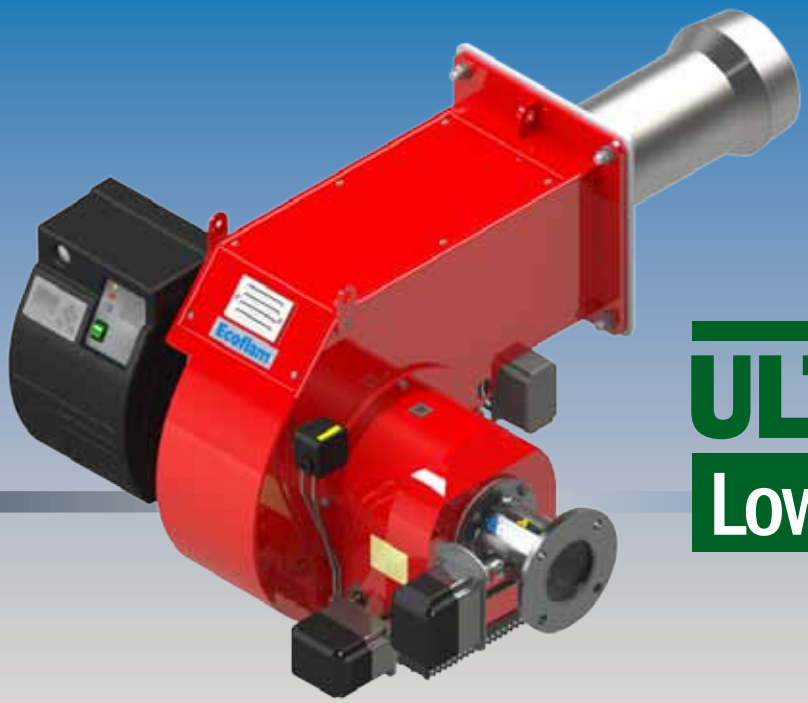
Ecoflam

ULTRA LOW NOx SOLUTIONS AND FGR SYSTEM



ULTRA
Low NOx

www.ecoflam-burners.com

Ecoflam

CUSTOMIZED BURNERS SOLUTIONS FOR ANY TYPE OF APPLICATION

OUR EXPERIENCE

Thanks to almost 50 years of experience in the design and production of burners, Ecoflam offers a full range of blown air pressure jet burners covering an extremely wide range of power, from small products for residential heating applications to high power burners dedicated to the industrial segment.
Ecoflam burners are renowned worldwide for providing high efficiency and reliable operation with significant energy savings and feature extreme ease of installation, maintenance and flexible boiler-burner matching.

OUR MISSION

Following a philosophy of continuous improving, the R&D Laboratory is constantly working to produce better results, such as the reduced NOx level emissions.
The development of new advanced combustion technologies allows to propose solutions in respect of the most stringent environmental regulations and to create the perfect condition to face the new upcoming market requests, such as Ultra Low NOx performance and ErP-ready products.

OUR PRODUCT RANGE

The flexibility of Ecoflam solutions allows the manufacturing of highly customized products covering a range from 17 kW to 34 MW:

MAX GAS
Gas range
17 - 700 kW

BLU
Gas range
245 - 18000 kW

MAX
Light oil range
18 - 546 kW

MAIOR
Light oil range
300 - 17000 kW

MAXFLAM/OILFLAM
Heavy oil range
68 - 17000 kW

OUR PROFESSIONAL TEAM

Ability to design state-of-the-art burners, manage demands of products for specific applications, ability to solve problems in real time are just some of the characteristics of our technicians and engineers.
But not only: Ecoflam has a worldwide network of service technicians able to support the installation, the commissioning and the periodic maintenance activities of the burner.

OUR INTERNATIONAL APPROACH

Our products are designed, developed and manufactured in Italy, combining quality, reliability and high performance. All these features are necessary for the end-user satisfaction, which is the first target for Ecoflam. Reaching this outcome throughout its extensive worldwide network of distributors and customers has always been a challenging task for Ecoflam, which was achieved only by developing a close and personalized relationship with each customer, always taking into account the needs and the distinctive characteristics of each individual market.

