
Guide for procurement of power station equipment - Part 4-7: Boilers auxiliaries - Ash handling plant

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Leitfaden für die Beschaffung von Ausrüstungen für Kraftwerke -- Teil 4-7: Nebenanlagen - Aschetransportanlage

Guide pour l'acquisition d'équipements destinés aux centrales de production d'électricité -- Partie 4-7: Auxiliaires de chaudière - Manutention des mâchefers

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**Guide for procurement of power station equipment - Part 4:
Boiler auxiliaries - Section 7: Ash handling plant**

Guide pour l'acquisition d'équipements destinés aux
centrales de production d'électricité - Partie 4: Auxiliaires
de chaudière - Section 7: Manutention des mafehers

Leitfaden für die Beschaffung von Ausrüstungen für
Kraftwerke - Teil 4: Nebenanlagen - Hauptabschnitt 7:
Aschetransportanlage

This European Standard was approved by CEN/CENELEC on 1 April 1999.

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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of an identical text or by endorsement, at the latest by October 1999, and conflicting national standards shall be withdrawn at the latest by October 1999.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 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_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.

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1 Scope

*This standard gives guidance on writing the technical **specification** for the procurement of **equipment** for ash handling associated with coal fired steam generating 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 mechanical conveying systems which handle the **ash** mechanically. Among those are for example:

- **submerged scraper conveyor**;
- **ram-type slag extractor**;
- belt conveyor;
- **drag-link conveyor**;
- **vibratory conveyor**;
- **screw conveyor**;
- **apron conveyor**;
- **bucket elevator**;
- **skip hoist**;
- vehicles.

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Hydraulic conveying systems use water as conveying medium. These include for example:

- **water-filled ash hopper**;
- **dry ash hopper**;
- **sluiceway**;
- **slurry pump** with pipeline;
- **ejector** with pipeline.

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Generally a combination of the above systems is employed.

*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 such as the boiler and gas treatment plant;
- 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 Operating conditions

3.2.1.1 ash handling plant: Equipment comprising devices for extraction, conveying, intermediate storage, treatment and loading for delivery by means of mechanical or hydraulic systems which together form a system to remove combustion residues such as **ash** or **slag** for utilisation or dumping.

3.2.1.2 ash: Residue of fuel after combustion consisting of mineral matter and some unburnt combustibles. Depending on chemical composition and temperature during combustion the mineral matter may be partially sintered.

3.2.1.3 bottom ash or coarse ash: Ash extracted from the combustion chamber of dry bottom pulverised fuel furnace.

3.2.1.4 bed ash: Ash extracted from the bed of fluidised bed furnaces.

3.2.1.5 fly ash: Dust burden entrained in the flue gas leaving the combustion chamber

3.2.1.6 slag: Residue of fuel after combustion in furnaces with high temperature conditions in the combustion chamber where a high percentage of the mineral matter is fused. Slag-tap furnaces are often operated with re-injection of fly ash after precipitation into the combustion chamber for retention in the slag flow.

3.2.1.7 grate slag: Slag extracted from grate furnaces.

3.2.1.8 granulate: Slag discharged from the slag-tap hole of a slag-tap furnace in molten state and finally quenched. Slag-tap furnaces are often operated with re-injection of the fly ash into the combustion chamber.

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

3.2.2 Mechanical conveying

3.2.2.1 ash hopper: Lowest part of the combustion chamber of a dry bottom pulverised fuel furnace or of the bend of boiler ducts from which the **ash** can be discharged under gravity.

3.2.2.2 slag-tap hole: Lowest part of the combustion chamber of a slag-tap pulverised fuel furnace from which the **slag** is discharged in molten state

3.2.2.3 submerged scraper conveyor: A scraper chain or **apron conveyor** installed in a trough of water. The trough provides an air seal to the combustion chamber and quenches and cools **ash** or **slag**. The **ash** is dewatered at the inclined exit of the trough.

3.2.2.4 ram-type slag extractor: A reciprocating ram installed in a trough of water. The water provides an air seal to the combustion chamber and quenches and cools the **slag**. The ram slowly pushes the **slag** forward for final discharge via the outlet edge. If sintered **slag** lumps are to be handled a **crusher** can be arranged downstream.

3.2.2.5 crusher: Machine to reduce oversized **ash** or **slag**, this can be separated by a screen to a size which can be handled by the conveying system.

3.2.2.6 belt conveyor: An endless rubber belt supported by idlers mounted on a structure in trough shape and stretched between a head drive pulley and a tail pulley.

3.2.2.7 drag link conveyor: One or two parallel endless chains with a series of scraper flights sliding in a stationary trough and stretched between a head drive roller assembly and a roller assembly at the other end equipped with a take-up adjuster to maintain chain tension. Conveying may be performed horizontal or at an inclined angle or even vertical.

3.2.2.8 vibratory conveyor: Tubular or flat trough with a spring or mechanical suspension system. Vibrations generated by an electromagnetic or hydraulic exciter or an unbalanced rotating mass impart an upward and forward continuous conveying movement to bulk material in the trough. When the trough is equipped with bar screens de-watering or classifying can be performed during conveying.

3.2.2.9 screw conveyor (worm conveyor): Tubular trough or pipe with a revolving worm or a helical surface of a screw within it. Rotation propels bulk material continuously. Conveying direction can be upwards, horizontal or downwards.

3.2.2.10 apron conveyor (slat conveyor): Device having a series of metal slats attached to an endless chain forming a conveyor belt stretched between a head drive roller assembly and a roller assembly at the other end equipped with a take-up adjuster to maintain chain tension. Cooling of **ash** in transit is possible.

3.2.2.11 bucket elevator: Endless belt or pair of chains carrying a series of discrete buckets for vertical transport which on turning over at the top pulley discharge their contents. Particularly suitable for larger elevations and when space is restricted.

3.2.2.12 skip hoist: Bucket or large container sliding between guides in a vertical shaft or running on skip track in inclined shaft. Can be used at similar conditions as a **bucket elevator** but for lower handling capacity. Works intermittently.

3.2.2.13 surge hopper: Device for transferring between two conveyors. Sometimes referred to as a surge bin.

3.2.3 Hydraulic conveying

3.2.3.1 water-filled ash hopper: System installed below the combustion chamber consisting of one or a number of water-filled compartments for quenching the **ash**. A separate air seal is provided between hopper and combustion chamber. **Ash** is sluiced out intermittently and conveyed further hydraulically.

3.2.3.2 dry ash hopper: System installed below the combustion chamber consisting of one or a number of sealed brick lined compartments for accepting the **ash**. An air seal is provided between hopper and combustion chamber. **Ash** is sluiced out intermittently and conveyed further hydraulically.

3.2.3.3 slurry pump: Wear-resistant centrifugal pump for transportation of **ash** in mixture with conveying water by pipelines.

3.2.3.4 ejector: Device for conveying **ash** by a pressurised water jet in pipelines. The **ejector** consists of an inlet housing for accepting the **ash**, a pressure nozzle and a diffuser. Simple design permits easy replacement of wearing components.

3.2.3.5 sluiceway: Device for conveying **ash** by flushing water in troughs or gullies.

3.2.3.6 overhead bunker: Elevated **slag** settling tank which can discharge directly to road or railway vehicles.

3.2.3.7 underground bunker: Settling tank for acceptance of hydraulically conveyed **slag**, intermediate storage and de-watering by bottom filtering system. Loading of road or rail vehicles for further transport by grab crane.

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, drag chains, conveyor belts or pipework are significant components.

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.