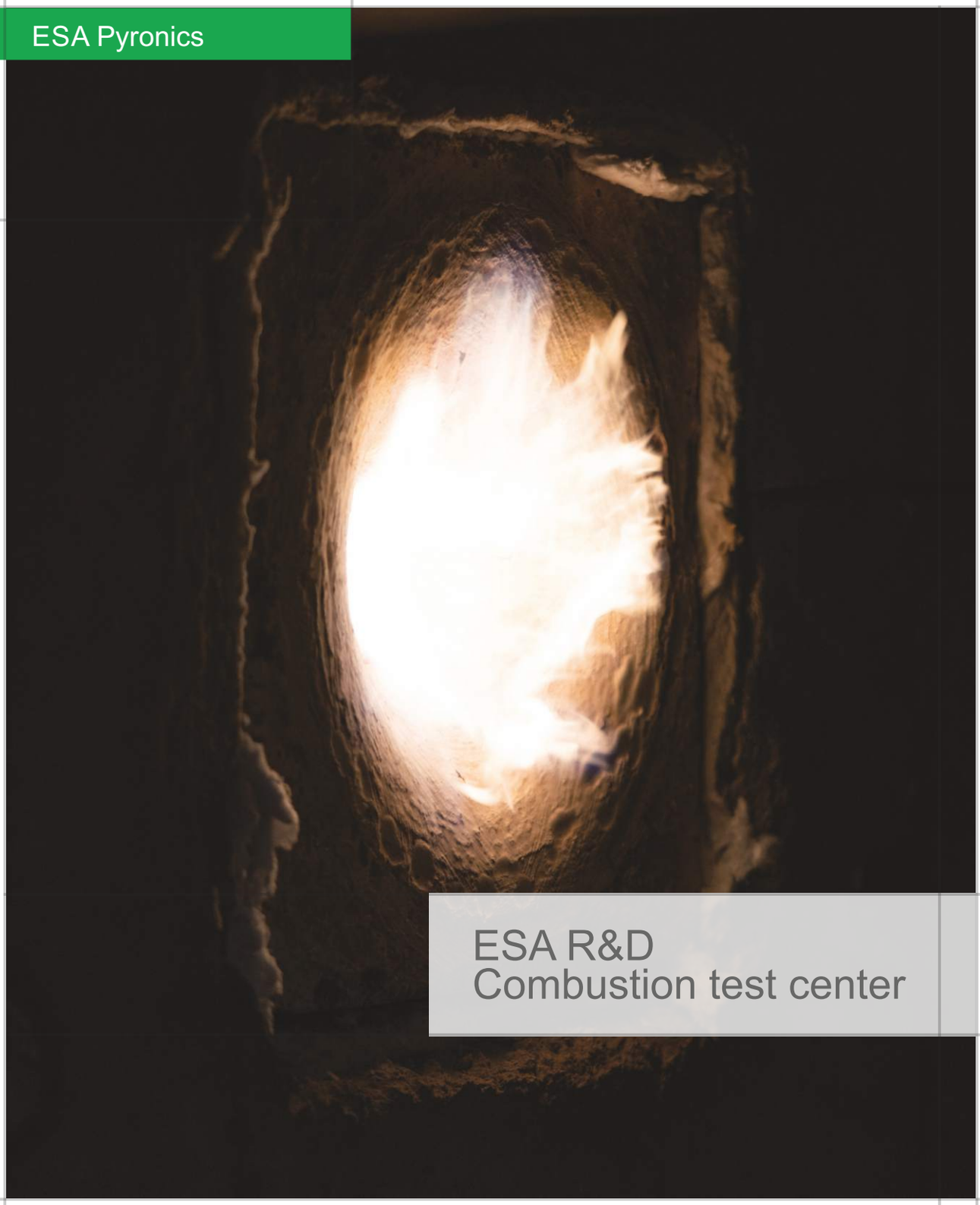
ESA PYRONICS INTERNATIONAL
SIAD Group

ESA Pyronics



ESA R&D
Combustion test center

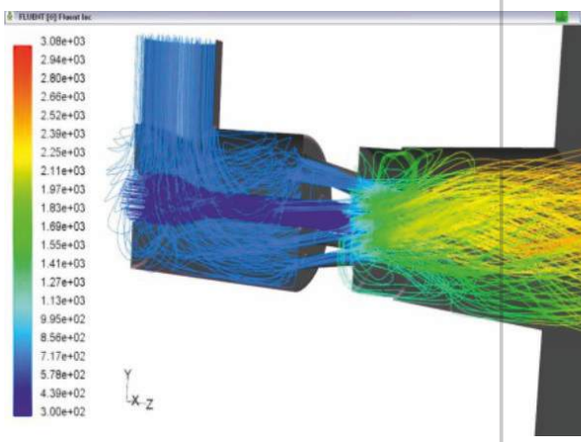
Combustion test center and R&D

European biggest R&D combustion center

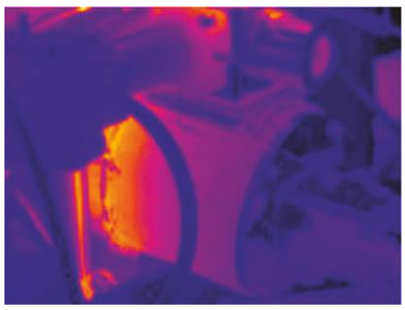
- 7 test furnaces up to 4MW and preheated air up to 550°C.
- ANSYS FLUENT® CFD software.
- Exhaust analyzers with data recording.
- New 1000 Nm^3/h of Hydrogen and LCV fuel gas tank and decompression station.
- Available fuels: NG pipeline, Liquid oxygen tank with evaporator, LPG, H_2 & N_2 gas bottles, light and heavy oil tanks with preheater.
- Customized mixes supplied by SIAD Group gas laboratory.

R&D focus

- **CO_2 emissions control** INDIRECTLY through energy efficiency (oxy-fuel and heat recovery with recuperators and regenerators). DIRECTLY through hydrogen and hydro-methane technologies and use of LCV fuels.
- **NOx emission control** diluted combustion, flameless combustion and FGR.
- **Burner & flame design** according to customer and process requirements.
- **Safety** Flame ignition & detection, proprietary test equipment.



Burner flame CFD analysis



REKO-NxT thermic image

ESA R&D Combustion Test Center

Fixed test furnace 4MW

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

Features

- Chamber size: 6000x2200x2000H
- No.1 front connection for burners Ø950 with max air inlet DN400 (4MW max).
- No.1 roof connection for burners Ø600 with max air inlet DN200 (1000kW max).
- Max furnace temperature 1300°C.
- Max preheated air temperature 600°C with extra air preheater and recuperator with 40 radiant tubes.
- No.12 water cooling pipes with evaporative towers for a maximum absorption of 1200kW.
- Max air flow Qmax=4000Nm^3/h@500°C.
- Portable emissions analyzer (O2, CO, NO/NOx and SO2).
- Air and fuel gas flow measurements using POP-U-S calibrated flanges (see bulletin E5719).
- No.6 “S” series thermocouples (4 on the side wall and 2 on the roof).
- Fixed supervision camera.
- Automatic chamber pressure control.
- Removable front panel, mounted on rail. Possibility of having different burner connections by replacing the front wall of the furnace.

