KALFRISA

ENERGY RECUPERATORS

RECUPERATORS FOR DIRECT REDUCED IRON (DRI) PLANTS

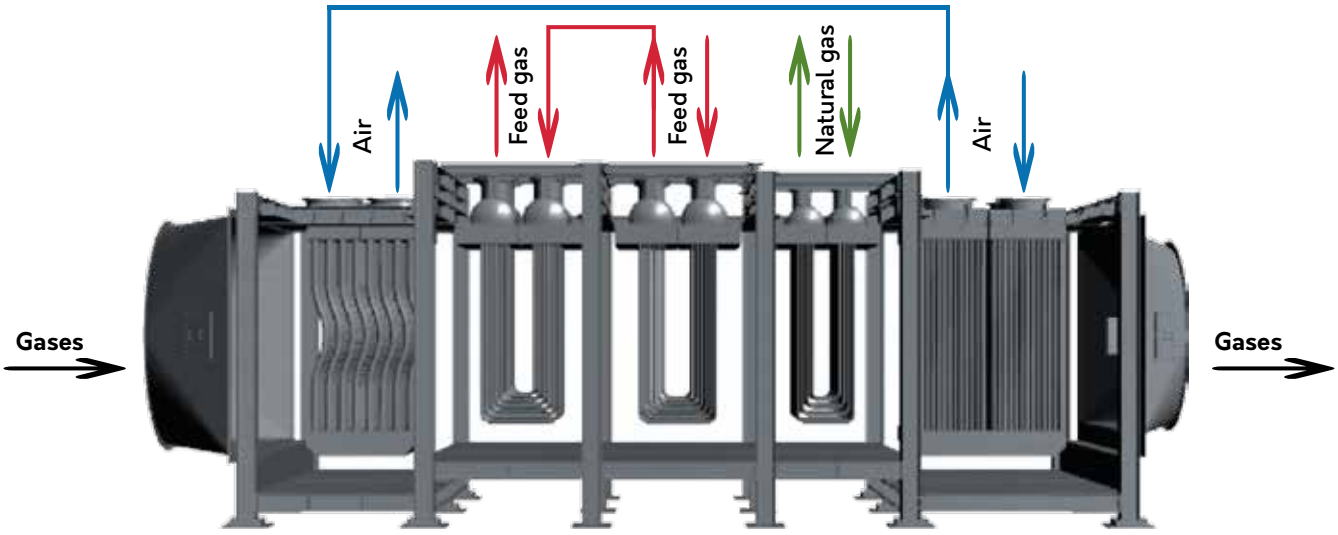
Heat recovery systems improve the thermal efficiency of the reformer.

Through straight or U-shaped tube bundles, heat from the reformer combustion gas is recovered to preheat the burner combustion air (up to 650°C), the feed gas (up to 565°C) and the natural gas (up to 380°C). Fuel gas of the reformer itself can also be preheated..

EXPERIENCE, PASSION AND RESPONSIBILITY

KALFRISA OFFERS:

- Design and manufacture of complete heat recovery systems for new DRI plants, with up to 2,5 MTPA capacity. Possibility of H_2 preheating.
- Design and manufacture of complete heat recovery systems for existing facilities where an increase in production is required.
- Supply of spare parts according to original or new design drawings.
- Consultancy work for the optimisation and improvement of heat recovery systems in existing facilities.
- Detail engineering and manufacturing of pipping, frame and refractory.



HEAT RECUPERATORS

A heat recuperator absorbs a significant part of the thermal energy from the exhaust gases generated during the combustion of a solid, a liquid or a gas, used for melting, heating, roasting, drying, etc. a specific product. Absorbed thermal energy is transmitted to another fluid, usually the combustion air for the process itself. Fuel savings are so considerable that the exchanger cost can be amortized in a few months.

Heat recovery units can be installed in all flue gas exhaust ducts from production processes where combustion air is required. The most common applications are:

Iron and steel industry

Reheating furnaces, forge furnaces, treatment furnaces.

