



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 63261:2023**  
**01-september-2023**

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**Predstavitev električnih in instrumentalnih objektov v digitalnih 3D modelih obratov med inženiringom**

Representation of electrical & instrument objects in digital 3D plant models during engineering

**iTeh STANDARD PREVIEW**  
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TITLE:

**Representation of electrical & instrument objects in digital 3D plant models during engineering**

PROPOSED STABILITY DATE: 2026

NOTE FROM TC/SC OFFICERS:

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**REPRESENTATION OF ELECTRICAL & INSTRUMENTATION OBJECTS IN  
DIGITAL 3D PLANT MODELS DURING ENGINEERING****Engineering of process plant instrumentation – 3D model requirements**

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International Standard IEC 63261 has been prepared by subcommittee SC65E Devices and integration in enterprise systems, of IEC technical committee SC65E WG 13.

## INTRODUCTION

Engineering and construction in the process industries typically require the cooperation of multiple companies. Due to economic reasons, special knowledge, special license, authorization or simply capacity utilization the work is divided between partners. They will arrange their cooperation for each individual project differently. This requires well defined division of work and responsibilities across the different phases of project execution.

Efficient engineering of a digital 3D plant model requires highly sophisticated tools for the different needs of the involved work processes and departments. By nature of the plant model all engineering disciplines meet in the model and need clear definitions of the content and interfaces.

Digital 3D plant models play an important part in electrical and instrumentation engineering to create technical drawings and avoid clashes between the elements provided by different engineering disciplines.

The first aim of this standard is to define the level of details of electrical and instrumentation equipment representations placed in the 3D plant model. It specifies minimum requirements at the different maturity grades of the model for each equipment, its related metadata and reports retrieved from the 3D plant model.

The second aim of this document is to define a timeline and project milestones with the associated level of detail for the incorporation of electrical and instrumentation equipment into the 3D plant model.

This document aims at avoiding misunderstandings and erroneous design work in order to reduce additional corrective works and expenses for clarification.

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## REPRESENTATION OF ELECTRICAL & INSTRUMENTATION OBJECTS IN DIGITAL 3D PLANT MODELS DURING ENGINEERING–

### Engineering of process plant instrumentation – 3D model requirements

#### 1 Scope

This document provides requirements for the E&I objects of a digital 3D plant model, used in the engineering phase to design and construct a process plant and its instrumentation. It provides guidance how to model plants and their electrical and instrumentation equipment.

This document also specifies the content and the possible output of the 3D plant model at project milestones.

This document can be used by the contractual partners to agree upon the content of the 3D plant model to be delivered at specified milestones.

This document does not specify the transfer and format of digital 3D plant models.

This document does not specify definitions or instructions to equipment representations and details of elements in the 3D plant model not belonging to electrical and instrumentation domains.

#### 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 61082-1, *Preparation of Documents used in electro technology - Part 1: Rules*

IEC 61355-1, *Classification and designation of documents for plants, systems and equipment*

IEC 61987, *Industrial-process measurement and control - Data structures and elements in process equipment catalogues*

IEC 62424, *Representation of process control engineering - Request in P&I diagrams and data exchange between P&ID tools and PCE-CAE tools*

IEC 62708, *Document kinds for electrical and instrumentation projects in the process industry*

IEC 62714 (all parts), *Engineering data exchange format for use in industrial automation systems engineering*

IEC 81346 (all parts), *Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations*

ISO 15926 (all parts), *Industrial automation systems and integration - Integration of life-cycle data for process plants including oil and gas production facilities*

10303-21 *Industrial automation systems and integration — Product data representation and exchange — Part 21: Implementation methods: Clear text encoding of the exchange structure*

### 3 Terms definitions and abbreviations

#### 3.1 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

##### 3.1.1 plant

complete set of technical equipment and facilities for solving a defined technical task

Note 1 to entry: A plant includes apparatus, machines, instruments, devices, means of transportation, control equipment and other operating equipment.

Note 2 to entry: This entry was numbered 351-21-45 in IEC 60050-351:2006.

[SOURCE: IEC 60050-351, IEV 351-42-35]

##### 3.1.2

##### digital 3D plant model

representation that defines, characterizes and relates electrical and instrumentation equipment, piping, structural elements as well as their building containment in a three-dimensional space

##### 3.1.3

##### electrical and instrumentation object E&I object

refer to the physical components, devices, or equipment used in the electrical and instrumentation systems of process plants. Note 1 to entry: For details about E&I objects see Table 1.

