SLOVENSKI STANDARD
SIST EN 45510-4-2:2000

01-junij-2000

Guide for procurement of power station equipment - Part 4-2: Boilers auxiliaries - Gas-air, steam-air and gas-gas heaters

Guide for procurement of power station equipment -- Part 4-2: Boiler auxiliaries - Gas-air, steam-air and gas-gas heaters

Leitfaden für die Beschaffung von Ausrüstungen für Kraftwerke -- Teil 4-2: Nebenanlagen - Gas/Luft-, Dampf/Luft- und Gas/Gas-Wärmeaustauscher

Guide pour l'acquisition d'équipements destinés aux centrales de production d'électricité -- Partie 4-2: Auxiliaires de chaudière - Réchauffeurs gaz-air, vapeur-air, gaz-gaz

Ta slovenski standard je istoveten z: **EN 45510-4-2:1999**

ICS:

27.060.30	Grelniki vode in prenosniki toplote	Boilers and heat exchangers
27.100	Elektrarne na splošno	Power stations in general

SIST EN 45510-4-2:2000 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 45510-4-2

April 1999

ICS 27.040; 27.060.30; 27.100

English version

Guide for procurement of power station equipment - Part 4: Boiler auxiliaries - Section 2: Gas-air, Steam-air and gas-gas heaters

Guide pour l'acquisition d'équipements destinés aux centrales de production d'électricité - Partie 4: Auxiliaires de chaudière - Section 2: Réchauffeurs gaz-air, vapeur-air, gaz-gaz

Leitfaden für die Beschaffung von Ausrüstungen für Kraftwerke - Teil 4: Nebenanlagen - Hauptabschnitt 2: Gas/Luft-, Dampf/Luft- und Gas/Gas- Wärmeaustauscher

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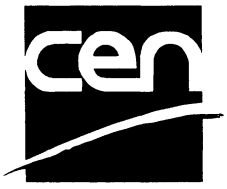

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Ref. No. EN 45510-4-2:1999 E

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Foreword

This European Standard has been prepared by Technical Committee CEN/CLC JTFPE "Joint Task Force Power Engineering", the secretariat of which 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of an identical text or by endorsement, at the latest by October 1999, and conflicting national standards shall be withdrawn at the latest by October 1999.

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.

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

*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
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 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.

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

1 Scope

This standard gives guidance on writing the technical ***specification*** *for the procurement of* air heating equipment associated with steam generating plant and gas reheating equipment associated with flue gas treatment 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 **heat exchangers** of the following types:

- indirect heating with steam;
- rotary **regenerative heaters**;
- tubular/plate **recuperative heaters**;
- **liquid coupled heat exchangers**;
- **heat pipes**.

This Guide does not cover systems for direct contact heating of air or flue gas by hot gases.

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 60050 (191)	*International electrotechnical vocabulary.*

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 heat exchanger: Equipment for transferring heat from one fluid to another. For this guide, the generic term "**heat exchanger** " has been used where clauses cover gas-air, steam-air and **gas-gas reheaters**.

3.2.2 airheater: Heat exchanger for utilising residual heat from the dust laden gas leaving the economiser of the boiler to heat combustion air, dry solid fuel and thereby maximise the thermal efficiency of the boiler.

3.2.3 primary airheater: Heat exchanger that provides hot air to dry and transport solid fuels to the burners. It may be a separate **heat exchanger** or a section of an **airheater** providing both primary and secondary air.

3.2.4 secondary airheater: Heat exchanger that provides hot air for combustion. It may be a separate **heat exchanger** or a section of an **airheater** providing both primary and secondary air.

3.2.5 gas-gas reheater: Heat exchanger that transfers heat from untreated to the treated flue gas of a desulphurization plant, in order to raise the temperature of the treated gas prior to discharge to the atmosphere.

3.2.6 regenerative heaters: Heat exchanger in which a matrix transfers heat from a hot gas stream to a cold air or gas stream either by rotating the matrix or by the diversion of gas streams through the matrix.

3.2.7 recuperative heaters: Static **heat exchanger** in which heat is transferred from a hot gas stream to a cold air or gas stream through a dividing wall, with no mixing of the hot and cold streams.

3.2.8 liquid coupled heat exchangers: Static **heat exchanger** having separate **heat exchanger**s in the hot gas and cold air or gas streams. Heat is transferred from the hot gas stream to the cold air/gas stream by a circulating liquid. There is no mixing of the hot and cold streams.

3.2.9 heat pipe: Static **heat exchanger** consisting of bundles of independent, closed, metal tubes containing a working fluid. Heat is transferred from the hot gas stream to the cold air or gas streams by continuous evaporation and condensation of the working fluid. The heating and cooling sections of each tube are connected by a continuous section of tube.

3.2.10 cross leakage: For a rotary **regenerative airheater**, the amount of air passing to the flue gas stream, expressed as a percentage of the flue gas inlet mass flow.

For a rotary **gas-gas reheater**, it is the amount of untreated gas passing to the treated gas stream, expressed as a percentage of the untreated gas inlet mass flow.

3.2.11 combined cold end temperature: Sum of the temperatures of air entering and flue gas leaving an **airheater**.

3.2.12 secondary air system: Part of the draught plant supplying the main part of the combustion air (except for example the primary air used to dry and transport solid fuel).

3.2.13 continuous maximum operating condition: Maximum condition at which the **equipment** may be operated for a period not exceeding the specified **design life**. This is the operating condition under which the performance tests are usually conducted.

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 rotor of a **regenerative heater** 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 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.*

4.4 Equipment to be purchased

*The **specification** may define the **equipment** type or arrangement to be purchased*, for example:

- the **heat exchanger** type (either steam, rotary **regenerative**, tubular/plate **recuperative**, **liquid coupled** or **heat pipes**);
- the number of **heat exchanger**s (for any particular application);
- the **heat exchanger** orientation, for example horizontal or vertical shaft rotary heaters and alternative arrangements for ducts.

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

The **specification** may define any preferences with regard to the grouping of systems, for example include the cleaning system with the **heat exchanger**.

*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.*

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.