MULTICALOR
Dual fuel (gas/light oil)
190 - 17000 kW

MULTIFLAM
Dual fuel (gas/heavy oil)
414 - 17000 kW

TS RANGE
All fuels
230 - 34000 kW

SPECIAL VERSIONS

COMBUSTION TECHNOLOGIES

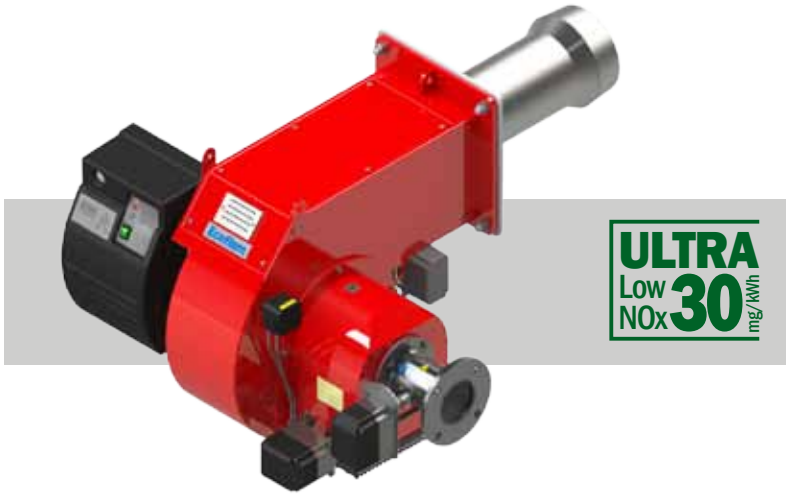
RESEARCH & DEVELOPMENT

Ecoflam is renowned worldwide for providing high efficiency and reliable burners with significant energy savings and extreme ease of installation, maintenance and flexible boiler-burner matching.
Following a philosophy of continuous improving, the R&D Laboratory is constantly working to produce better results, such as the reduced NOx level emissions.
Decades of presence on the international market have enabled Ecoflam to develop a considerable experience in customizing burners and developing innovative technologies which are attentive to the issue of polluting emissions, even in the most demanding applications.
Ecoflam is therefore well placed to provide solutions for the growing number of markets which are enacting ever more restrictive emissions regulations.

In the laboratory of Resana, Italy, the R&D technicians are able to simulate real-life working conditions and measure the performance of burners fitted with Low NOx combustion heads and the **FGR system**.
The excellent results obtained in this field have enabled Ecoflam to offer a complete range of monoblock and duoblock products equipped with the FGR technology.

The principle of external flue gas recirculation consists in sending a mixture of comburent air and flue gas to the combustion head, thus reducing the NOx emissions.

This technology enables Ecoflam to guarantee emissions of less than **30 mg/kWh**, a value which is hard to obtain with conventional combustion systems, and offer cutting-edge products which satisfy the requirements of any current regulations.



COMBUSTION TECHNOLOGIES

FGR SYSTEM: THE BASIC CONCEPT

Ecoflam developed a performant range of products which uses the external **FGR technology** (Flue Gas Recirculation) to reduce NOx emissions and satisfies even the most stringent regulations.
As previously mentioned, the principle of external flue gas recirculation consists in sending a mixture of comburent air and flue gas to the combustion head, thus reducing the NOx emissions. This process allows the possibility to reach NOx emissions **below 30 mg/kWh**, a value which is hard to reach with conventional combustion systems.

The external recirculation sends a mixture of air and flue gas to the burner combustion head. The gases are mixed upline of the combustion process by the burner fan (for monoblock units) or by the external fan (in case of duoblock burners).