Glass industry

In melting furnaces, starting from earth, cut glass or mixed.

Enamel industry

In frit melting furnaces.

RELIABILITY

EFFICIENCY

As a result of high energy costs and the worldwide concern for energy savings, heat recovery units are becoming increasingly important.

Our production in this field covers:

- Radiation recuperators:
  - Tube cage recuperators.
  - Double shell recuperators.
- Convection recuperators, tube type.
- Combination of these two types: COMBIFLEX.

Five parameters determine the design of a recuperator:

a) Fumes composition & dust content.

b) Flue gas temperature at the recuperator inlet and the temperature to which the air is to be heated.

c) Fume and air flow rates to be passed through the recuperator.

d) Working pressure of the installation.

e) Location where the recuperator is to be installed.

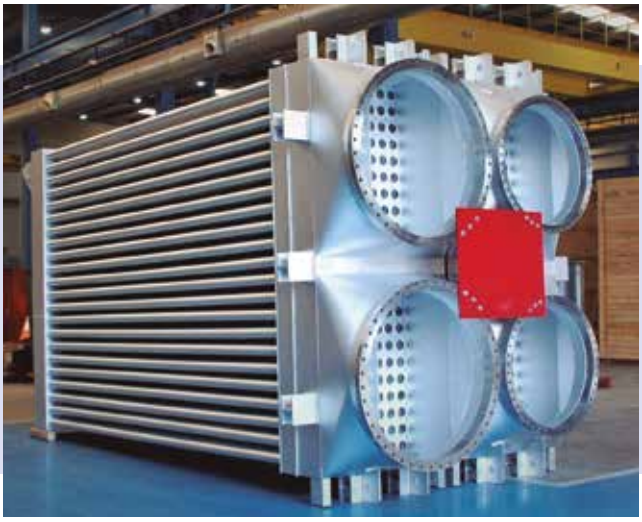
CONVECTION RECUPERATORS

These recuperators transfer heat (thermal energy) between primary and secondary flows by convection across smooth steel tubes.

Tube type recuperators can be supplied loose, to be inserted into a horizontal flue (underground or overhead), a vertical one (chimney) flue, or, alternatively, inside lined shell.

These devices are applicable to several new technological developments and are preferably used when the flue gas energy in a combustion process can be recovered and recycled in the process itself as useful energy, e.g. in the iron and steel industry, in direct reduction processes, heating furnaces, forging furnaces, treatment and annealing furnaces.

The ability to create a specific design for each process according to its requirements makes it possible to achieve energy recovery with very significant savings, either in new installations, or by replacing existing heat exchangers with more efficient ones, in existing recovery systems.



HEAT EXCHANGERS

These heat exchangers transfer heat through convection. They have a much more compact design, which allows a quick and easy assembly.

SUITABILITY:

Installations where flue gas exhaust temperatures are in the range of 700 to 750 °C, when there is no channel available in which to install a tube bundle.

APPLICATIONS:

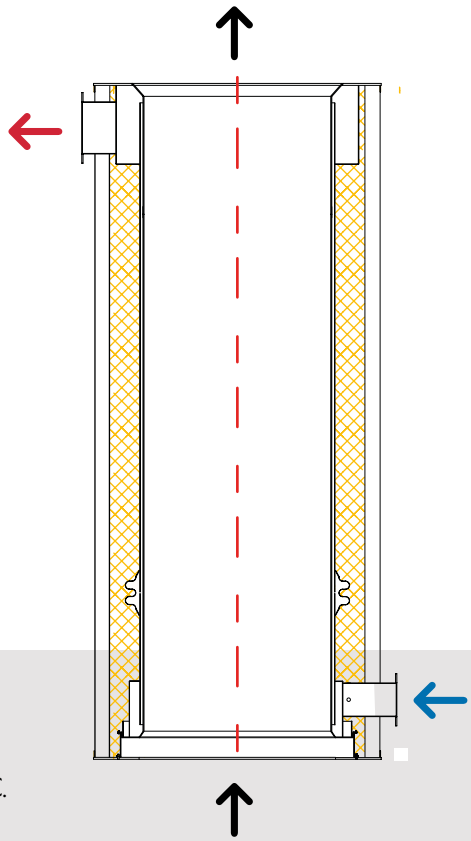
Solvent incineration plants in the automotive industry, cogeneration plants, metal and plastic surface treatment plants...

