

PUBLICLY AVAILABLE SPECIFICATION PRE-STANDARD

Requirements concerning the interoperability between electromechanical and electrical applications in CAX-systems

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INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**REQUIREMENTS CONCERNING THE INTEROPERABILITY
BETWEEN ELECTROMECHANICAL AND ELECTRICAL APPLICATIONS
IN Cax-SYSTEMS**

FOREWORD

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A PAS is a technical specification not fulfilling the requirements for a standard but made available to the public.

IEC-PAS 62515 has been processed by technical committee 3: Information structures, documentation and graphical symbols.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
3/837/NP	3/855/RVN

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned will transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of three years starting from 2007-09. The validity may be extended for a single three-year period, following which it shall be revised to become another type of normative document or shall be withdrawn.

INTRODUCTION

During the preparation of several international IEC standards, especially ISO/IEC 10303-212, the question arose as to how to deal with the requirements concerning the physical layout of cubicles, panels, boards, in which devices of different size and of any product class are used, defining the requirements for their installation, service and operation.

The existing definitions on the national level as well as the definitions on the international level do not suffice to supply, process and exchange the data in a computer-sensible form with partners in a process chain. This includes, for example, the installation of devices using robots as well as the semi- or automatic wiring in cubicles.

At the same time, software suppliers requested the German Electrotechnical Commission within VDE (DKE) to define related specifications. For this purpose a task-force has been established, consisting of members of the following companies.

ABB Calor-Emag Schaltanlagen AG	Mannheim
Robert Bosch GmbH	Crailsheim and Stuttgart
Klöckner-Moeller GmbH	Bonn
L. Schuler GmbH	Goeppingen
Siemens AG	Erlangen

During the specification period members of the task force established the request to specify a list of minimum requirements for a software system concerning the needs within electrotechnical applications.

The results of the task force concerning data element types are already widely included within IEC 61360-4.

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REQUIREMENTS CONCERNING THE INTEROPERABILITY BETWEEN ELECTROMECHANICAL AND ELECTRICAL APPLICATIONS IN CAX-SYSTEMS

1 Scope

This PAS is intended to serve as a checklist and guideline for the evaluation of CAX-software for applications within the electromechanical field by users in industry.

This PAS provides a set of data element types required in the context of electromechanical applications, especially in the context of electrical applications and their mechanical representations in the real or virtual three-dimensional world.

Where possible, existing internationally standardized data element types have been taken from the existing data element repository as listed in the data base of IEC 61360 available under the URL <http://std.iec.ch/iec61360>

Available data element types are indicated by their identity number, followed by its name and the definition as given in the data base at the time of publication of this document.

The application of standardized data element types supports the automatization of design processes during the development of products, systems and plants.

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 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60715:1981, *Dimensions of low-voltage switchgear and controlgear – Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations*

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

IEC 61360-4:DB, *Standard data element types with associated classification scheme for electric components – Part 4: IEC reference collection of standard data element types and component classes*

IEC 61666:1997, *Industrial systems – Installations and equipment and industrial products – Identification of terminals within a system*

IEC 81714-3:2004, *Design of graphical symbols for use in the technical documentation of products – Part 3: Classification of connect nodes, networks and their encoding*

ISO 31 (all parts), *Quantities and units*

ISO 128 (all parts), *Technical drawings – General principles of presentation*

ISO 129, *Technical drawings – Indication of dimensions and tolerances*

ISO 406:1987, *Technical drawings – Tolerancing of linear and angular dimensions*

ISO 3098 (all parts), *Technical product documentation – Lettering*

ISO 5455:1979, *Technical drawings – Scales*

ISO 5457:1999, *Technical product documentation – Sizes and layout of drawing sheets*

ISO 6428:1982, *Technical drawings – Requirements for microcopying*

ISO 7200:2004, *Technical product documentation – Data fields in title blocks and document headers*

ISO 10303-42:2003, *Industrial automation systems and integration – Product data representation and exchange – Part 42: Integrated generic resource: Geometric and topological representation*

ISO 10303-212:2001, *Industrial automation systems and integration – Product data representation and exchange – Part 212: Application protocol: Electrotechnical design and installation*

ISO 10303-214:2003, *Industrial automation systems and integration – Product data representation and exchange – Part 214: Application protocol: Core data for automotive mechanical design processes*

3 Terms and definitions

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

3.1

object

entity treated in the process of design, engineering, realization, operation, maintenance and demolition

NOTE 1 The entity may refer to an abstract or physical object or to a set of information associated with it.

NOTE 2 Depending on its purpose, an object may be viewed in different ways, called "aspects".

[IEC 61346-1, 3.1]

3.2

system

set of interrelated objects

NOTE 1 Examples of a system: a drive system, a water supply system, a stereo system, a computer.

NOTE 2 When a system is a part of another system, it may be considered as an object.

[IEC 61346-1, 3.2]

3.3

aspect

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

NOTE Such ways may be:

- what the system is doing (function viewpoint);
- how the system or object is constructed (product viewpoint);
- where the system is located (location viewpoint).

[IEC 61346-1, 3.2]

3.4

function

purpose related to an object

[IEC 61346-1, 3.4]

3.5

product

intended or accomplished result of labour or of a natural or artificial process

NOTE 1 A product usually has a part number, order number, type number, and/or a name.

NOTE 2 A technical system or plant can be considered as a product.

[IEC 61346-1, 3.5]

3.6

structure

organization of relations among objects of a system describing constituency relationships ("consist of"/"is a part of")

[IEC 61346-1, 3.6]

3.7

reference designation

identifier of a specific object with respect to the system of which it is a constituent, based on one or more aspects of that system

[IEC 61360-1, 3.7]

3.8

terminal

point of access to an object intended for connection

NOTE The connection may refer to

- a physical interface between conductors and/ or contacts to provide a signal or energy path;
- an association of functional nature established between logical elements, software modules, etc. for conveying information.

3.9

terminal designation

identifier of a terminal with respect to the object to which it belongs, related to one aspect of the object

[IEC 61666, 3.8]

3.10

terminal function designation

identifier of a terminal with respect to the function of the object to which it belongs, related to one aspect of the object

3.11**terminal product designation**

identifier of a terminal with respect to the product of the object to which it belongs, related to one aspect of the object

3.12**terminal location designation**

identifier of a terminal with respect to the location of the object to which it belongs, related to one aspect of the object

3.13**terminal strip**

assembly of different terminals with a common identification

3.14**connect node**

node designed for connection to a specific kind of net, for example, electrical

[IEC 81714-2, DB]

3.15**2D Cartesian coordinate space**

type of Cartesian coordinate space that is defined by two mutually perpendicular axis

[ISO 10303-201]

3.16**3D Cartesian coordinate space**

type of Cartesian coordinate space that is defined by three mutually perpendicular axis

[ISO 10303-201]

4 Identification and classification of objects

The following requirements concerning the identification of objects within a plant or system are based on IEC 61346-1.

4.1 Identification of objects

Each object within a context may be identified according to the aspects regarding

- its function-oriented structure; and/or
- its location-oriented structure; and/or
- its product-oriented structure.

At least one of these reference designations is required in order to identify an object unambiguously within its context. There may also be cases where all three reference designations are provided. Each of these reference designations may be unambiguous on its own or all together may uniquely identify the object.

As all reference aspects via their reference designations are related to the same object, these have been collected within the reference designation set.

As there is an increasing need for interoperability of data between mechanical and electrical CAx-systems, the common use of the reference designations is needed in order to identify