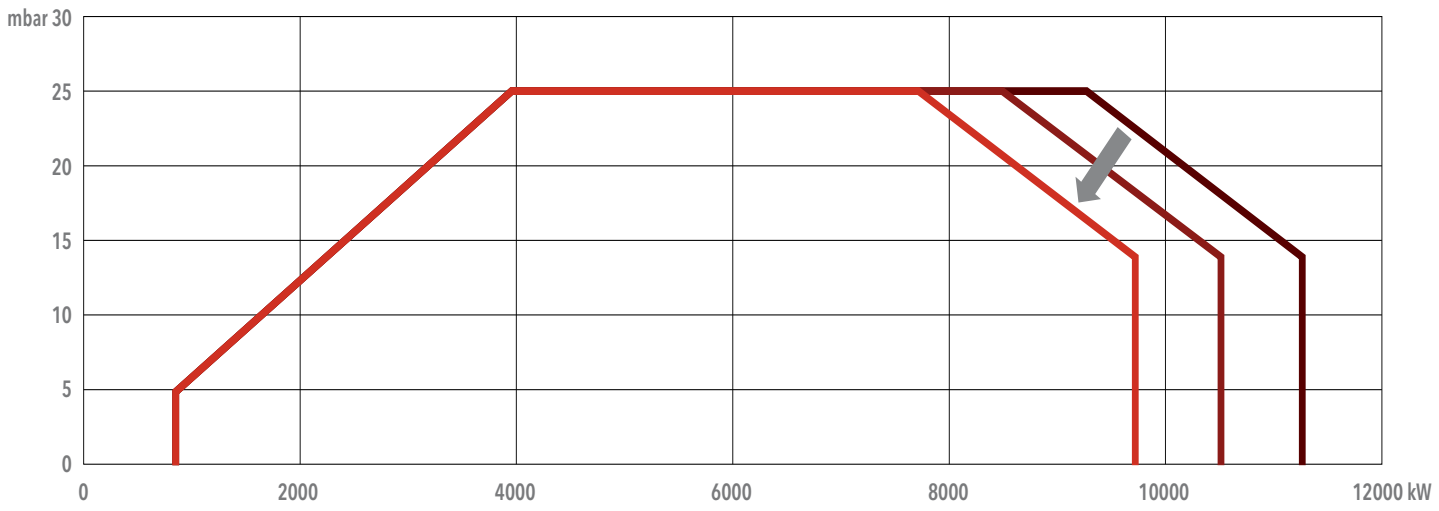
The effect in terms of NOx emissions is the result of numerous factors, the most important of which are:

- burners technical characteristics
- fuel
- type of generator
- comburent air temperature
- vector fluid temperature
- thermal load of the combustion chamber

When the FGR technology in applied to further reduce the NOx level, another parameter comes into play: the flue gas recirculation flow.
The amount of recirculation, which is generally no more than 20% of the total flow generated by the fan, is calibrated for each application in relation to the target value and the system performance without recirculation.

There is not a single percentage value which suits all applications, because of the many factors in play and their interactions, but in any case the flue gas recirculation reduces the power of all monoblock burners, since part of the fresh comburent air is replaced by flue gas.
This results in a lower O_2 content and hence reduces the combustion of fuel.

The outcome is that the working diagram is reduced proportionately.



