Combustion Air Preheaters

Our RAAG patented type, plate recuperative static type, zero leakage features. Much more compact than tubular type.

What is an air preheater?

Air preheaters are gas/gas heat exchangers whose aim is to exploit last part of sensible heat, meanly preheating air going to burners or to processes. Gas/gas/ air preheaters are also often referred to as “air heaters” or air preheater due to the main application It is interesting to note that roughly for any 10°C decrease in gas temperature there is a 1% of increase in efficiency of boiler / heater. The APH are convective type heat exchangers, working typically in range of 400°C to 150°C, except certain application in petrochemical reformers, steel mills, glass or cement kilns in which gas temperature can reach 800°C. Generally, APH are sized only as convective recuperators.

Regenerative Vs recuperative types.

In regenerative type also called LJUNGSTROM normally used in utility boilers, the gas hot streams cross a rotating wheel containing “baskets” heating these elements; and then the heated elements are crossed by a cold air stream releasing their heat. The main advantage is the large surface and sizes and consequently big volumes of gases and big amount of heat. The big disadvantage is that they are rotating machine, hence absorbing power for rotation, having gas

to poor exchange coefficient of bare tubes, were developed finned type. A common type especially used in oil industry become rectangular plate finned type, mostly in cast iron and in steel.

Our air preheaters.

Our experience in designing and manufacturing combustion air preheaters dates back to 1947 at the period of post-war reconstruction of Italian industry. The first equipment made by cast iron finned elements was realized in that year for the Cisa-Viscosa Company at service of a Breda Termomeccanica steam boiler.

- Cast iron finned plates type air preheaters: *(first generation)* Afterwards this first installation, we've designed and manufactured hundreds of combustion air preheaters realized with cast iron finned tubes, provided with external fins gas side and internal fins air side, at service of steam boilers or at service of refinery heaters.
- Finned steel plates type air preheaters: *(second generation)* Due to reduction of sulphur content in fuels and reduced corrosion problems cast iron become more and more obsolete and we started in 80' to realize finned air preheaters made by steel finned rectangular elements stacked to realize modules. Being steel it was possible to weld all elements and realize "Zero Leakage Feature".
- Dimpled plates air preheathers: *(third generation today air preheaters)* Since early 2000's we started to develop a new type of combustion air preheater made by chevron dimpled steel plates. The elements are no more finned but realized with enchanced corrugated plates, with higher heat transfer coefficients, driving to more compact solutions. Differential dimpling is possible to balance external and internal heat coefficients to follow temperature profiles avoiding gas condensation.

Combination of different materials.

Combustion air preheaters may be realized with different materials:

- carbon steel
- alloy steel
- stainless steel
- COR-TEN (corrosion resistant) steel
- enamelled steel
- glass tubes

MAIN FEATURES

We now realize all combustion air preheaters our RAAG patented type with enhanced chevron shaped steel plates. The flue gas flows one side and the combustion air in the other one, normally crossflow. If the dimensions are fit for transportation, our equipment are supplied completely preassembled, ready to erection. If the overall dimensions are exceeding the transport capability or the erecting maneuverability they are supplied in prefabricated modules.

The most important feature of our Combustion air preheaters is the possibility to realize the "ZERO LEAKAGE" manufacturing option, all welded: no brazing, no clips are presents but all welded construction to guarantee a complete tightness. No air leakage into gas zone means lower corrosion problems, no oversizing for air fans, lower maintenance costs.

1st Advantage HEAT EXCHANGE:

fin surfaces had a very low efficiency, which is inversely proportional to their height and thickness. Plain Plate type have a superior heat transfer but dimpled enhanced are on the technical forefront. Plate type to reach the same effectiveness of a dimpled surface need more surface. This was the drive to dimple surfaces adoption. The various flow phenomena caused by dimpled surface have a significant impact on heat transfer: recirculating flow, generation of vortex structures, ejection of flow, boundary layer separation at leading edge and reattachment with the formation of secondary flows at trailing edge are the main reasons of such high performance.

2nd Advantage CLEANING:

CAPH is at the cold tail of exhaust gas path, so it "filters" dust, fouling and debris collected by gas during its way; the result is reduction of flow section area, gas stagnation and increase risk of acid corrosion. Fins act as a sieve and collect g and debris, whereas plain plates or dimpled plates facilitate the passage through the exchanger to the stack.

Surface with suitable shape, orientation and distance of dimples performs significantly better than the plain surface and present a higher reliability compared to finned surfaces, improving overall performance of the exchanger.

References

These solutions have been installed at the following customers.

ITT | Born Heaters Ltd | Petronas | Kirchner Italia S.p.A. | KT-Kinetics Technology | Acciaieria Pietra S.p.A | Lukoil | Saipem | Conoco | Enel S.p.A. | Wood Foster Wheeler | JNK Heaters CO,LTD

Other Solutions

Decades of Experience in Heat Transfer and an Outlook aimed firmly at the Future.

Gas Gas Preheaters | Waste Heat Recovery Units | Steam Air Preheaters | Exaust Gas Boilers | Economizers | Industrial Dryers | Retractable Lance Soot Blowers | Rotary Soot Blowers | Rake Soot Blowers

Applications Fields

Efficiency solutions for each industry. We design and supply customized heat recovery and heat exchanger equipment.

More Info

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