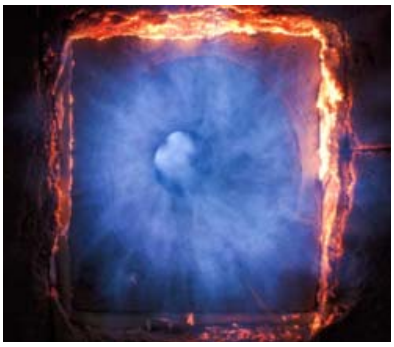
ESA Pyronics International R&D test center

A new frontier for the Research and Development combustion tecnologies

ESA Pyronics International has, over the years, acquired a reputation on a worldwide level for the manufacturing quality of its products. All this is the result of more than thirty years of experience in industrial combustion plants.

Upon reaching these results, no company can work professionally without dedicating an area to research and development. The R&D department must respond in adequate manner and time to every new expectation that the market demands.



ESA Pyronics International had its own Research and Development structure since 1992 on the company's premises in Curno (BG - Italy). It supplies fundamental support for the developing of new products as well as a continuous improvement of the standard product range.

It is also the area where our technical staff are constantly gaining experience and competence. The R&D department is essential to show our clients how the products that will then be installed on an actual plant, function.

Research & Development

During the first few months of 2010, following a choice made by the company, the R&D department was expanded and concentrated in one single area of about 1000 m sq including a strorehouse.
It was also decided to equip ourselves with a new furnace to test high capacity burners up to 4 MW. This new testing furnace has been operating since December 2010.
Up 'till today, the R&D center in Curno is equipped with furnaces that are used for combustion tests, efficiency and consumption monitoring, analysis of combustion products: All the activities are registered and documented by drawing up data sheets supported by photographs and films.

Furnaces	Capacity
• F1:	2 MW
• F2:	100 kW
• F3:	500 kW
• F4:	200 kW
• F5:	400 kW
• F6:	60 kW
• F7:	4 MW
• F8:	150kW

A view of the new ESA Pyronics International R&D Test Center in Curno (Bergamo) - Italy

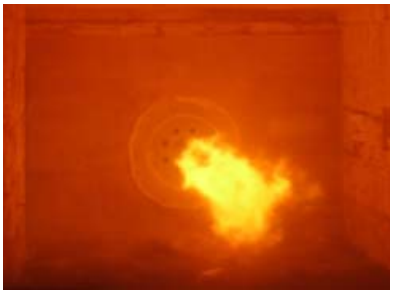
ESA Pyronics International R&D test center

Fixed test furnace F1 and air heater

The furnace is used for long flame burners or for roof radiant burners up to a maximum power of 2MW, fed by natural gas, LPG, different gases (COG, BFG) or diesel oil. It is equipped with n. 2 cooled inspection windows.

Characteristics

- Chamber size: 6200 x 2200 x 1600H.



- N°1 frontal fitting for burner Ø780 with max air inlet ND350 (2MW max).
- N°1 roof fitting for burner Ø500 with max air inlet ND150 (500kW max).
- N°1 roof fitting for burner Ø600 with max air inlet ND150 (1000kW max).
- Max furnace temperature 1300°C.
- Max preheated air temperature 550°C.
- Tubular bundle type air exchanger and radiant tube exchanger
- Max air flow Qmax=2000Nm3/h @500°C.
- SIEMENS ULTRAMAT 23 fixed fume analyzer (O2, CO e NO/NOx).
- Fuel gas and air flow measurements via calibrated POP-U-S flanges (see data sheet E5719).
- N°6 "S" series thermocouples (4 on side wall and 2 on roof).
- Automatic chamber pressure control.

Furnace F1

- Maximum capacity applied on furnace: 2 MW
- Application: Long flame fuel oil or gas burner Tmax=1300°C

Air heater

- Maximum capacity applied on furnace: 2 x 150 kW
- Application: Air preheated up to 500°C, Qmax=2000Nm3/h @500°C

A view of the fixed test furnace F1 and air heater in Curno (Bergamo) - Italy

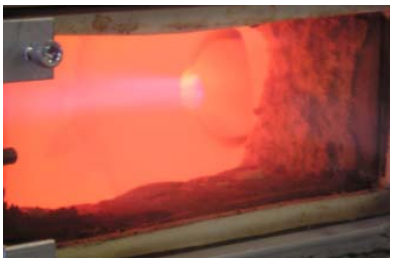
ESA Pyronics International R&D test center

Mobile test furnace F2

The furnace is used to test medium high velocity low power burners (up to 100kW), self recuperative burners or straight radiant tube burners up to Ø200 and lg.2500. It is equipped with n. 5 cooled inspection windows.