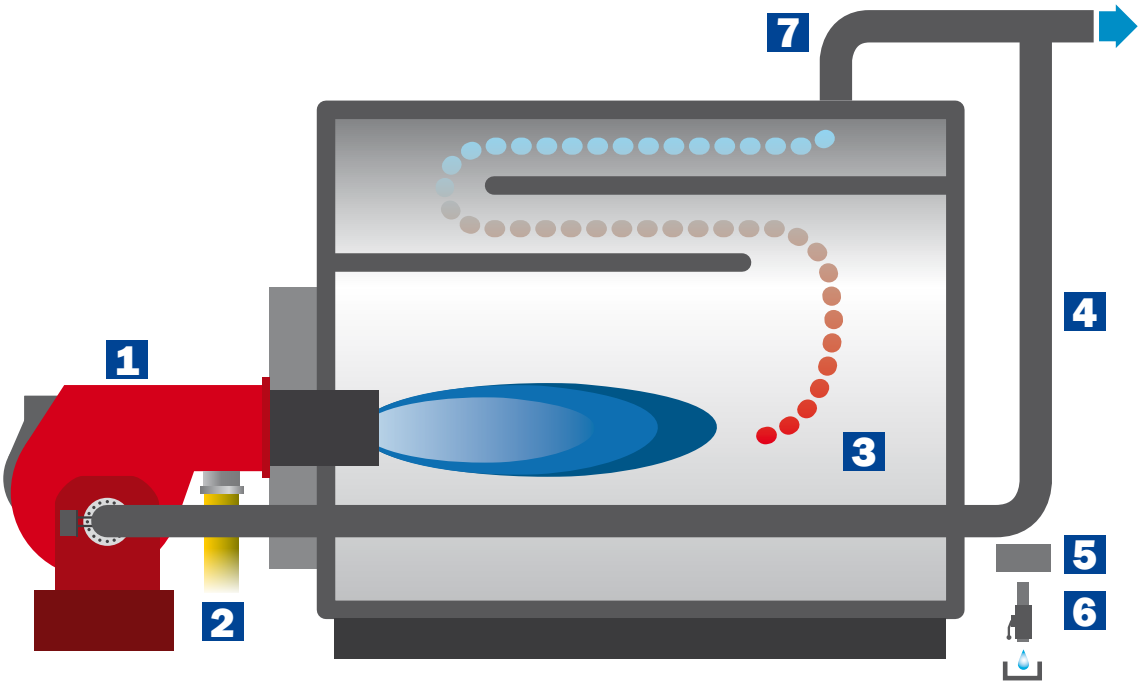
FGR SYSTEM

ULTRA LOW NOx BURNERS (NOx ≤ 30 mg/kWh)

FGR ON MONOBLOCK BURNERS

The FGR system on **monoblock burners** provides that the flue gas is drawn in by the burner fan.
The installer must therefore install a line connecting the flue gas outlet to the burner fan inlet. The extraction point is generally at the base of the flue pipe, where the pressure is close to zero. A suction is generated in the burner intake box which is a function of the fan curve and the air damper position.
In order to ensure an adequate rate of flue gas from the stack and thus to provide the required NOx reduction, the pipeline between the flue and the burner must be sized to minimise the pressure drop.

Legenda
1 - Burner
2 - Gas inlet
3 - Furnace
4 - Flue pipeline
5 - Drainage
6 - Drainage valve
7 - Stack



