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High voltage switchgear and controlgear -
Part 321: Product data and properties for information exchange - Catalogue data

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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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High-voltage switchgear and controlgear - Part 321: Product data and properties for information exchange - Catalogue data

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IEC TR 62271-321 has been prepared by the technical committee 17: High-voltage switchgear and controlgear. It is a Technical Report.

This document is a first step and is intended to be built upon in the near future. The scope of this work is being specified by TC17/ahG12.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
17/1187/DTR	17/1191/RVDTR

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

The language used for the development of this Technical Report is English.

A list of all parts in the IEC 62271 series, published under the general title *High-voltage switchgear and controlgear*, can be found on the IEC website.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

INTRODUCTION

It is mainly large customers and regulations which confirm the need for data availability over the life cycle of the high-voltage switchgear and controlgear. For that digital standardized high-voltage switchgear and controlgear product descriptions and product properties are increasingly required to minimize data transfer, migration and re-formatting. This applies to all domains such as generation, transmission, distribution, consumption, and all life cycle phases such as design, planning, procurement, operation, maintenance, dismantling, etc.

Multiple associations or groups of actors have launched different initiatives, external to standardization bodies, to try to respond to this demand but, due to the lack of standardisation of device classes and properties, the situation is not satisfactory neither for customers, nor for manufacturers nor for recyclers and waste managers.

The works and associated documents aim to solve interoperability issues met during data migration as expected by IEC TC 17 standards and along a whole life cycle of a high-voltage switchgear and controlgear. They even influence the future lives of their used materials, by different stakeholders.

IEC TC 17, which deals with high-voltage switchgear and controlgear, decided to extend initial work to take into account consideration of required properties during enquiries, tenders and orders as shown in Figure 1.

Initial work by TC 17 highlighted inconsistencies between high-voltage switchgear and controlgear standards such as different names for the same property, different definitions for the same property, different units for the same property, and even several properties within summarized in one.

In subsequent work, the mapping was extended to the properties from all IEC TC 17 standards and any other useful standards dealing with high-voltage components implemented inside switching devices and assemblies. This mapping is no longer limited to the properties defined by the nameplates and considers properties for information exchanges during enquiries, tenders, and orders.

To harmonize product description, IEC TC 17 proposes a new consistent solution within this document.

The purpose of this document is to describe the process of the catalogue data from the mapping of IEC TC 17 standards to the data intended to be implemented in IEC Common Data Dictionary (IEC CDD) using ParcelMaker™ [1] tool, as follows:

– Create a spreadsheet database.
  - Review of properties of TC 17 standards and when possible associated standards.
    – Define source database (IEV, glossary, ISO OBP, etc).
    – Define device classes and properties for each high-voltage switchgear and controlgear standard.
    – Follow relevant attributes of properties for users as defined by IEC 61360.
– Create potential other digital representation supporting database verification and bringing awareness of available digital material awaiting the final stage IEC CDD for its maintenance.

[1] ParcelMaker is the trademark of a product supplied by Toshiba Corporation. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

– Feed ParcelMaker™ spreadsheet tool with the support of the IEC SC 3D to provide a basis for introduction of the high-voltage switchgear and controlgear classes and properties into the IEC 61360 database maintained by IEC/SC 3D (see http://std.iec.ch/iec61360).
– Raise awareness on value created by such catalogue data assuming to feed many digital twins along the whole life cycle of high-voltage switchgear and controlgear (see Annex C).

This document is not intended to establish a hierarchy of classes called classification.

The intended benefits of this document are to:

– solve interoperability issues;
– reuse digital properties defined by IEC TC 17 standards;
– reduce the costs, time and efforts of mapping data for each customer request;
– optimize the workflow of industrial stakeholders' exchanges;
– minimize duplication of articles in customer inventories and in databases;
– minimize losses and misinterpretation of data during exchanges;
– facilitate the selection of a product, especially regarding reliability and safety;
– give access to product data everywhere regardless of country, language and culture;
– provide product data related to environmental aspects such as material declaration;
– contribute to the fast growth of the e-business by simplifying the development of e-Catalogue allowing the differentiation of products performances, certificates, etc.;
– e-Commerce: use of electronic networks to exchange information, products, services and payments for commercial and communication purposes between individuals (consumers) and businesses, between businesses themselves.

1 Scope

This part of IEC 62271 relates to high-voltage switchgear and controlgear for all rated voltage levels above 1 kV AC and 1,5 kV DC and assemblies thereof and provides materials for the reference dictionary for all products covered by the IEC 62271 series.