Characteristics

- Chamber size: 2800 x 600 x 400H
- N°1 frontal fitting for burner Ø250 with max air inlet ND65 (100kW max).
- Max. furnace temperature 1150°C.
- Max. air flow Qmax=120Nm3/h @500°C with external heater.
- TESTO 330/335/340 series portabile fume analyzer (O2, CO e NO/NOx).
- Fuel gas and air flow measurements via calibrated POP-U-S flanges (see data sheet E5719).
- N°1 "S" series thermocouple for thermoregulation.



Furnace F2

- Maximum capacity applied on furnace: 100 kW
- Application: Medium/high velocity burners, straight radiant tubes. Tmax=1150°C

Mobile test furnace F2 and a view of the flame.

ESA Pyronics International R&D test center

Fixed test furnace F3

The furnace is intended for demonstration purposes, for flame shape and length analysis.
It is used to test medium/high velocity burners with medium powers (up to 500kW), fed by natural gas, LPG, different gases (COG, BFG) or diesel oil.
It is provided with n. 10 inspection windows.

Characteristics

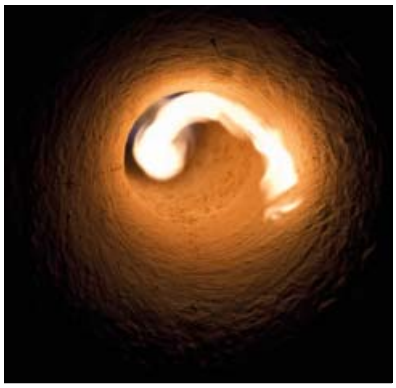
- Chamber size:
  3000 x 1600 x 1400H
- N°4 frontal fittings for burner Ø250 with max air inlet ND150 (600kW max).
- N°3 side fittings for burner Ø80 with max air inlet ND50 (100kW max).
- Maximum furnace temperature 600°C.

- Maximum air flow Qmax=700Nm3/h @30°C.
- Fuel gas and air flow measurements via calibrated POP-U-S flanges (see data sheet E5719).

Furnace F3

- Maximum capacity applied on furnace:
  500 kW

- Application:
  Medium/high velocity gas or fuel oil burners.
  Tmax=600°C



Fixed test furnace F3

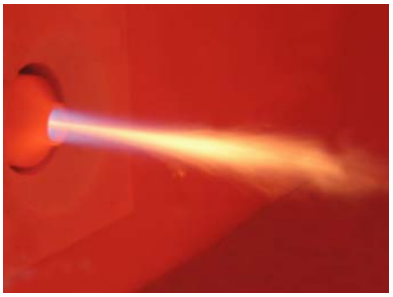
ESA Pyronics International R&D test center

Mobile test furnace F4

The furnace is used to test medium/high velocity burners having low/medium power (up to 200kW), self recuperative burners or for burners with M and 2P radiant tubes.
It is equipped with n. 2 cooled inspection windows.

Characteristics

- Chamber size: 1800 x 1400 x 800H
- N°1 frontal fitting for burners Ø300 with max air inlet ND100 (200kW max).
- N°1 side fitting for M/2P radiant tubes (200kW max).
- Maximum furnace temperature 1250°C.
- Maximum air flow Qmax=250Nm3/h @450°C with external heater.
- TESTO 330/335/340 series portable fume analyzer (O2, CO e NO/NOx).
- Fuel gas and air flow measurements via calibrated POP-U-S flanges (see data sheet E5719).
- N°1 "S" series thermocouple for thermoregulation.



