

Efficient burner for industrial furnaces

For combustion air preheating

Concept

Industrial furnaces can reach very high temperatures. When they operate on natural gas, the fumes have to be vented continuously through a stack and their outlet temperature can reach very high values (close to the temperature of the furnace itself). This means that a large amount of energy is released into the atmosphere. Recovering this energy to preheat combustion air can greatly lower the temperature of these fumes and thus reduce heat losses through the stack, resulting in a marked improvement in the furnace's energy efficiency.

Advantages

- Improved energy efficiency of industrial furnaces: typical energy savings of 25% to 55%*.
- Energy recovered from hot stack fumes.
- Increased furnace productivity: increased speed and reduced wait times.
- Greater uniformity of temperature.
- Fewer burners in a furnace.
- Expanded range of products to be treated.
- Burners have low nitrogen oxide emission rates.
- Reduced greenhouse gas emissions.
- Different technologies are available (including the three described below).

Applications

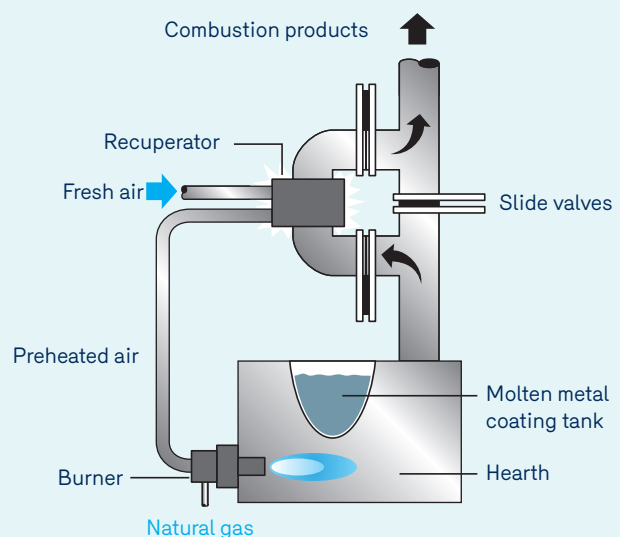
Several techniques are available on the market. Here are details of three of them.

1. Install a recuperator on the stacks

A recuperator on the stack is an air-air heat exchanger to which the natural gas combustion gases are diverted. The exchanger is mounted parallel to the fume duct and the system incorporates a set of slide valves to direct the fume flow. The fresh air for combustion passes in counter-current to the hot fume flow and is preheated before reaching the burner.

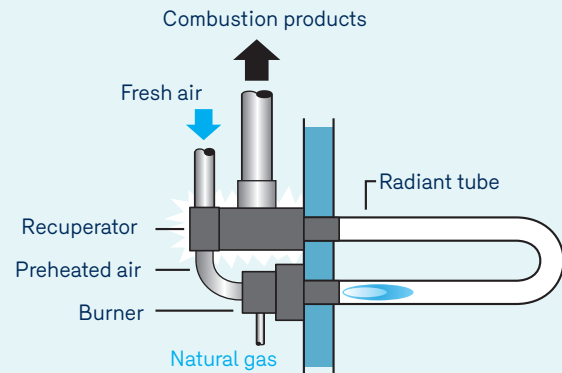
These recuperators are used in the following processes:

1. Molten metal coating tanks, including zinc and lead;
2. Tanks with or without cover;
3. Burners installed in a double wall around the tank.



2. Install a recuperator directly on the radiant tubes

Each radiant tube has its own heat exchanger, whose purpose is to preheat the combustion air that enters in counter-current to the hot fume flow. These tubes heat an enclosure without direct contact with the fumes. The tubes become very hot and produce infrared radiation and convection inside the furnace. Several U-tubes may be installed to reach the power and temperature desired. Radiant tubes are mainly found in controlled atmosphere heat treatment furnaces.

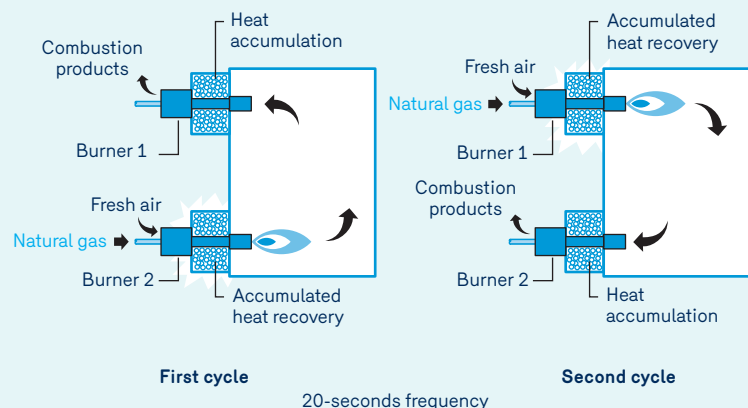


3. Replace by regenerative burners

These burners are always coupled and have two operating modes: fire mode and recuperator mode. When one burner is in fire mode, the other is necessarily in recuperator mode. Every 20 seconds, each burner changes modes. The combustion air is recovered and preheated by the heat that accumulates in the porous ceramic materials with high thermal inertia. In fire mode, the burner operates and uses the heat accumulated in its thermal masses to preheat the combustion air. The other burner recharges the energy of its thermal masses to vent the fumes.

Regenerative burners are used in the following processes:

1. Glass fusing furnaces;
2. Aluminium remelt, holding or homogenizing furnaces;
3. Steel annealing or forging furnaces.



Energy Efficiency Financial Assistance**

Financial assistance varies depending on the tariff covering the customer.

Tariff D₁ or D_M

- Énergir's Implementation of Energy Efficiency Measures Grant offer 30 ¢/m³ saved, up to a maximum of \$100,000, in a one-time payment on presentation of a study by an engineer member of the Ordre des ingénieurs du Québec.

Tariff D₄ ou D₅***

- If the investment recovery period for the measure is 1, 2 or 3 years and longer, the respective grants are 15 ¢/m³, 25 ¢/m³ or 30 ¢/m³, up to a maximum total of \$175,000.

List of manufacturers

Here is a non-exhaustive list of manufacturers. This list may be revised and amended as needed.

- Combustion Engineering
- Eclipse
- Exothermies
- Maxon
- North American

Selection criteria

None apply

Installation standards

Installation must comply with the CAN/CSA B149.1 CAN/CSA B149.3 gas codes.

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* Savings vary depending on the different parameters.

** Certain conditions apply. The financial assistance is subject to change without prior notice.

*** A Énergir major industrial customer is covered by Tariffs D₄ or D₅. Affiliated accounts may also be included. Affiliated accounts are companies covered by Tariffs D₁, D₃ or D_M whose energy supply is managed by a company covered by Tariffs D₄ or D₅, or whose location is the same as that of a company covered by Tariffs D₄ or D₅. Affiliated companies must be part of the same legal entity.

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