



Handläggande organ

SVENSK MATERIAL- & MEKANSTANDARD, SMS

Fastställt

1999-05-21

Utgåva

1

Sida

1 (1+24)

© Copyright SIS. Reproduction in any form without permission is prohibited.

## Guide for procurement of power station equipment – Part 4: Boiler auxiliaries – Section 3: Draught plant

The European Standard EN 45510-4-3:1999 has the status of a Swedish Standard. This document contains the official English version of EN 45510-4-3:1999.

Swedish Standards corresponding to documents referred to in this Standard are listed in "Catalogue of Swedish Standards", issued by SIS. The Catalogue lists, with reference number and year of Swedish approval, International and European Standards approved as Swedish Standards as well as other Swedish Standards.

## Vägledning vid upphandling av kraftverksutrustning – Del 4: Tillbehör till pannor – Avsnitt 3: Ventilationssystem

Europastandarden EN 45510-4-3:1999 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 45510-4-3:1999.

Motsvarigheten och aktualiteten i svensk standard till de publikationer som omnämns i denna standard framgår av "Katalog över svensk standard", som ges ut av SIS. I katalogen redovisas internationella och europeiska standarder som fastställts som svenska standarder och övriga gällande svenska standarder.

---

ICS 23.120; 27.040; 27.100

Standarder kan beställas hos SIS som även lämnar allmänna upplysningar om svensk och utländsk standard.  
Postadress: SIS, Box 6455, 113 82 STOCKHOLM  
Telefon: 08 - 610 30 00. Telefax: 08 - 30 77 57

Upplysningar om **sakinnehållet** i standarden lämnas av SMS.  
Telefon: 08 - 459 56 00. Telefax: 08 - 667 85 42  
E-post: [info@sms-standard.se](mailto:info@sms-standard.se)  
Prisgrupp R

Tryckt i augusti 1999



EUROPEAN STANDARD

EN 45510-4-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 1999

ICS 23.120; 27.040; 27.100

English version

## Guide for procurement of power station equipment - Part 4: Boiler auxiliaries - Section 3: Draught plant

Guide pour l'acquisition d'équipements destinés aux centrales de production d'électricité - Partie 4: Auxiliaires de chaudière - Section 3: Système de ventilation

Leitfaden für die Beschaffung von Ausrüstungen für Kraftwerke - Teil 4: Nebenanlagen - Hauptabschnitt 3: Ventilatoranlage

This European Standard was approved by CEN/CENELEC on 25 March 1999.

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.

**Warning** : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



CEN Central Secretariat:  
rue de Stassart, 36 B-1050 Brussels

CENELEC Central Secretariat:  
rue de Stassart, 35 B-1050 Brussels

**Contents** **Page**

<b>Foreword</b> .....	<b>4</b>
<b>1 Scope</b> .....	<b>6</b>
<b>2 Normative references</b> .....	<b>6</b>
<b>3 Definitions</b> .....	<b>7</b>
3.1 Organisational terms.....	7
3.2 Technical terms .....	7
3.3 General terms .....	8
<b>4 Brief overall project description</b> .....	<b>8</b>
4.1 Role and organisation of purchaser .....	8
4.2 Site location.....	8
4.3 Equipment task .....	9
4.4 Equipment to be purchased .....	9
4.5 Control and instrumentation .....	9
4.6 Electrical supplies and other services .....	9
4.7 Other interfaces .....	9
4.8 Project programme .....	10
4.9 Equipment identification systems.....	10
<b>5 Extent of supply</b> .....	<b>10</b>
<b>6 Terminal points</b> .....	<b>10</b>
<b>7 Operational requirements</b> .....	<b>11</b>
7.1 Operating environment .....	11
7.2 Manning levels .....	11
7.3 Normal operation .....	11
7.4 Operating hours .....	11
7.5 Start-up and shut-down.....	11
7.6 Abnormal conditions .....	12
7.7 Further operational requirements.....	12
<b>8 Life expectancy</b> .....	<b>12</b>
8.1 Design life .....	12
8.2 Components requiring periodic maintenance .....	12
<b>9 Performance requirements</b> .....	<b>13</b>
9.1 Duty.....	13
9.2 Performance .....	13
9.3 Equipment margins .....	13
9.4 Availability .....	14
9.5 Levels of component redundancy .....	14
9.6 Further performance requirements .....	15
<b>10 Design and fabrication</b> .....	<b>15</b>
10.1 Specific equipment features .....	15
10.2 Design justification .....	17
10.3 Material selection .....	17
10.4 Safety .....	17
10.5 Interchangeability .....	17
10.6 Fabrication methods .....	17
<b>11 Maintenance requirements</b> .....	<b>17</b>
11.1 Planned maintenance .....	17
11.2 Personnel safety .....	17
11.3 Requirements for access .....	18
11.4 Lifting requirements .....	18
11.5 Special tools.....	18
11.6 Test equipment .....	18
11.7 Spare parts strategy.....	18
11.8 Special precautions.....	18

