

Gas-Gas Heaters



Rotating Regenerative Heat Exchanger

Today power generation with fossil fuels requires installation of flue gas cleaning systems such as electrostatic precipitators for removal of dust, desulphurisation plants (FGD) for removal of SO_2 and deNO_x plants (SCR) for removal of No_x.

Many flue gas cleaning processes contain some form of heat exchange between the untreated flue gas and the treated flue gas. In the wet limestone FGD processes, the untreated flue gas is cooled before it enters the absorber, and the treated gas is heated before entering the stack. In the Tail-end SCR process, the heat flow is the reverse, with the untreated gas being heated before entering the catalyst and the clean gas being cooled.

In all these processes the most energy economical way to create this heat transfer is to let the two flue gas flows exchange heat directly from the hot flow to the cold one. The most efficient equipment in terms of the heat transfer area required and hence also cost-wise the most favourable solution, is the rotating regenerative type of gas-gas heaters.

The BWE GGH

The BWE regenerative type of heat exchanger operates on the counter flow principle. Basically, the gas-gas heater is similar to the well known rotating regenerative air preheater type, but is designed with special consideration to the conditions prevailing in a gas cleaning plant, i.e. choice of materials which can withstand environmental corrosion.

Special consideration is given to the sealing between the untreated flue gas and the treated flue gas in order to minimize the leakage of untreated gas to treated gas as this leakage will increase the emission from the plant.

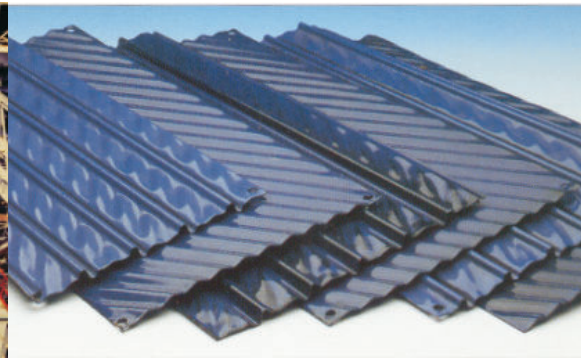
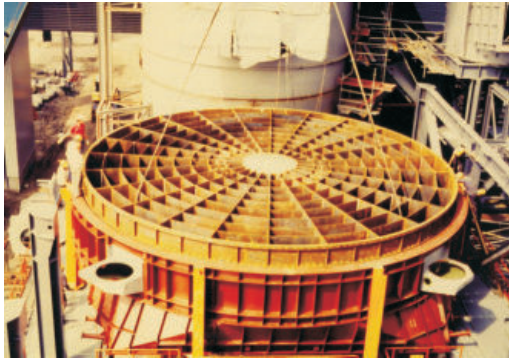
The first Gas-Gas Heater was supplied in 1986 and since then more than 60 units for application in various types of flue gas cleaning plants have been supplied.

Corrosion Resistance

In most GGH applications, the risk of condensation and corrosion is much greater than in a typical air preheater. The GGH operates at lower temperatures - the untreated gas enters at 105 - 150 °C and is cooled down to 75 - 100 °C, which is below the acid dew point. The clean gas enters saturated with water at 45 - 50 °C and is reheated to typically 75 - 90 °C. This means that the GGH is exposed to fly ash and acid condensing on the untreated side and to a combination of water droplets (often with a high chlorine content), unreacted limestone and the remaining SO_2/SO_3 on the clean gas side.

To withstand corrosion, the BWE Gas-Gas Heater is designed with the application of many special materials. For example, the rotor is manufactured of Corten-steel, the heating elements are made of enamelled steel and the housing, cold ducts and sealing plates are lined with flake-glass coating.





Leakage Minimization

If untreated flue gas for some reason leaks to the treated, clean gas side, the efficiency of the flue gas treatment plant will be reduced. Two types of leakages are encountered in rotary regenerative heat exchangers - the direct leakage and the entrained leakage.

The direct leakage means flue gas from the gas side with the highest pressure passing between the rotor and the radial and axial seals to the gas side with the lowest pressure. The entrained leakage means the volume of flue gas contained in a rotor sector which will hence be carried from one gas side to the other due to the rotation of the rotor.

In order to minimize the leakage several measures can be employed. First of all, BWE has developed a very efficient radial sealing system where the radial seals are elaborated as a labyrinth sealing between the rotor radial walls and the radial sealing plates. The radial sealing plates are provided with a sensor control which adjusts the gap distance between the rotor and the radial seal plate

automatically, keeping the gap constant and minimum, independent of the thermal deformation of the rotor.

In plants where the highest pressure will be on the untreated gas side, the direct leakage can almost be eliminated by installing a special leakage minimization system. This system comprises a small fan supplying pressurized treated gas to the space between the rotor and the radial seal plates. This seal gas prevents the untreated gas from passing to the untreated gas side, and the untreated gas contained within the rotor sections between the radial seal plates will also be purged out of the rotor into the untreated gas duct. With such a system it is possible to obtain leakage levels of less than 0.5%.

Service

BWE can offer to modernize and improve the performance of existing GGHs 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 and Gas-Gas Heaters.

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



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