



SLOVENSKI STANDARD

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Guide for procurement of power station equipment - Part 2-7: Electrical equipment - Switchgear and controlgear

Guide for procurement of power station equipment -- Part 2-7: Electrical equipment - Switchgear and controlgear

Leitfaden für die Beschaffung von Ausrüstungen für Kraftwerke -- Teil 2-7: Elektrische Ausrüstung - Schaltanlagen

Guide pour l'acquisition d'équipements destinés aux centrales de production d'électricité -- Partie 2-7: Equipements électriques - Appareillage

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**Guide for procurement of power station equipment
Part 2-7: Electrical equipment –
Switchgear and controlgear**

Guide pour l'acquisition d'équipements
destinés aux centrales de production
d'électricité
Partie 2-7: Equipements électriques –
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Leitfaden für die Beschaffung von
Ausrüstungen für Kraftwerke
Teil 2-7: Elektrische Ausrüstung -
Schaltanlagen

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This European Standard was approved by CEN and CENELEC on 2001-03-06.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN or CENELEC member into its own language and notified to the CENELEC Central Secretariat has the same status as the official versions.

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Foreword

This standard takes the form of a recommendation and is therefore entitled a "Guide".

This Guide for procurement has been prepared by the CEN/CENELEC Joint Task Force Power Engineering (JTFPE) of which the secretariat is held by the British Standards Institution.

The text of the draft was submitted to the formal vote and was approved by CEN and CENELEC as EN 45510-2-7 on 2001-03-06.

The following dates were fixed:

- *latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement* (dop) 2003-03-01
- *latest date by which the national standards conflicting with the EN have to be withdrawn* (dow) 2004-04-01

This Guide for procurement has been prepared under mandates given to CEN and CENELEC by the European Commission and the European Free Trade Association.

This Guide for procurement is a part of a series of Guides mandated to cover the procurement of power station plant and equipment in conformity with European Procurement Directives. The Guides are:

EN 45510: Guide for procurement of power station equipment

Part 1: Common clauses

Part 2-1: Electrical equipment - Power transformers

Part 2-2: Electrical equipment - Uninterruptible power supplies

Part 2-3: Electrical equipment - Stationary batteries and chargers

Part 2-4: Electrical equipment - High power static converters

Part 2-5: Electrical equipment - Motors

Part 2-6: Electrical equipment - Generators

Part 2-7: Electrical equipment - Switchgear and controlgear

Part 2-8: Electrical equipment - Power cables

Part 2-9: Electrical equipment - Cabling systems

Part 3-1: Boilers - Water tube boilers

Part 3-2: Boilers - Shell boilers

Part 3-3: Boilers - Boilers with fluidized bed firing

Part 4-1: Boiler auxiliaries - Equipment for reduction of dust emissions

Part 4-2: Boiler auxiliaries - Gas-air, steam-air and gas-gas heaters

Part 4-3: Boiler auxiliaries - Draught plant

Part 4-4: Boiler auxiliaries - Fuel preparation equipment

Part 4-5: Boiler auxiliaries - Coal handling and bulk storage plant

Part 4-6: Boiler auxiliaries - Flue gas desulphurization (De-SO_x) plant

Part 4-7: Boiler auxiliaries - Ash handling plant

Part 4-8: Boiler auxiliaries - Dust handling plant

Part 4-9: Boiler auxiliaries - Sootblowers

Part 4-10: Boiler auxiliaries - Flue gas denitrification (De-NO_x) plant

Part 5-1: Turbines - Steam turbines

Part 5-2: Turbines - Gas turbines

Part 5-3: Turbines - Wind turbines

Part 5-4: Turbines - Hydraulic turbines, storage pumps and pump-turbines

Part 6-1: Turbine auxiliaries - Deaerators
Part 6-2: Turbine auxiliaries - Feedwater heaters
Part 6-3: Turbine auxiliaries - Condenser plant
Part 6-4: Turbine auxiliaries - Pumps
Part 6-5: Turbine auxiliaries - Dry cooling systems
Part 6-6: Turbine auxiliaries - Wet and wet/dry cooling towers
Part 6-7: Turbine auxiliaries - Moisture separator reheaters
Part 6-8: Turbine auxiliaries - Cranes
Part 6-9: Turbine auxiliaries - Cooling water systems
Part 7-1: Pipework and valves - High pressure piping systems
Part 7-2: Pipework and valves - Boiler and high pressure piping valves

Part 8-1: Control and instrumentation

*EN 45510-1 contains those clauses common to all the above Guides giving the provisions of a non **equipment** specific nature for use in the procurement of power station plant. EN 45510 is the responsibility of JTFPE. The so called “common clauses”, as appropriate, also appear in italics in the documents specific to particular **equipment**.*

Where paragraphs of “common clauses” are omitted, each paragraph omitted is indicated by the symbol *****.

In this Guide, words in bold type indicate that they have the meaning given in the definitions, clause 3.

In this Guide, words and sentences not in italics are specific to this Guide and refer to the particular **equipment** covered.