<b>12 Technical documentation requirements</b> .....	<b>18</b>
12.1 Tender documentation.....	18
12.2 Contract documentation.....	19
<b>13 Applicable legislation, regulations, standards and further requirements</b> .....	<b>19</b>
13.1 Legislation and regulations .....	19
13.2 Standards.....	19
13.3 Further requirements .....	19
<b>14 Evaluation criteria</b> .....	<b>19</b>
14.1 General .....	19
14.2 Technical criteria.....	20
<b>15 Quality measures</b> .....	<b>20</b>
15.1 General .....	20
15.2 Approvals procedure.....	21
15.3 Inspection requirements.....	21
15.4 Non-conformity.....	21
<b>16 Site factors</b> .....	<b>21</b>
16.1 Access .....	21
16.2 Facilities .....	21
16.3 Site specific requirements.....	22
<b>17 Verification of specified performance</b> .....	<b>22</b>
17.1 General .....	22
17.2 Works tests.....	22
17.3 Test during installation and commissioning .....	22
17.4 Technical conditions for trial run .....	22
17.5 Functional and performance tests .....	23
<b>Annex A (informative): Bibliography</b> .....	<b>24</b>

## 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 converters*

*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<sub>x</sub>) 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<sub>x</sub>) 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 fans, ducts and dampers associated with steam generating plant and **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:

- **primary air fans** and **exhauster fans**;
- secondary air fans, **forced draught fans** and **induced draught fans**;
- **flue gas recirculating fans** and **flue gas booster fans**;
- **modulating dampers** and **shut-off dampers**;
- diverters and guide vanes;
- lined and unlined flues and ducts;
- thermal/acoustic insulation and cladding.

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 draught plant:** A combination of equipment comprising fans, ducts, dampers etc. which together form a system for transferring and controlling gas and air.

**3.2.2 primary air fans:** Fans supplying the air required to transport pulverised coal from the coal mills to the boiler furnace. The fan draws air from either within or outside the boiler house (cold **primary air fans**) or from downstream of the airheaters (hot **primary air fans**).

**3.2.3 forced draught fans:** Fans supplying all or a large proportion of the combustion air to a steam generating plant. The fan draws its air from either within or outside the boiler house. Where the combustion air supply is independent of the primary air, this may be termed a **secondary air fan**.

**3.2.4 induced draught fans:** Fans located downstream of the boiler, extracting the gas flow from the boiler and maintaining the required suction pressure in the boiler furnace.

**3.2.5 flue gas recirculating fans:** Fans returning **flue gas** to the furnace to effect steam temperature control or modify combustion characteristics. The gas may be drawn either from the economizer outlet (dirty gas) or from downstream of the dust removal equipment (clean gas).

**3.2.6 flue gas booster fans:** Fans which provide additional pressure to pass **flue gases** through gas treatment plant prior to delivery to the chimney.

**3.2.7 exhaustor fans:** Fans which convey a mixture of gas (air or recycled **flue gas**) and fuel from the milling plant to the burners.

**3.2.8 modulating damper:** Flow control device in a duct which uses movable blades to regulate the flow of air or **flue gas**.

**3.2.9 shut-off damper:** Device in a duct for shutting off the flow of combustion air or **flue gas**. Its effectiveness is defined in terms of the leakage flow rate when shut-off.

**3.2.10 secondary air system:** Part of the **draught plant** supplying combustion air except primary air.

**3.2.11 forced draught system:** Part of the **draught plant** from the air intake to the burners.

**3.2.12 induced draught system:** Part of the **draught plant** from the boiler exit to **induced draught fans** outlet or the chimney inlet.

**3.2.13 continuous maximum operating condition:** Maximum condition at which the **draught plant** may be operated for a period not exceeding the specified **design life**.

**3.2.14 turndown:** Ratio of continuous maximum to minimum operating condition, for example a **turndown** ratio of 4:1 means that the **equipment** should be capable of operating from 100% down to 25% of the flow rate at the **continuous maximum operating condition**.

**3.2.15 flue gas:** Mixture of gases resulting from the combustion process and other gases entering the **induced draught system** (e.g. air ingress or cross-leakage).

NOTE: The term "flue" refers to the ducts conveying **flue gas** and "air ducts" to the ducts conveying air.

### 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 centrifugal fan impeller 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 fan type (either axial or centrifugal fan);
- the number of fans (for any particular application);
- the motor drive type.

The **specification** may define any preferences with regard to the grouping of systems, for example the fan lubricating system could be included with the fan so as to ensure system completeness and to enable works fan testing.

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 part 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.

### 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 civil work, cranes or temporary systems such as a maintenance cradle.