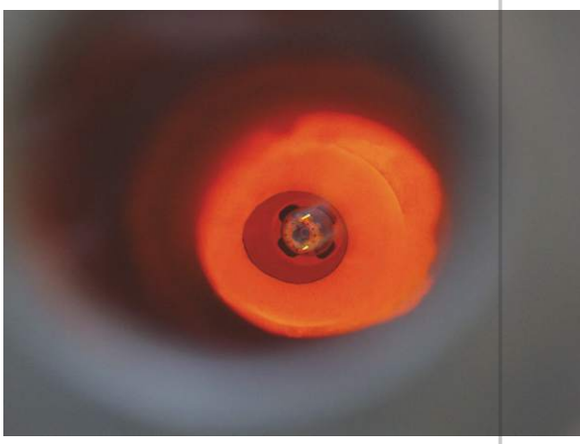
Fixed test furnace

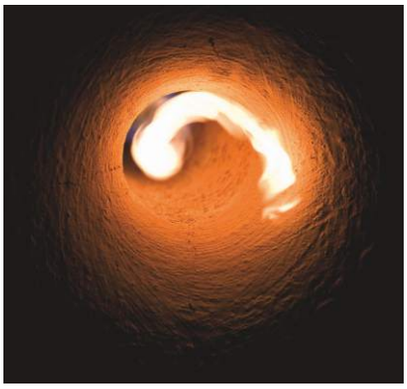
Fixed test furnace 500 kW

The furnace has a demonstration function, for the analysis of the shape and length of the flame. It is used for the test of medium/high speed burners of medium power (up to 500kW), fueled by natural gas, LPG, various gases (COG, BFG) or diesel oil. It is equipped with 10 inspection windows.

Features

- Chamber size: 3000x1600x1400H
- No.4 front connection for burners Ø250 with max air inlet DN150 (600kW max).
- No.3 lateral connections for burners Ø80 with max air inlet DN50 (100kW max).
- Max furnace temperature 600°C.
- Max air flow Qmax=600Nm^3/h@30°C.
- Air and fuel gas flow measurements using POP-U-S calibrated flanges (see bulletin E5719).





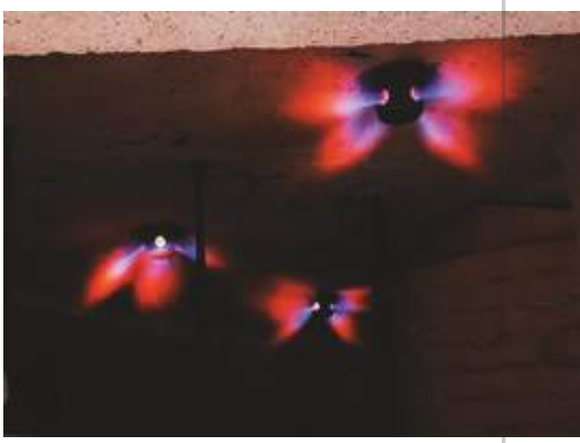
Fixed test furnace

Fixed test furnace 500 kW

The furnace is used to test medium/high speed burners of medium power (up to 500kW), self-recuperative burners or burners for M and 2P radiant tubes up to 200kW.
It is equipped with 4 cooled inspection windows.

Features

- Chamber size: 2500x2500x1800H
- No.1 front connection for burners Ø320 with max air inlet DN150 (500kW max).
- No.1 roof connection for burners Ø600 with max air inlet DN150 (500kW max).
- Two side connections 1350x450 for M radiant tubes.
- Max furnace temperature 1250°C.
- Max air flow Qmax=600Nm^3/h @450°C with external heater.
- Portable emissions analyzer (O2, CO and NO/NOx).
- Air and fuel gas flow measurements using
- POP-U-S calibrated flanges (see bulletin E5719).



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

Fixed test furnace

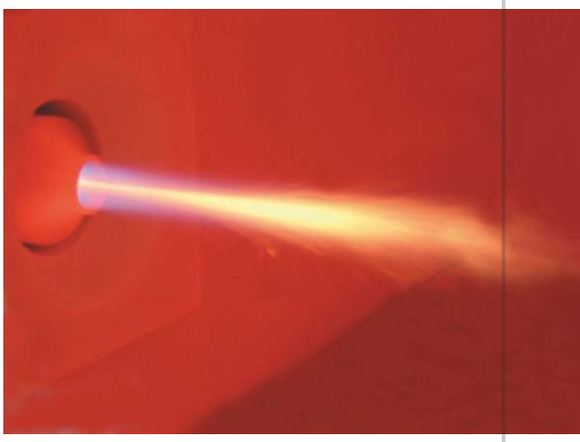
Mobile test furnace 200kW

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

Features

- Chamber size: 1800x1400x800H
- No.1 front connection for burners Ø300 with max air inlet DN100 (200kW max).
- No.1 lateral connection for M/2P radiant tubes (200kW max).

