

Air Preheaters



Rotating Regenerative Heat Exchanger

Air Preheaters (APH) are important components in modern fossil fuel fired power stations. By preheating the combustion air with the hot flue gases leaving the boiler, a considerable increase in efficiency is obtained. In recent years, the attention has also been focused on a reduced need of maintenance, longer operational periods between major overhauls, and the need of operating in connection with flue gas cleaning equipment such as high dust SCR (Selective Catalytic Reduction) plants. The type of air preheater totally dominating the market is the regenerative type, first and foremost because it is extremely efficient which results in reduced space requirements and a favourable price.

The design of air preheaters today requires weighing of often conflicting demands for high heat transfer, small pressure drop, reduced fouling, and ease of cleaning. BWE has more than 40 years experience in the design and delivery of regenerative heat exchangers.

The BWE regenerative heat exchanger operates according to the counterflow principle. Heat transfer elements placed in a vertical shaft rotor rotate continuously in a housing divided into a flue gas section and an air section by means of diagonally arranged sector beams. During the rotation through the flue gas side, the heat transfer elements absorb heat which is later given off during the rotation through the air section.

Sealing Systems

The APH is equipped with various sealing systems in order to minimize the leakage of air to the flue gases:

- radial sealing system
- axial sealing system
- circumferential sealing system
- shaft sealing system

Radial Sealing System

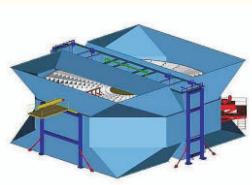
The function of the radial sealing system is to minimize the leakage from the air side to the flue gas side.

The radial seals are arranged between the rotor and the sector beams both at the top and at the bottom and comprise a horizontally placed plate construction that is suspended from the sector beams via a movable rod system.

The radial sealing system forms a labyrinth sealing between the radial sealing plates and the radial walls of the rotor. The radial seal plates and the sector beams are connected by flexible fabric compensators.

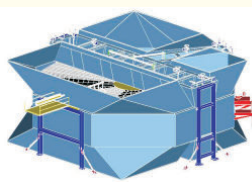
The radial sealing plates are divided into five sections hinged together, so that an optimum adaption to the thermal deflection of the rotor along the entire rotor diameter is achieved.

Each of the external and middle sections is provided with an automatic control system for the radial seal plates which keeps the radial seals at a constant distance from the rotor. With this system it is assured that the radial seal plates follow the thermal deflection of the rotor, and



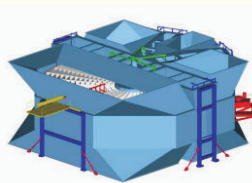
Bi-Sector Type

This type of air preheater is used in gas and oil fired boilers, and in coal fired boilers as separate preheaters for the primary and the secondary air.



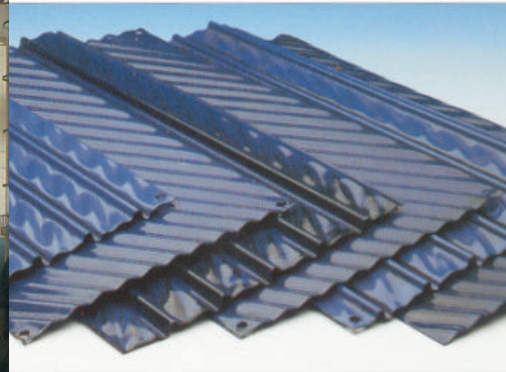
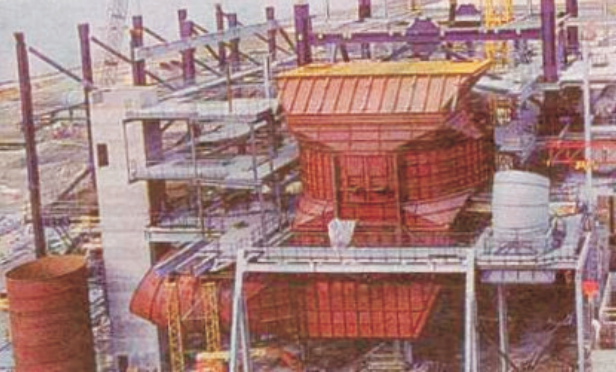
Tri-Sector Type

This type of air preheater is divided into three sections, one for the flue gas, one for the primary air and one for the secondary air.



Quad-Sector Type

This type of air preheater is a further development of the Tri-sector type. The secondary air section is divided into two sections embracing the primary air section. The advantage of the quad-sector type compared to the tri-sector type is the reduced leakage.



thereby minimize the leakage as much as possible independent of the boiler load. For the sensor control, BWE uses its own measuring equipment and the control system comprises an electronic measuring system, a control cubicle, and a mechanical setting gear of electro-mechanical design.

Axial Sealing System

The function of the axial sealing system is to minimize the leakage from the air to the flue gas side.

The axial seals are mounted vertically in the rotor housing between sector beams in the top and in the bottom and form the sealing between the rotor housing and the vertical sealing ribs on the rotor shell.

The axial sealing comprises horizontally movable plates with curvature after the rotor. The plates are suspended from the upper sector beams and can be adjusted so that they follow the movements of the rotor shell during operation.

Further, the axial sealing plates are coupled to the external radial sealing plates by a joint connection, so that a changed heat influence, involving extension/contraction of the radial sealing plates and the rotor, is automatically transferred to the axial sealing plates.

Circumferential Sealing System

The function of the circumferential sealing is to minimize the by-pass air and flue gas flows around the rotor without heat exchange with the rotor heat exchange elements.

The circumferential seals are mounted on the external encircling console in the rotor housing at the upper rim and the lower rim of the rotor periphery.

The circumferential sealing comprises thin, profiled plates with curvature after the rotor periphery and forms the sealing against the machined flange on the rotor.

Adjustment of the circumferential seals takes place in cold state after a pre-calculated deflection curve for the rotor in operation.

Shaft Sealing System

The shaft seals are mounted above and below the rotor at the shaft penetrations for the guiding and supporting shaft in the sector beams. Each shaft seal comprises a housing with three sealing rings "swimming" in the sealing housing to allow a certain movement between the sector beams and the rotor shafts.

References

During more than 40 years in the regenerative air preheater business, BWE has delivered more than 100 air preheaters and gas-gas heaters.

Service

BWE can offer to modernize and improve the performance of existing APHs regardless of make. The work can comprise installation of new improved sealing systems, delivery of enamelled heating surface or general repair and maintenance work.

World leader in steam power technology

Burmeister & Wain Energy A/S has specialized in the development and design of advanced steam boiler plants for utility and biomass fired power stations.

Furthermore, BWE designs a wide range of auxiliary power station equipment such as the BWE Low-NO_x coal/oil/N-gas/biomass burners, Air Preheaters, Gas-Gas Heaters and Flue Gas Desulphurization.

BWE is part of the Italian STF S.p.A. Group.

BURMEISTER & WAIN ENERGY A/S
Lundtoftøgårdsvej 93A
DK-2800 Kgs. Lyngby, Denmark
Tel. +45 39 45 20 00
Fax. +45 39 45 20 05
E-mail: info@bwe.dk
[Http://www.bwe.dk](http://www.bwe.dk)