RADIATION RECUPERATORS

These recuperators transfer heat (thermal energy) between primary and secondary flows by radiation. Double jacketed radiation recuperators offer a reduction of 40% or more in fuel consumption. Their compact design facilitates their installation in the flue gas exhaust chimney.

They are made of two concentric cylinders in which the secondary fluid circulates through a circular crown, either parallel to the recuperator axis or helically, in counter or in parallel flows. They are suitable for working pressures up to 2000 mm. WG (water gauge).

For higher working pressures, tube basket type recuperators offer better performance, greater resistance and more homogeneous air distribution. They are designed replacing the inner shell with a tube basket with an annular layout, through which the air circulates, so the heat transfer continues to be carried out by radiation.



APPLICATIONS:

Forging furnaces.

Frit melting.

Glass manufacture.

Aluminium smelting.

CRITERIA FOR USE:

Temperature of hot gas > 1000°C.

Gases containing aggressive components or with a large amount of particles.

NEW RECUPERATOR
HIGH EFFICIENCY DOUBLE JACKET

RELIABILITY

MIXED COUNTER FLOW

+ PARALLEL CURRENTS DESIGN:

Maximum metal temperature up to 150°C lower

vs

Traditional counter flow recuperator.

EFFICIENCY

AIR PREHEATING MAX T^{a} OF 800°C:

Continuous operation, remotely supervised.

Tested by leading companies in the sector.

KALFRISA

360°

EXPERIENCE, KNOWLEDGE AND INVOLVEMENT

AENOR
GESTIÓN DE LA CALIDAD
ISO 9001
ER-0488/2016

The knowledge and experience gained over more than 50 years working with energy and environment techniques at industrial plants has enabled us to offer reliable and cost-effective solutions to our customers.

Our equipment is approved, certified and authorised by the EC. In addition, Kalfrisa, with its commitment to innovation, has been recognized as an INNOVATIVE SME by the Spanish Government's Ministry of Science and Innovation.

Competing for European leadership is only possible through 360ª of service. KALFRISA has proprietary technologies, designing, developing, manufacturing, commissioning and providing technical support once the equipment has been sold.

Kalfrisa guarantees the optimum adaptation of its installations to the client's requirements, adapting its design to the different technical specifications of each project. Obtaining ISO 9001:2015 quality certification signifies Kalfrisa's commitment to excellence, implementing a work philosophy regulated by both external and internal quality standards.

KALFRISA SERVICE

- **TECHNICAL ASSISTANCE SERVICE**
  Performed by a team of qualified, experienced professionals, in accordance with certified procedures.
  Guaranteeing the use of only original spare parts.
  Fault diagnosis and 365-day telephone on-call service.

- **PREVENTIVE MAINTENANCE CONTRACTS AND OPERATIONS**
  Coordination of scheduled visits with clients to evaluate and guarantee the proper function of the equipment.

- **WE ARE CONNECTED**
  All our equipment incorporates remote connection systems that allow its operation monitoring in real time. A key factor in preventing breakdowns or repairing them quickly.

360° SOLUTIONS

Our engineering and technical team analyses each project to offer the proper technological solution, sized exclusively to best meet the needs of our clients.

We take responsibility for comprehensive management of the project, from conception and general design to the assembly and commissioning at the client's facilities.

Kalfrisa Service can manage preventive maintenance and periodic review of our equipment to obtain maximum performance.

All our equipment is manufactured in our own facilities, guaranteeing the quality and performance of our projects.

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