- Max furnace temperature 1250°C.
- Max air flow Qmax=250Nm^3/h@450°C with external heater.
- Portable emissions analyzer (O2, CO and NO/NOx).
- Air and fuel gas flow measurements using POP-U-S calibrated flanges (see bulletin E5719).
- No.1 “S” series thermocouple for thermoregulation.



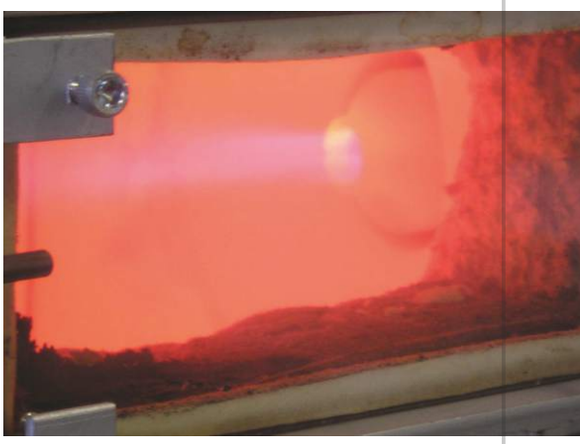
Mobile test furnace

Mobile test furnace 100kW

The furnace is used for the test of medium / high speed burners of low power (up to 100kW), self-recuperative burners or burners for unifilar radiant tubes up to Ø200 and lg. 2500. It is equipped with 5 cooled inspection windows.

Features

- Chamber size: 2800x600x400H
- No.1 front connection for burners Ø250 with max air inlet DN65 (100kW max).
- Max furnace temperature 1150°C.
- Max air flow Qmax=2000Nm^3/h@500°C with external heater.
- Portable emissions analyzer (O2, CO and NO/NO2/NOx,SOx).
- Air and fuel gas flow measurements using POP-U-S calibrated flanges (see bulletin E5719).
- No.1 “S” series thermocouple for thermoregulation.



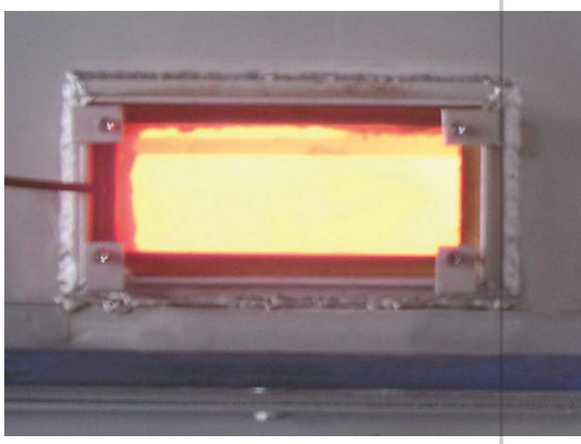
Mobile test furnace

Mobile test furnace 60kW

The furnace is used for the test of medium/high speed burners of low power (up to 60kW), self-recuperative burners or burners for straight radiant tubes up to Ø200 and lg. 2200.
It is equipped with 3 cooled inspection windows

Features

- Chamber size: 2400x300x300H
- N°1 front connection for burners Ø150 with max air inlet DN50 (60kW max).
- Max furnace temperature 1000°C.
- Max air flow Qmax=70Nm^3/h@500°C with external heater.
- Portable emissions analyzer (O2, CO and NO/NOx).
- Air and fuel gas flow measurements using POP-U-S calibrated flanges (see bulletin E5719).



- N ° 1 “K” series thermocouple for thermoregulation.