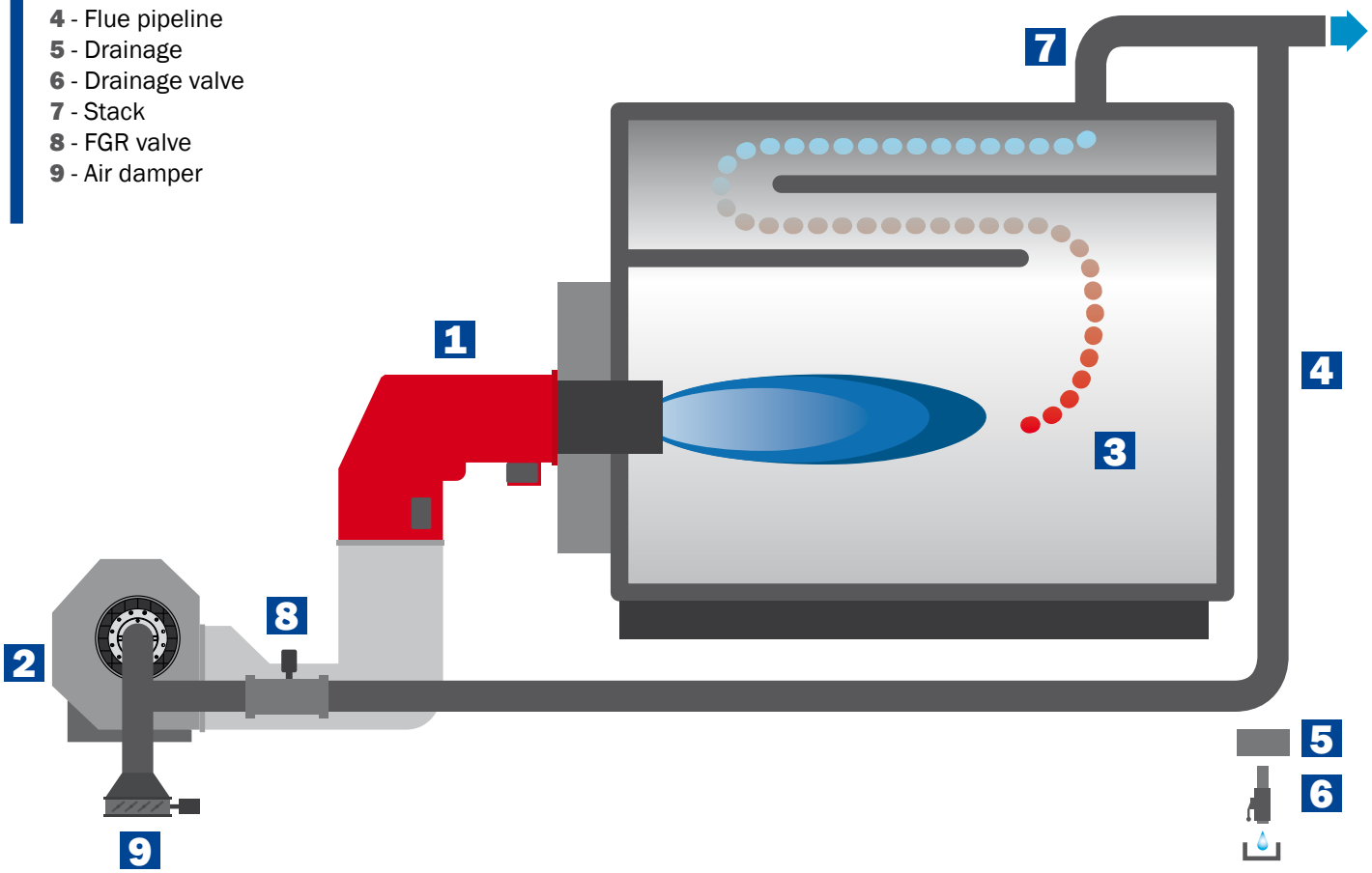
FGR SYSTEM

ULTRA LOW NOx BURNERS (NOx ≤ 30 mg/kWh)

FGR ON DUOBLOCK BURNERS - LAYOUT 1

The FGR system for **duoblock burners**, in which the drughtfan is installed in a remote position, has a different layout, since the flue gas line must enter the circuit upstream of the fan itself. Furthermore, to generate the required suction to convey the flue gas into the fan and mix it with the comburent air, the flow regulation device must be located upstream of the flue gas inlet into the fan suction circuit. As for monoblock units, also here the flue gas line must be properly sized.

Legenda
1 - Burner
2 - Draught fan
3 - Furnace
4 - Flue pipeline
5 - Drainage
6 - Drainage valve
7 - Stack
8 - FGR valve
9 - Air damper