Furnace F4

- Maximum capacity applied on furnace: 200 kW
- Application: Medium/high velocity burners with U/M/P/2P radiant tubes. Tmax=1250°C

Mobile test furnace F4

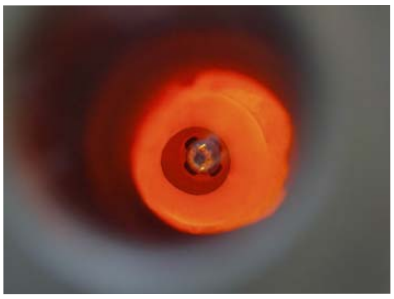
ESA Pyronics International R&D test center

Fixed test furnace F5

The furnace is used to test medium/high velocity burners having low/medium power (up to 500kW), self recupative burners or M and 2P radiant tube burners, roof radiant burners.
It has n. 1 cooled inspection window.

Characteristics

- Chamber size: 2400 x 1600 x 1600H
- N°1 frontal fitting for burners Ø250 with max air inlet ND150 (500kW max).
- N°1 roof fitting for burners Ø500 with max air inlet ND150 (500kW max).
- Maximum furnace temperature 1250°C.
- Maximum air flow Qmax=600Nm3/h @450°C with external heater.
- TESTO 330/335/340 series portable fume analyzer (O2, CO e NO/NOx).
- Fuel gas and air flow measurements via calibrated POP-U-S flanges (see data sheet E5719).



- N°1 “S” series thermocouple for thermoregulation + n°4 “S” thermocouples for flame temperature measurement.

Furnace F5

- Maximum capacity applied on furnace: 400 kW
- Application: Medium/high velocity burners and roof radiant burners. Tmax=1300°C

Fixed test furnace F5

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Mobile test furnace F6

The furnace is used to test medium/high velocity low power burners (up to 60kW), self recuperative burners or straight radiant tube up to Ø200 e lg.2200. It is equipped with n. 3 cooled inspection windows.

Characteristics

- Chamber size: 2400 x 300 x 300H
- N°1 frontal fitting for burners Ø150 with max air inlet ND50 (60kW max).
- Maximum furnace temperature 1000°C.
- Maximum air flow Qmax=70Nm3/h @500°C with external heater.
- TESTO 330/335/340 series portable fume analyzer (O2, CO e NO/NOx).
- Fuel gas and air flow measurements via calibrated POP-U-S flanges (see data sheet E5719).
- N°1 "K" thermocouple for thermoregulation.

Furnace F6

- Maximum capacity applied on furnace: 60 kW
- Application: Medium/high velocity burners, straight radiant tubes. Tmax=1000°C

Mobile test furnace F6

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Fixed test furnace F7

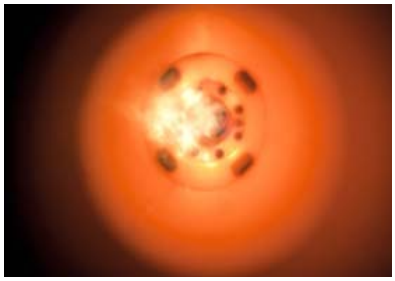
The furnace is used to test long flame or roof radiant flame burners with a maximum power of 4MW, fed by natural gas, LPG, different gases (COG, BFG) or diesel oil. It is equipped with n. 6 cooled inspection windows.

Characteristics

- Chamber size: 8000 x 2200 x 2000H
- N°1 frontal fitting for burners Ø950 with max air inlet ND400 (4MW max).
- N°1 roof fitting for burners Ø600 with max air inlet ND200 (1000kW max).
- Maximum furnace temperature 1300°C.
- Maximum preheated air temperature 500°C.
- Air exchanger with n°40 radiant tubes.
- N°12 water cooling tubes with evaporation towers having maximum absorption of 1200kW.
- Max. air flow Qmax=4000Nm3/h @500°C.
- TESTO 350XL series portable fume analyzer (O2, CO,NO/NOx e SO2).
- Fuel gas and air flow measurements via calibrated POP-U-S flanges (see data sheet E5719).
- N°6 “S” series thermocouples (4 onside wall and 2 on roof).
- Fixed supervision television camera.
- Automatic chamber pressure control.
- Mobile front wall mounted on rails. Possibility of having different burner fittings by replacing the front wall of the furnace.

