

**"ENERGOPROJEKT -
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Arch No

U-14526

Branch

C2

Page

1

Symbol

Komořany Heating Station

PROJECT:

Komořany Retrofit Project

K1 Boiler

STAGE

Collective dispositions

PART : thermal-mechanical

Disposition drawings of boiler house.

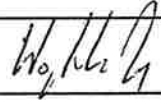
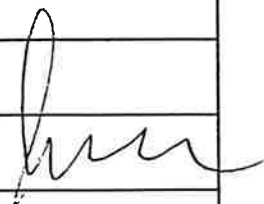
VOL.

C2.13

AS BUILT DOCUMENTATION**DOKUMENTACE SKUTEČNÉHO
PROVEDENÍ**

Contract No PL 000 603 603/1993/0001

Item of contr. 1

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KATOWICE VI 1994r.

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Coordinate page

Design coordinated with branch	B r a n c h		
	Symbol	Branch Manager	Signature
Thermo-mechanical			
Mechanical			
Civil			
Electrical			
Automation			
Checked	C2	J.Jonszta	

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1. Introduction.

Retrofit of boiler K1 in Komořany Power Station which has been started in 1994, in its basic part, comprises reconstruction of a furnace with a stop grate to a furnace with fluidized bed. Reconstruction of the boiler makes it necessary to build additional installations and to modernize installations which have already been under operation. To comply with environmental standards it is required to build in a new sack filter behind the existing electrostatic precipitator what is connected with reconstruction of a flue gas system and with replacing of an induced - draught fan. Undergate air system shall be modernized, and it shall consist of two fans :

- undergate air fan
- additional air fan

and air ducts.

Additional steam reheater (III stage) shall be built in a boiler pass. Installation for transferring steam from existing steam reheaters (I, II stage) to the new steam reheater and installation for attemperation of steam shall be located in the boiler's roof. For cooling basic elements of the retrofitted boiler such as fluidized bed and ash feeder, new cooling water installation shall be made which will enable recovery of heat received from the boiler. Boiler shall be equipped with an installation for transporting, portioning of inert material and limestone and adequate storage tanks. System of coal feeders and boiler lighting - up system shall be modernized. Boiler shall be operated with a new automatic control system.

2. Subject and scope of elaboration

Disposition design of equipment and pipelines comprises location of equipment together with their connecting steam, water, condensate, limestone, inert material and air pipelines belonging to the scope of designs made by EP Katowice. Disposition drawings have been made on the basis of drawings handed over by Power International company. New installations designed by EP Katowice

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have been plotted in these drawings and installations which had been plotted before the technical design was made by EP Katowice have been updated. Three installations, which technical designs will be realised by EP Katowice later, have not been included in the present design. These are :

- boiler auxiliary installations
- installation of blow - out pipelines
- installation of electrostatic presipitator ash recirculation

After making technical designs of the above installations EP Katowice will update the present design.

3. Boiler house characteristic

Boiler house has the following service levels :

- level - 2,5 m - level of service of : undergate air fan, conveyers of ash from under boilers;
- level + 0,2 m - service level of : ash feeder, additional air fan;
- level + 4,3 m - service level of same of auxiliary installations of boiler and boiler house;
- level + 7,7 m - service level of : boiler, air heaters, circulating pumps of boiler water, limestone storage tank;
- level + 29,75 m - service level of coal conveyers.

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Boiler house is divided into two bays :

- bay of coal bunkers in axis A to B
- bay of a boiler and electrostatic precipitator in axis B to C

Supporting structure of the building consists of reinforced concrete pillars.

4. Characteristics of basic equipment

In the scope of installations designed by EP Katowice there are same of boiler auxiliaries. A short characteristic of these is given below :

a) sack filter

- flow rate of flue gas 4,362 m³/min.
- operating temperature 157°C
- calculating temperatura 177°C
- negative pressure limit ~ 800 mm of H₂O column
- weight 190,0 t

b) limestone storage tank

- volume - 22,0 m³
- weight - ~ 10,0 t

c) air compresor, type Atlas Copco ZR5-51E Elek Pack

- capacity - 50 Nm³/min
- pressure - 7 bar
- power - 279 kW

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- weight - 6750 kg

d) induced draught fan type WPX - 173/562

- capacity - 71,5 m³/s
- total pressure - 3,374 kPa
- power of a fan - 345 kW
- weight - 25000 kg

e) undergate air fan, type WPM - 106/2,3

- capacity - 36,0 m³/s
- total pressure - 22,2 kPa
- power of a fan - 1225 kW
- weight - 11000 kg

f) additional air fan, type WP - 56/2,3

- capacity - 6,0 m³/s
- total pressure - 5,8 kPa
- power of a fan - 57 kW
- weight - 2400,0 kg

g) cooling water pump, type META - 24 - LC PLUS

- delivery - 40 m³/h
- lift of a pump - 35 m of H₂O column
- power of a motor - 14,5 kW
- rotation speed - 1450 r.p.m.

h) basic heat exchanger, panel type UFX-205H

- heat capacity - 18 MW
- water flow I - 518.3 m³/h
II - 517,4 m³/h

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- temperatures I - 110/79°C
- II - 75/106°C
- calculating temperature - 120°C

i) stand-by heat exchanger OPW2 - panel type UFX-60H

- heat capacity - 18 MW
- water flow I - 518,3 m³/h
- II - 250,7 m³/h
- temperatures I - 110/79°C
- II - 27/90°C
- calculating temperature - 120°C

j) cooling water circulating pump

- type META - 37 - LC PLUS
- delivery - 260 m³/
- lift of a pump - 82 m sl. H₂O
- power of a motor - 130 kW
- rotation speed - 1450 obr/min.