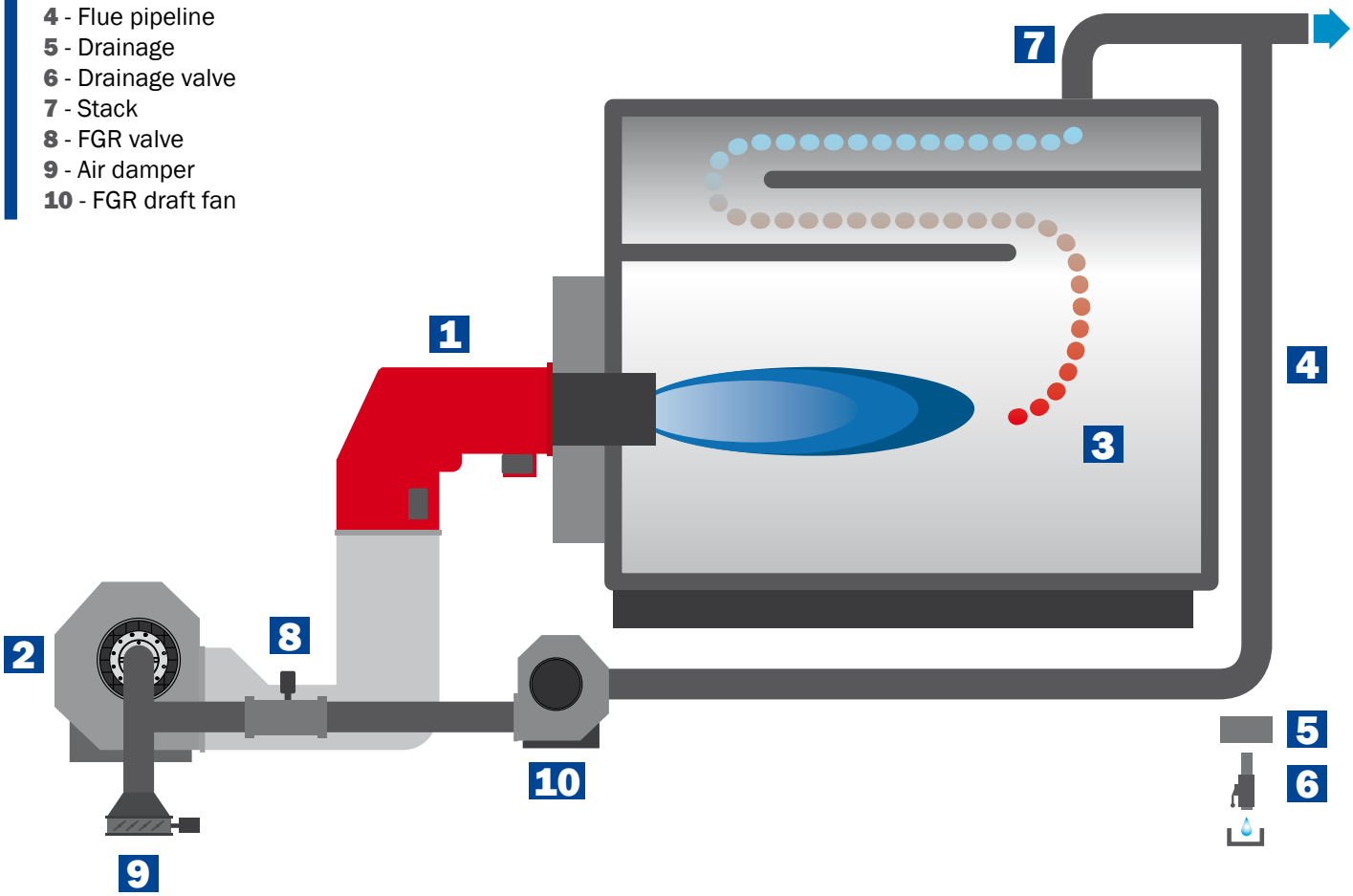
FGR SYSTEM

ULTRA LOW NOx BURNERS (NOx ≤ 30 mg/kWh)

FGR ON DUOBLOCK BURNERS - LAYOUT 2

In case of installations with duoblock burners there is an alternative option to layout 1.
In this scenario there is a further draught fan dedicated to the flue: it takes the flue from the stack and pushes it into the duct between the burner and the fresh air draught fan.
The flue damper is just after the flue fan. The air damper is on burner board and therefore it adjusts the rate of the mixture between the flue and the fresh air.
Also in this case the flue duct has to be properly sized in order to minimize the pressure drop.

Legenda
1 - Burner
2 - Fresh air draught fan
3 - Furnace
4 - Flue pipeline
5 - Drainage
6 - Drainage valve
7 - Stack
8 - FGR valve
9 - Air damper
10 - FGR draft fan



REFERENCES

ULTRA LOW NOx INSTALLATIONS

3x **BLU 4000 FGR**
mounted on 3x 4 TPH steam boiler units

3x **BLU 3000 FGR**
mounted on 3x 1,4 MW hot water boiler units

2x **BLU 6000 FGR**
mounted on 2x 4,2 MW hot water boiler units

4x **BLU 4000 FGR**
mounted on 4x 2,8 MW hot water boiler units

2x **BLU 4000 FGR**
mounted on 2x 2,8 MW hot water boiler units

2x **BLU 4000 FGR** on 2x 2,8 MW hot water boilers
1x **BLU 2000 FGR** on a 1,4 MW hot water boiler

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