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1 Scope

This standard gives guidance on writing the technical **specification** for the procurement of **switchgear** and **controlgear** for use in electricity generating stations (power stations). This Guide for procurement is not applicable to **equipment** for use in the nuclear reactor plant area of nuclear power stations. Other possible applications of such **equipment** have not been considered in the preparation of this Guide.

This Guide covers **switchgear** and **controlgear** within installations primarily concerned with the generation of electrical power and, where appropriate, their interconnection with the transmission and/or distribution system. It also includes main connections (**busbars**) associated with generator circuits and the ancillary plant forming part of switchboards and/or switching circuits.

The **equipment** covered by this Guide is defined by its function rather than design type. Therefore, the guidance to the **specification** is stated in performance terms rather than being specified by a detailed description of the **equipment** to be supplied.

This Guide indicates to potential **purchasers** how their **specification** should be prepared so that:

- the **equipment** type and capacity interfaces correctly with other elements of the systems;
- predicted performance is achieved;
- ancillary **equipment** is properly sized;
- **reliability, availability** and safety requirements are achieved;
- proper consideration is given to the evaluation process and the quality measures to be applied.

This Guide does not determine the type of **specification** (e.g. detailed, performance, functional) or the extent of supply for any given contract which is normally decided on the basis of the **purchaser's** project strategy. It does not cover:

- any commercial, contractual or legal issues which are normally in separate parts of an **enquiry**;
- any allocation of responsibilities which are determined by the contract.

This Guide does not prescribe the arrangement of the documents in the **enquiry**.

NOTE As a comprehensive European environmental policy is still under preparation, this Guide does not address the environmental implications of the **equipment**.

2 Normative references

This Guide for Procurement incorporates by dated or undated reference, provisions from other publications. These normative references are cited in the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Guide only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

European Standards

EN ISO 9001	Quality systems - Model for quality assurance in design, development, production, installation and servicing
EN ISO 9002	Quality systems - Model for quality assurance in production, installation and servicing
EN 60044-1	Instrument transformers - Current transformers (IEC 60044-1, mod.)
EN 60071	series Insulation co-ordination (IEC 60071 series)
EN 60129	Alternating current disconnectors and earthing switches (IEC 60129)
EN 60265-1	High-voltage switches for rated voltages above 1 kV and less than 52 kV (IEC 60265-1)
EN 60265-2	High-voltage switches - Part 2: High-voltage switches for rated voltages of 52 kV and above (IEC 60265-2)

EN 60282-1	High-voltage fuses - Part 1: Current-limiting fuses (IEC 60282-1)
EN 60298	AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV (IEC 60298)
EN 60420	High-voltage alternating current switch-fuse combinations (IEC 60420)
EN 60439-1	Low-voltage switchgear and controlgear assemblies - Part 1: Type-tested and partially type-tested assemblies (IEC 60439-1)
EN 60439-3	Low-voltage switchgear and controlgear assemblies - Part 3: Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards (IEC 60439-3, mod.)
EN 60439-4	Low-voltage switchgear and controlgear assemblies - Part 4: Particular requirements for assemblies for construction sites (ACS) (IEC 60439-4)
EN 60470	High-voltage alternating current contactors and contactor-based motor starters (IEC 60470)
EN 60517	Gas-insulated metal-enclosed switchgear for rated voltages of 72,5 kV and above (IEC 60517)
EN 60622	Sealed-nickel-cadmium prismatic-rechargeable single cells (IEC 60622)
EN 60623	Vented nickel-cadmium prismatic rechargeable single cells (IEC 60623)
EN 60644	Specification for high-voltage fuse-links for motor circuit applications (IEC 60644)
EN 60694	Common clauses for high-voltage switchgear and controlgear standards (IEC 60694)
EN 60865 series	Short-circuit currents - Calculation of effects (IEC 60865 series)
EN 60896 series	Stationary lead-acid batteries - General requirements and methods of tests (IEC 60896 series)
EN 60947-1	Low-voltage switchgear and controlgear - Part 1: General rules (IEC 60947-1, mod.)
EN 60947-2	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers (IEC 60947-2)
EN 60947-3	Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units (IEC 60947-3)
EN 60947-4-1	Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters (IEC 60947-4-1)
EN 60947-5-1 + A12	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices (IEC 60947-5-1)
EN 60947-6-1	Low-voltage switchgear and controlgear - Part 6-1: Multiple function equipment - Automatic transfer switching equipment (IEC 60947-6-1)
EN 60947-7-1	Low-voltage switchgear and controlgear - Part 7-1: Ancillary equipment - Terminal blocks for copper conductors (IEC 60947-7-1)
EN 61264 + Corr.	Ceramic pressurized hollow insulators for high-voltage switchgear and controlgear (IEC 61264)
EN 62271-100	High-voltage switchgear and controlgear - Part 100: High-voltage alternating-current circuit-breakers (IEC 62271-100)

Harmonization Documents (HD)