k) equalizing tank

- type - cubical
- volume - 2,5 m³
- operating pressure - 0,12 MPa
- operating temperature - 100°C

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5. General characteristic of designed installations

5.1. Flue gas ducts

Complying with new environmental standards concerning amount of dust in flue gas made it necessary to build in an additional dust extractor - sack filter, located in series behind the existing dust extractor - vertical electrostatic precipitator. This situation also made it necessary to replace an induced - draught fan with a new one, with higher draught pressure. Both the sack filter and the induced - draught fan are located on a new steel structure which is built over the boiler house floor, over boiler K1 and is supported on boiler house pillars in axis A,B,C,D. The induced - draught fan rests on a steel frame which is mounted on anti -- vibration insulators to eliminate vibration. The sack filter is equipped with a hoisting device for replacing sacks. An assembly hatch has been designed in the boiler house roof to enable transportation of an induced - draught fan. Building in of a new induced - draught fan and sack filter forced the reconstruction of flue gas ducts on the boiler house floor. Servicing platforms have been designed for servicing measurement connectors on flue gas ducts and elements of an induced - draught fan.

5.2. Air ducts

New construction of a combustion chamber of a boiler made it necessary to replace an undergate air fan and build in a new additional air fan. The undergate air fan is located in the basement at level - 2,5 m. The additional air fan is located at boiler K1 from the side of boiler K2 at level + 0,2 mm. An assembly hatch covered with removable beam has been designed in the floor + 0,2 m for transporting the additional air fan. Air ducts for new fans have been designed from existing air ducts (at a wall in axis C) to inlet flanges of fans.

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5.3. Cooling water system

Closed cooling system with possibility of heat recovery has been designed for cooling a fluidized bed of a boiler and an ash feeder. Heat from the closed cooling system is transferred to water in a panel heat exchanger. In case of break - down in water system or lack of demand for heat the system will be cooled by main cooling circuit of the power station. As a II level of security boiler equipment will be cooled with raw water from two water collectors in Nehranice. Auxiliary equipment (fans i.c.) will be cooled in open circuit -- on funnels. The design of boiler K1 cooling system assumes possibility of including the next 4 boilers in the system and operation of the system with 5 boilers : K1 ÷ K5.

Heat exchangers and circulation pumps of the closed circuit are located on the floor + 0,2m, between axis C and D and 11 and 12.

5.4. Suspension of high - pressure pipelines

New steam reheater (III stage) shall be built in a boiler pass. New installations of pipelines connecting the new reheater with existing reheaters (I, II stage) and the new reheater with live steam collector. Additionally pipelines connecting reheaters (the existing with the new one) are equipped with feeding water injection for attenuation of steam. All the above mentioned installations will be suspended on supporting structures rested on boiler floor at level + 27,45 m.

5.5. Compressed air installation

There will be new receivers of compressed air after retrofit of boiler K1 :

- transporting pump
- rotating pneumatic feeder
- sack filter over a 24 - hour limestone storage tank
- system of returning ash to a boiler
- sack filter for extracting dust from flue gas.

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A new compressor with capacity of 50 Nm³/min shall be built in the existing compressor room to cover increased demand for compressed air. Piston compressors which are now in operation will be in reserve. Boilers K1 ÷ K10 will be prospectively equipped with 5 new compressors : (4 - main, 1 - in reserve).

5.6. Natural gas installation

The retrofitted boiler will be equipped with a new lighting - up installation based on natural gas. Gas collector with connectors for each boiler shall be placed on external wall of a boiler house. Piping installation connecting the collector with a burner shall be made only for boiler K1, however the last section in the area of the burner will be realized according to CBKK -- Tarnowskie Góry design.

5.7. Limestone and sand installations

The retrofitted boiler will be also equipped with an installation for limestone proportioning to the boiler and an inert material system. A 24 - hour limestone storage tank is located in a bay of coal bunkers at level + 7,7 m, and an inert material storage tank is located in boiler room between boiler K1 and an upper wall, close to axis B of the building. Limestone and sand from the storage yard behind a turbine hall will be transported in common pipeline.

6. Automatic control and measurement

All thermal processes taking place in generation and transmission of thermal energy will be controlled by measuring equipment. All measuring points will be plotted on fragmental schemes (it concerns mainly a cooling water system) and on assembly drawings of working design of the given section.

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7. Directions for assembly of equipment and pipelines

Assembly of equipment should be done in accordance with manufacturers' instructions. Pipelines should be assembled according to notes included in working documentation and notes from technical descriptions of designs. Possible changes in documentation of a section, use of substitute materials at assembly, each time should be co-ordinated with authors of a design.

8. Anticorrosion protection and insulation

Directions to anticorrosion protection of insulation and selection of insulation are inserted in separate designs.

9. Operating of equipment of thermoelectrical part

Instruction for start-up of equipment and pipelines should be elaborated for boiler K1. This instruction is not included in the scope of the present design.

All detailed instructions for equipment given by manufacturers should be observed during start-up.

10. Withdrawal of the boiler from service

Withdrawal of the boiler from service should be done in accordance with operating instructions. All withdrawal of the boiler from service maintenance works on external and internal surfaces as well as necessary repair works should be executed.