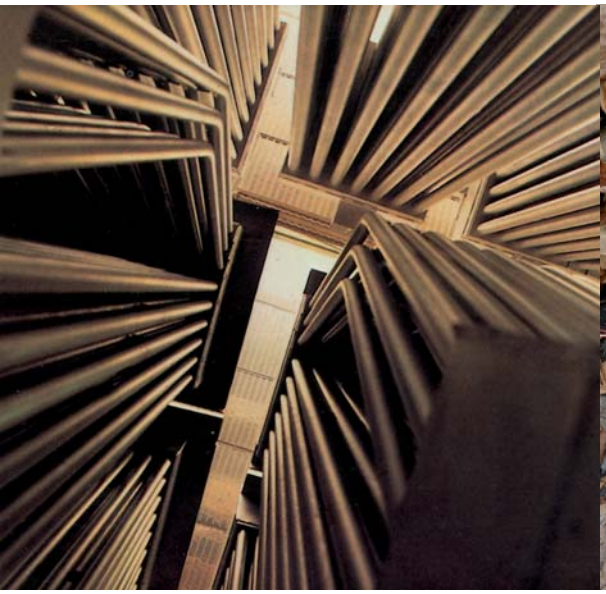
Heat recovery



KALFRISA
ENERGÍA Y MEDIO AMBIENTE

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Radiation recuperators

Use criteria:

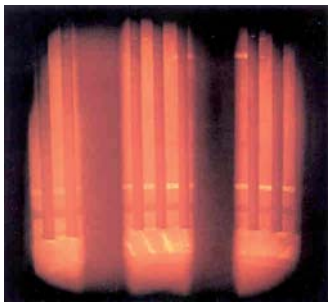
Hot gas temperature:
> 1.000 ºC

Gases that contain agresive compounds or a big quantity of particles

Applications:

Forge furnaces
Frit melting
Glass manufacturing
Aluminium melting

- DIFFERENT COMBINATIONS OF TYPES AND MODELS ACCORDING TO CLIENT'S NEEDS
- FUEL SAVING
- DRASTIC REDUCTION OF GREENHOUSE EFECT GASES EMISSIONS



Ring arranged tubes cage radiation exchanger working at 1.200 ºC

In these recuperators the calorific power transfer between the primary and secondary fluids is basically made by **radiation**.

Double shell recuperators offer a lower fuel consumption, even over 40%, because of a combustion air pre-heating and a compact design which allows their installation in the fumes stack.
They are made of two concentric cilinders in which the secondary fluid flows through the circular crown, either in paralell to the recuperator axis or helicoidally, counterflow or in paralell drafts.
Appropriate for working pressures up to 2.000 mm. W.G.

For higher working pressures the ***ring arranged tubes cage*** recuperators offer a better performance, a higher resistance and a more homogeneous air distribution.
They are designed replacing the interior shell by a ring arranged tubes cage, though which the air flows, so that the heat transfer is still made by radiation.

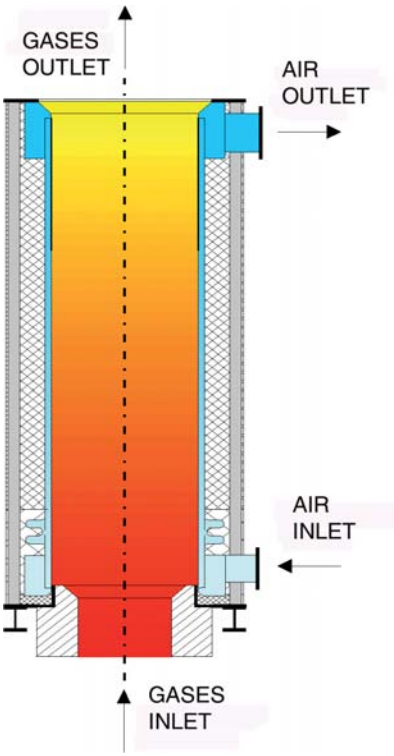


Fig. 1: Double shell radiation recuperator

Convective recuperators

Use criteria:

Hot gases temperature < 1.000 ºC
Gases that does not contain corrosive compounds neither a big quantity of solid particles

Applications:

- Iron and steel industry
- Calcination furnaces
- Waste valorization
- Gases or air cooling

Using steel plain tubes, in these recuperators the heat transfer between the primary and secondary fluid is made by means of convection.

Tubes recuperators can be supplied separately, to be introduced in a horizontal gases duct (underground or elevated) or vertical (stack), or even include the internally covered cage.

With the same working principle, but aimed at cooling a primary fluid, gaes coolers offer an alternative to the air dilution in gases cleaning systems. These equipment, as a previous step to cleaning, avoid gases from getting to the cleaning systems at a too high temperature.

Essential factors in their design are dust content in gases, as much as the capacity of dust separation in the gaseous current, which could require the installation of dust collection and extraction systems in areas where there is a bend or counterboring.

- SPECIFIC CALCULATION FOR EACH RECUPERATOR
- OPTIMUM ENERGY RECOVERY
- INVESTMENT AMORTIZED IN A SHORT PERIOD OF TIME

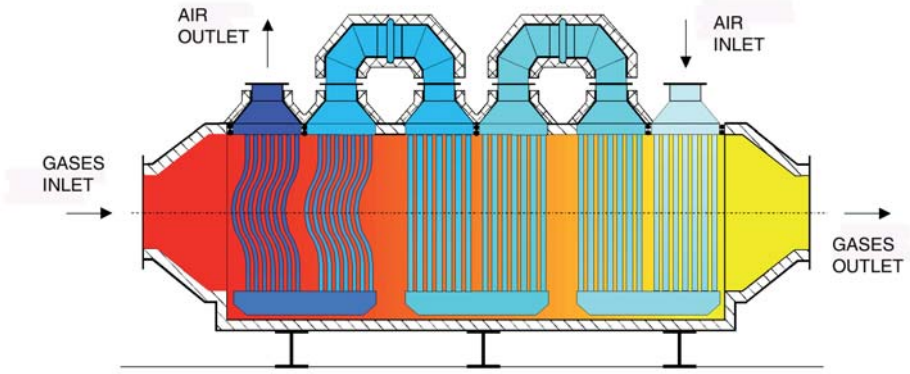


Fig. 2: Channel type recuperator with six bundles. Horizontal gases / vertical recuperator

GASES - AIR HEAT EXCHANGE

EXCHANGERS

Exchangers make the heat transfer by means of **convection**.

They are equipment with a ***more compact design,*** which allows a ***quick and easy assembly***.

In a heat exchanger the tube bundle is fixed to the frame that contains it, so avoiding possible breaks as a consequence of the different thermal expansions between the bundle and the frame, adding compensators or bending the bundle tubes.

Appropriate equipment for the following cases:

- Not very high gases temperature, near 700-750 ºC.
- When a duct to put the tube bundle in is not available.

Applications: solvent incineration installations in the automotive industry, cogeneration installations, metal and plastic surfaces treatment installations...

more than 40 years of experience in recuperators designing and manufacturing

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