This dictionary is a preliminary work which can be used to facilitate exchanges in digital format of data related to high-voltage switchgear and controlgear components, devices, equipment, and assemblies of the power systems.

Such a dictionary improves the interoperability of the power systems required for these data exchanges along the power system lifetime and over its life cycle.

Each property has an unambiguously defined meaning and name, and where relevant, a defined value list, a defined format, and a defined unit.

This document defines, digitalizes and then summarizes the properties related to high-voltage switchgear and controlgear nameplates and information usually exchanged during the enquiries, tenders, and orders life phases defined by IEC TC 17 standards of physical elements.

The intention is not to cover manufacturer specific features.

The intention is not to cover IEC TC 17 standards dealing only with assessment methodology (calculation, tests, rules, etc.).

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.

IEC 61360-1:2017, *Standard data element types with associated classification scheme - Part 1: Definitions - Principles and methods*

3 Terms and definitions

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

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

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

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

3.1
attribute
data element for description of a property, a relation or a device class

EXAMPLE The name of a property, the code of a class, the measure unit of a property.

3.2
block (of properties)
collection of properties describing one common aspect of the device class

Note 1 to entry: A block is a feature class in the sense of IEC 61360-1 and ISO 13584-42 [67].

EXAMPLE Diagnostic functions, control circuit.

[SOURCE: IEC 62683:2017, 3.2]

3.3
cardinality
pattern defining the number of times a concept reoccurs within a description

Note 1 to entry: 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.

Note 2 to entry: Cardinality is defined by IEC 61987-10 [32].

3.4
classification
systematic division of a set of items into subsets according to their difference in some predetermined characteristics

3.5
class
abstraction of a set of similar products

Note 1 to entry: A product that complies with the abstraction defined by a class is called a class member.

Note 2 to entry: A class is an intentional concept that can take different extensional meanings in different contexts.

EXAMPLE The set of products used by a particular enterprise and the set of all ISO-standardized products are two examples of contexts. In these two contexts (the particular enterprise and ISO), the set of products that are considered as members of the single ball bearing class can be different, in particular because employees of each enterprise ignore a number of existing single ball bearing products.

Note 3 to entry: Classes are structured by class inclusion relationships.

Note 4 to entry: A class of products is a general concept as defined in ISO 1087-1. Thus, it is advisable that the rules defined in ISO 704 be used for defining the designation and definition attributes of classes of products.

Note 5 to entry: In the context of the ISO 13584 series, a class is either a characterization class, associated with properties and usable for characterizing products, or a categorization class, not associated with properties and not usable for characterizing products.

[SOURCE: IEC 61360-2:2012, 3.6]

3.6
device
material element or assembly of such elements intended to perform a required function

Note 1 to entry: In this document, a device corresponds to a high-voltage switchgear and controlgear.

[SOURCE: IEC 60050-151:2001 [3], 151-11-20, modified – Note replaced with a new note.]

3.7
device class
set of properties which gives a description of a device

Note 1 to entry: For this document device classes are represented by the devices covered by the TC 17 standards such as switching devices, assemblies, if any operating devices. A property can characterize functional aspect or physical aspect.

3.8
polymorphism
pattern that allows substitution of a single concept in the same context by a different more specific (specialized) concept

Note 1 to entry: A specialized polymorphic block of properties can replace a more generic one in the same context. A polymorphic operator (control property) can act in selecting between of various specializations.

Note 2 to entry: Polymorphism is defined by IEC 61987-10 [32].

3.9
property
defined parameter suitable for the description and differentiation of a specific characteristic describing an aspect of class

4 Normal and special service conditions

IEC 62271-1 [34] and its related product standards have been used to identify the properties of respective service conditions.

5 Ratings

IEC 62271-1 [34] and its related product standard have been used to identify the properties of ratings. The property name of a rating starts by “rated….”.

6 Design and construction

6.1 General

The attributes are in accordance with IEC 61360-1.

Based on the IEC 61360-1 data model, the structured data called cardinality and polymorphism can be used.

The IEC Common Data Dictionary (IEC CDD) comprises seven dictionaries (status as at 05/2025) over all IEC technical committees. Usually, those databases include the properties related to the design and the nameplate but not the full life cycle stage of the covered electrical equipment. Figure 1 mentions the clause numbers from the IEC 62271 series of standards [34] to [57], [63] and [64] for each life cycle stage.