HD 554	Voltage transformers (IEC 60186, mod.)
HD 578	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1 kV (IEC 60273)
HD 637	Power installations exceeding a.c. 1 kV

International Standards

IEC 60050-191	<i>International electrotechnical vocabulary - Chapter 191: Dependability and Quality of Services</i>
IEC 60050-441	<i>International electrotechnical vocabulary - Chapter 441: Switchgear, controlgear and fuses</i>
IEC 60466	AC insulation-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 38 kV
IEC 60478	Stabilized power-supplies, DC output
IEC 60815	Guide for the selection of insulators in respect of polluted conditions

3 Definitions

For the purposes of this Guide, the following definitions apply:

3.1 Organisational terms**3.1.1****purchaser**

recipient of a product and/or a service provided by a **supplier**

3.1.2**supplier**

person or organisation that provides a product and/or a service to the **purchaser**

3.1.3**specification**

document stating technical requirements of the **purchaser**. It may form part of an **enquiry** issued by a **purchaser**

3.1.4**enquiry**

invitation to **tender** issued by a **purchaser**. It will normally include a **specification** together with the necessary contractual and commercial conditions

3.1.5**tender**

offer made by a **tenderer** in response to an **enquiry**

3.1.6**tenderer**

person or organisation submitting a **tender** for the **equipment** in response to the **enquiry**

3.1.7

site

place to which the **equipment** is to be delivered or where work is to be done by the **supplier**, together with so much of the area surrounding as the **supplier** may, with the consent of the **purchaser**, use for the purposes of the contract

NOTE Further definitions of useful organisational terms may be found in EN ISO 8402 (see annex A).

3.2 Technical terms

The terms **switchgear and controlgear** are used in accordance with the international definitions as given in IEC 60050-441. However, for simplicity throughout this Guide, the general term **switchgear** covers both **switchgear** and **controlgear**

3.2.1

busbar

a conductor with associated connections, joints and insulated supports forming a common electrical connection between a number of circuits or individual pieces of apparatus

3.3 General terms

3.3.1

equipment

plant, component, system and/or associated service to be provided in response to the **enquiry**

3.3.2

conformity

fulfilment of specified requirements by a product, process or service

3.3.3

performance

obligations verified by specified tests

3.3.4

operating period

time between planned outages or maintenance periods during which the **equipment** is in operation and/or does not restrict operational requirements of the power station

3.3.5

life expectancy

time period over which the **equipment** might be expected to operate with planned maintenance but without replacement of a significant component. For example, a switching device is a significant component

3.3.6

design life

operating hours of the **equipment** on which design calculations are based

3.3.7

acceptability

compliance with criteria defined by the **purchaser** for assessing the suitability of **equipment**

3.3.8

equipment margins

allowance for design, fabrication or operating contingency defined in the **specification**. These are separate to those normally included by the **supplier** for his own purposes

3.3.9

proven equipment

equipment which may be demonstrated to be similar to that offered and has operated for a sufficient time to have demonstrated performance and availability

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3.3.10**availability**

as defined in IEC 60050-191

3.3.11**reliability**

as defined in IEC 60050-191

3.3.12**maintainability**

as defined in IEC 60050-191

4 Brief overall project description**4.1 Role and organisation of purchaser**

The **enquiry** should define the **purchaser's** role in the project, including whether the **purchaser** will assume responsibility for the planning and technical coordination of the project, or whether other organisations will be appointed to carry out all or part of this function. The **enquiry** should define all organisational interfaces and the procedures to be employed for managing the contract and the **site**.

4.2 Site location

The **specification** should describe the geographical location of the **site** which may include surveying points, the previous use of the **site** and any local features such as impact of industrial or military activities and planning restrictions.

Where applicable, the **specification** should indicate **site** datum on **specification** drawings and specify **site** and drawing orientation and define co-ordinate axes (x,y,z) and numbering order to ensure consistency between suppliers of connected equipment.

Where appropriate, the **specification** should define the permitted ground loading, dimensional and time restrictions on access routes up to but not including public roads or railways.

The **specification** should identify, where appropriate, the environment of the **site** in which the **equipment** will operate. The following factors may normally be included if appropriate:

- climatic e.g. atmospheric pressure, annual variation of air and cooling water temperature, relative humidity, rain fall, icing, snow, wind velocity (normal and maximum), lightning;
- geological e.g. seismic conditions and characteristics of subsoil (e.g. caverns, gliding stratifications, load bearing capability of subsoils);
- geographic e.g. elevation, influence of local topography and structures;
- hydrological e.g. flooding and tides.

4.3 Equipment task

The **specification** should describe in general terms the function, task or role of the **equipment** to be purchased. e.g. whether it is part of a new power generating plant, a modification to an existing power generating plant or replacement **equipment**.

Where appropriate, the **specification** should define the function and the known limitations, if any, in the **equipment** connected to that which is being supplied so that the **equipment** may avoid imposing adverse conditions or the **supplier** may suggest modifications to connected equipment which would ensure satisfactory operation.