uses properties to describe devices, their operating environment (ambient conditions) or other aspects.

3.1.7
commercial list of properties
CLOP
list of properties describing the aspect concerning business workflows

NOTE   A commercial list of properties contains for example prices, costs, delivery times, transport information, and order or delivery quantity.

3.1.8
composite device
device composed of various devices

NOTE   These devices might be supplied as a whole or the parts comprising the assembly of the composite device might be supplied individually.

EXAMPLE: A control valve which consists of the valve itself, a drive and a positioner.

3.1.9
concept
unit of knowledge described by a unique combination of characteristics

[ISO 1087-1:2000, 3.2.1, modified]

EXAMPLE: IEC 61987 subsumes LOP, blocks, properties, unit of measure, values etc. as concepts.

3.1.10
concept identifier
sequence of characters, capable of uniquely identifying that with which it is associated, within a specified context

[ISO/IEC 11179-1:2004, 3.1.3, modified]

NOTE   This standard prefers the approach of IEC 61360-1 with a six-character code, which is unique for all concepts.

3.1.11
customer
organization or person that receives a product

EXAMPLE: Consumer, client, end-user, retailer, beneficiary and purchaser.

NOTE   A customer can be internal or external to the organization.

[ISO 9000:2005, 3.3.5]

3.1.12
definition
representation of a concept by a descriptive statement which serves to differentiate it from related concepts

[ISO 1087-1:2000, 3.3.1]

3.1.13
device
material element or assembly of such elements intended to perform a required function

[IEC 60050-151, 151-11-20]

NOTE 1   A device may form part of a larger device.

NOTE 2   For measuring devices the identifier is the measuring principle, for actuators, the design/style and the operating principle.

NOTE 3   A List of Properties is defined for each device type, thus defining the structural data.

3.1.14
device list of properties
DLOP
list of properties describing a device

NOTE   It may contain data relevant for CAE systems.

3.1.15
enumerated value domain
value domain that is specified by a list of all its permissible values

[ISO/IEC 11179-1:2004, 3.3.14]

3.1.16
list of properties
LOP
collection of properties applicable to a particular device type, its blocks and its aspects

NOTE 1   A list of properties, as defined in this standard, consists of blocks of properties.

NOTE 2   Lists of properties can be compiled for various aspects of a device type that are represented by different LOP types, for example, user requirements are part of the operating LOP, device description is the aim of the device LOP, commercial information is included in the commercial LOP, etc.

3.1.17
LOP type
list of properties concerning a device type describing one aspect of the device type

NOTE 1   Each aspect of a device is described by its own LOP type.

NOTE 2   LOP types of an LOP for a given device type create the first construction level of an LOP.

3.1.18
manufacturer
maker of the device (who may also be the supplier, the importer, or the agent) in whose name usually the certification, where appropriate, was originally registered