
**Guide for procurement of power station equipment - Part 6-1: Turbine auxiliaries -
Deaerators**

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Deaerators

Leitfaden für die Beschaffung von Ausrüstungen für Kraftwerke -- Teil 6-1:
Turbinenhilfseinrichtungen - Entgaser

Guide pour l'acquisition d'équipements destinés aux centrales de production d'électricité
-- Partie 6-1: Auxiliaires de turbine - Dégazeurs

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Leitfaden für die Beschaffung von Ausrüstungen für Kraftwerke - Teil 6-1: Turbinenhilfseinrichtungen - Entgaser

This European Standard was approved by CEN/CENELEC on 11 December 1997.

CEN/CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN/CENELEC member.

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/CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN/CENELEC members are the national standards bodies and national electrotechnical committees, respectively, of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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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 BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 1998, and conflicting national standards shall be withdrawn at the latest by July 1998.

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 convertors

Part 2-5: Electrical equipment - Motors

Part 2-6: Electrical equipment - Generators

Part 2-7: Electrical equipment - Switchgear and control gear

Part 2-8: Electrical equipment - Power cables

Part 2-9: Electrical equipment - Cabling systems

Part 3-1: Boilers - Water tube boilers [SIST EN 45510-6-1:2000](#)

Part 3-2: Boilers - Shell boilers [http://standards.iteh.ai/catalog/standards/sist/776b02e2-6092-4b9d-a8bb-](#)

Part 3-3: Boilers - Boilers with fluidized bed firing [http://standards.iteh.ai/catalog/standards/sist/776b02e2-6092-4b9d-a8bb-en-45510-6-1-2000](#)

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 desulphurisation (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 Part 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**.*

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

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

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This standard gives guidance on writing the technical **specification** for the procurement of **deaerators** associated with steam generating plant and steam turbine plant 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 all types of **deaerators** installed in power plants whose function is to accept condensate from the LP (low pressure) feed train, to heat and deaerate the water to a specified level and then supply it as feed to the feed pumps. The **feedwater storage tank** provides a reservoir of deaerated feedwater to satisfy system transient and feed pump suction requirements. It also acts as a receiving vessel for HP (high pressure) heater drains and feed pump recirculation flows. The term **deaerator** in this context is taken to include the **deaerating tower or dome**, the **feedwater storage tank** and associated plant.

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.

EN ISO 9001	Quality systems - Model for quality assurance in design, development, production, installation and servicing (ISO 9001:1994)
EN ISO 9002	Quality systems - Model for quality assurance in production, installation and servicing (ISO 9002:1994)
IEC 50 (191)	International electrotechnical vocabulary - Chapter 191: Dependability and quality of service

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

- 3.2.1 deaerator:** Equipment for heating and deaerating the main condensate to be supplied to the steam producing system.
- 3.2.2 deaerating tower or dome:** Tank where all or almost all deaeration and heating of the entering condensate takes place (it is separate from the storage tank but may be contained within the storage tank).
- 3.2.3 feedwater storage tank:** Tank where the deaerated condensate is collected.
- 3.2.4 vent condenser:** Heat exchanger which condenses a part of the steam which has been discharged together with non-condensable gases.
- 3.2.5 sole plates:** Plates supporting the **deaerator** feet or saddles.
- 3.2.6 start-up/off-load heating system:** System for injecting steam into the condensate to heat it during start-up or off-load and to slow down the depressurisation during a quick load rejection. Submerged electrical immersion heaters may be necessary in certain cases to initially heat the condensate or to maintain its temperature.

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 the **vent condenser** 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.
- 3.3.10 availability:** As defined in IEC 50 (191).
- 3.3.11 reliability:** As defined in IEC 50 (191).

3.3.12 maintainability: As defined in IEC 50 (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.

4.4 Equipment to be purchased

The **specification** may define the **equipment** type or arrangement to be purchased. For example, the **purchaser** may specify:

- whether the **deaerator** is to be incorporated in the **feedwater storage tank**;
- the type of spray system;
- requirements for **start-up/off-load heating system**.

The **specification** may also define preferences for **equipment** types (or give information) regarding compatibility with existing equipment, if required.

The **specification** should define the intended methods or local practice for maintenance, inspection and operation.

The **specification** should define requirements with regard to the general appearance of the **equipment** (e.g. dimensions, shape or colour) to meet local planning requirements or specific criteria, where such requirements exist.

NOTE: Attention is drawn to European, national and/or local legislation which may place restrictions in this area.

4.5 Control and instrumentation

The **specification** should define the general requirements for the control and instrumentation system, the level of operator intervention allowed or required, integration with other control systems, localised control loops, commonality and redundancy.

NOTE: Guidance on the procurement of control and instrumentation systems for power stations, including advice on interfaces can be found in EN 45510-8-1 (see Annex A).

4.6 Electrical supplies and other services

The **specification** should define the electrical supplies available for the operation of the **equipment**, their voltages and frequencies, with their range of variation, phases available and, where appropriate, the acceptable values of maximum load (kW) and short circuit level at each voltage level and the harmonic content. Requirements for terminals and terminal boxes should be stated; these should be to a recognised European or international standard.

The **specification** should define the type and capacity of other services for the operation of the **equipment** such as compressed air or auxiliary steam.

4.7 Other interfaces

The **specification** should define the interfaces with existing ancillary or new ancillary equipment to be supplied under separate contracts which interact directly with the **equipment**, for example condensate pipes, feed pump suction pipes, steam and feedheater drains pipework, civil works or temporary systems.

4.8 Project programme

The **specification** should describe the overall programme and timescale in which the project is to be carried out. This may include the principal dates associated with tendering, placement of orders, access to **site**, start and completion of installation, commissioning, take-over and final acceptance.

4.9 Equipment identification systems

The **specification** may specify the equipment identification system for use during the operating life of the plant. If applicable to the **project**, a recognised European or international system should be used.

5 Extent of supply

The **specification** should define the extent of supply of all the **equipment**.

This may include:

- main equipment:
 - **deaerator, feedwater storage tank**, sprays, trays and/or reboilers, **vent condensers** if necessary;
- auxiliary equipment:
 - safety valves, drain valves, orifice plates, equipment within the **deaerator** system to accommodate steam, vents, condensate and feedwater entering the **deaerator, start-up/off-load heating system**, temperature maintaining system, pressure maintaining system (pegging), level control system including emergency trip system, nitrogen preservation system, anti-vortex device on feedwater outlet nozzles, local instrumentation, thermal insulation;
- accessories:
 - handling and maintenance systems, etc.;