Mobile test furnace

Portable heater 150 kW / Other test facilities

The furnace is used to preheat the combustion air up to 550°C and can be moved to be used closed to furnaces that use burners with preheated air.

Features

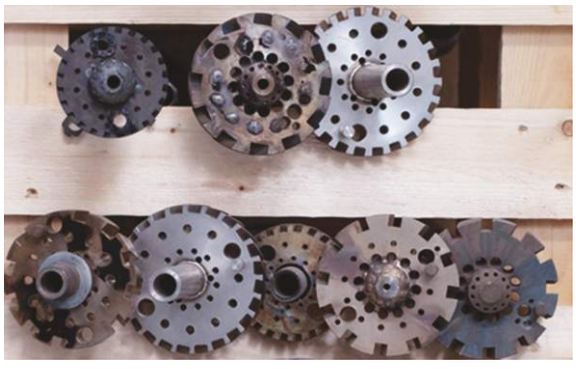
- Maximum furnace power P=150kW
- Max furnace temperature 900°C.
- Max air flow Qmax=600Nm^3/h@400°C.
- No.1 “K” series thermocouple for air thermoregulation + No.1 “K” series thermocouple for chamber thermoregulation.

Portable heater

Test facilities

Skid for various power burners

Ribbon burners test skid



Special fuels feeding facilities

ATEX compliant hydrogen supply and reduction line for packaged cylinders at 200 BAR

Tanks for heavy and light liquid (bio)fuels

Oxygen tank with evaporator

Besides medium pressure NG supply line, ESA boasts various gases supply facilities. Any gas, like CO, CO2, Hydrocarbures… or special mixes (COG, BFG…) are supplied in cylinders by SIAD gas laboratory.

SIAD credited gas laboratory provide us cylinders of any gas.

Radiant tubes

Radiant tubes of various kind are always available for tests with cold air burners with plugin recuperators or self recuperative burners.

Radiant tube type M

Radiant tube type I

Radiant tube type P

Control systems and data acquisition

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

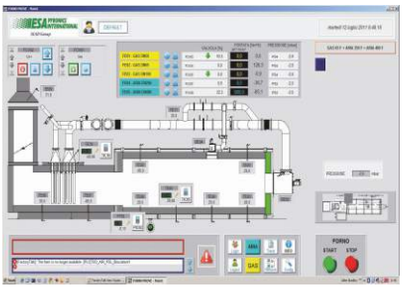
- Air and gas ratio
- Furnace temperature
- Burner flame
- Analysis of exhaust emissions
- Testing reports

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.



Control furnace software

Emission analyzer

The ESA Pyronics group

ESA S.p.A.
Via Fermi 40,
I-24035 CURNO (BG) - ITALY
Tel: +39 035 6227411 - Fax: +39 035 6227499
www.esapyronics.com - esa@esacombustion.it
GPS: N 45 41.162 - E 9 37.264

ESA Belgium
Zoning industriel, 4ème rue,
B-6040 JUMET - BELGIUM
Tel: +32 71 256970 - Fax: +32 71 256979
www.esapyronics.com - sales@pyronics.be
GPS: N 50 27 27.90 - E 4 27 07.97

ESA Manufacturing Pvt. Ltd.
Plot No. J - 17, MIDC, Bhosari
IN-411 026 PUNE - INDIA
Tel: +91 (020) 68197001
www.esapyronics.com - esaindia@esapyronics.com
GPS: N 18 38.41 - E 73 49.60

ESA PYRONICS INTERNATIONAL
SIAD Group

Printed in Italy
CATenR02/22 RD

www.esapyronics.com

ESA S.p.A.
I-24035 CURNO (BG) Italy - Via Fermi, 40
Fiscal Nr.: 03428410157 - VAT Nr.:
(IT)00793030164
Share Capital euro 1.000.000,00 paid up
N: 03428410157 Reg. delle Imprese di Bergamo

Tel: +39 035 6227411
Fax: +39 035 6227499

www.esapyronics.com - esa@esacombustion.it