Furnace F7

- Maximum capacity applied on furnace: 4 MW
- Application: Long flame gas or fuel oil burners. Tmax=1300°C



Fixed test furnace F7

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Mobile air heater F8

The furnace is used to preheat combustion air up to 500°C and is mobile so it can be used near furnaces that use burners with preheated air.

Characteristics

- Maximum furnace power P=150kW
- Maximum furnace temperature 900°C.
- Maximum air flow Qmax=600Nm3/h @400°C. Qmax=400Nm3/h @500°C.
- N°1 “K” series thermocouple for air thermoregulation + n°1 “K” series thermocouple for chamber thermoregulation.

Air heater F8

- Maximum capacity applied on furnace: 150kW
- Application: Preheated air up to 450°C, Qmax=500Nm3/@450°C

Mobile air heater F8

ESA Pyronics International R&D test center

Furnace control systems

The F1 and F7 furnaces have been respectively equipped with a Eurotherm and Rockwell system, which allows to manage and control the following processes:

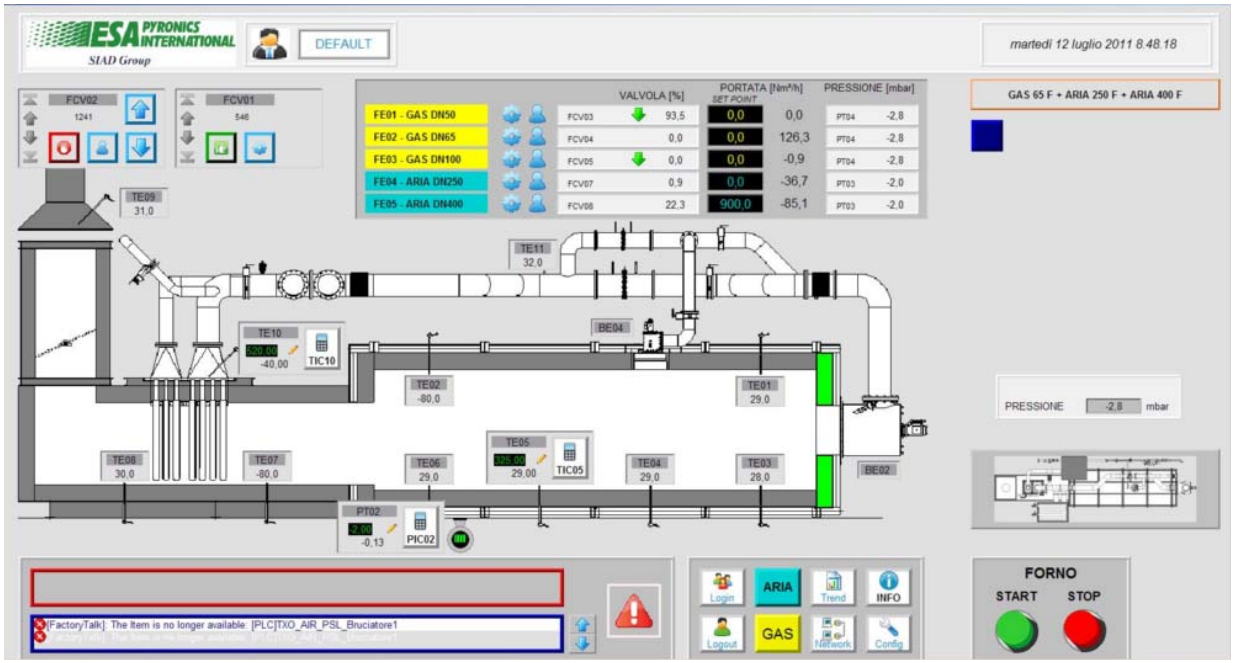
- Air and gas ratio
- Furnace temperature
- Burner flame
- Analysis of exhaust emissions
- Testing reports

The systems are interfaced in Ethernet also with:

- Video cameras for high temperature to film and frame flame formation.
- ESA ESTRO flame control device for burner supervision

The flame control ESA ESTRO

The electrical panel with a view on the PLC control system software.



The control system software in action.

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We regularly update our data, for updated data please visit our web site www.esapyronics.com

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