##### 3.1.4

##### functional location

identifier that references technical objects of a plant according to functional, process-related or spatial criteria

##### 3.1.5

##### room number

number that identifies a physical or virtual space in a plant, normally with reference to the building grid and level

##### 3.1.6

##### 30% model review

design review of the 3D plant model with 30% progress, including equipment arrangement, E&I rooms and preliminary information of E&I objects with reservation of space

Note 1 to entry: Major plant buildings, structures, equipment outlines, pipe bridges are modelled. Major large bore piping systems are planned.

##### 3.1.7

##### 60% model review

design review of the 3D plant model with 60% progress

##### 3.1.8

##### 90% model review

design review of the 3D plant model with 90% progress

Note 1 to entry: All equipment, piping, valves, electrical, structural items are modelled, before design freeze of small bore piping system.

### 3.2 Abbreviations



FAS	Fire alarm system
E&I	Electrical & instrumentation
HVAC	Heating, Ventilation, Air conditioning
MTO	Material take off
P&ID	Piping and instrumentation diagram

## 4 Requirements for E&I objects

### 4.1 Properties

The properties of the E&I objects shall at least include

- a unique designation as an identifier, related to functional location or to project designation structure,
- the class or type of the E&I object
- the process connection properties of the E&I object (nominal diameter; nominal pressure) if applicable.
- the electrical, signal and pneumatic connection properties if applicable.

### 4.2 Detail of design

The type of the objects in the 3D plant model shall be visually recognizable. The dimensions of the objects shall reflect the technical specification sheets of these objects.

The representation of E&I objects in the 3D plant model shall include necessary interference volumes for regular operation and maintenance aspects.

## 5 Content and timeline of the 3D plant model during engineering

### 5.1 Content of the 3D plant model

In Table 1 is defined, which E&I objects the 3D plant model shall contain, should contain, should not contain or may contain.

The table provides the minimum requirements and may be extended.

**Table 1 – Content of 3D plant model**

E&I-Object	Description	Requirement
<b>Instruments / Valves</b>		
Automated Valves	All control devices (installed in the piping) within the P&ID with their maximum geometric dimension of their drives and description of the mounting	shall
In-line Instruments	All in-line devices within the P&ID (installed in piping) with their maximum geometric dimension according to the installation drawing	shall
Inlet and outlet sections	Special inlet and outlet sections	should
Flange-mounted instruments	All flange-mounted devices within the P&ID with their maximum geometric dimension. The room for installation and removal shall be considered	shall
Surface-mounted instruments	Clamp-on measurement devices	shall
Externally-mounted instruments	Process control devices with tubing measurement lines: At least one measurement connection including the tubing adapter shall be modelled	shall
<b>Electrical / Cable trays</b>		
Transformers	Transformers	shall

Motors	Electrical drive for motors with equipment	shall
Cable trays and ladders	All horizontal and vertical cable routes (equal and larger than 200 mm width)	shall
Cable routing	Configuration of the cable routes and cable run. All cables at a given cross section	should
Mesh cable trays	Mesh cable trays are usually not depicted	should not
Major electrical supports	Major electrical supports for cable routes shall be planned in the model.	shall
Cable tray supports	Mounting for cable trays only as required	should
Cable ducts	Planned wall openings for cable trays or cable entries shall be depicted	shall
Trenches / culverts and underground conduits	All trenches and underground conduits	should
<b>Electrical Panels / Cabinets</b>		
Electrical Panels	Switch cabinets and control rooms in the field	shall
Cabinets	Switch cabinets in the switch room (required for cable routing and collision avoidance with HVAC and FSA)	shall
Process analyzer cabinets and containers	Analyzer cabinets, analyzer container; including room air measurement	shall
Remote-IOs	Remote IOs	shall
Junction boxes	Electrical junction box	shall
Junction boxes	Field bus and transition junction box	should
Grounding Boxes	Grounding box and central grounding point	should
<b>Installation</b>		
Local control station	Local control station including mounting.	should
Power sockets	Power sockets and welding receptacles	shall
Instrument air distribution	Air distributors (minimum placeholder)	should shall in case it is connected to piping
Electrical heat tracing	Reference measurement and distribution for electrical trace heating. Electrical trace heating shall only be depicted by its thermal insulation	should
Lighting	Lighting row, lighting fixtures	should
Emergency lighting	Emergency lights	should
<b>Communication systems</b>		
Fire alarm system	Fire detectors and alarm annunciators (horn, lights)	may
Public address system	Speaker, intercom stations	may
Video systems	Cameras	may
WLAN access points	Network components	may
<b>Others</b>		
Hazardous areas	Depiction of explosion hazard zones	may

## 5.2 Timeline of the 3D plant model

The degree of detail design in the 3D plant model shall be specified at project milestones like 30% model review, 60% model review, 90% model review or equivalent project related milestones.