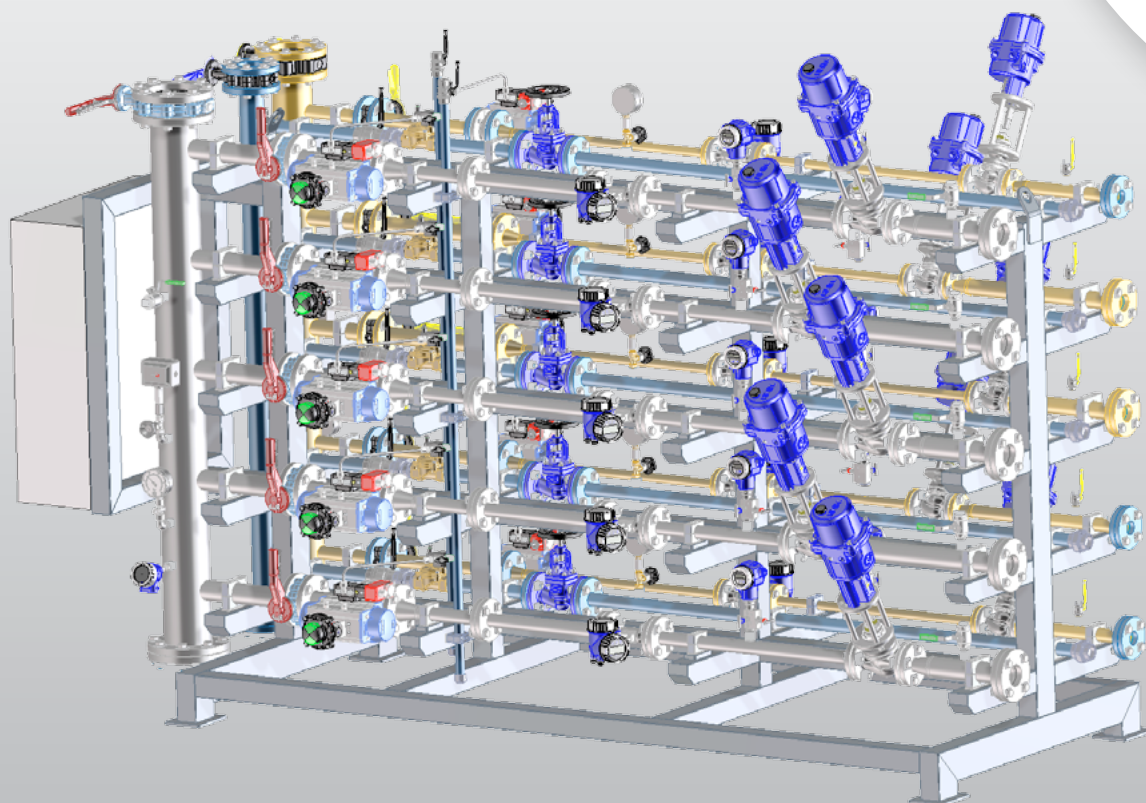




SOLUTIONS FOR THE GLASS INDUSTRY

OXY - GAS COMBUSTION SYSTEM





COMBUSTION SYSTEM CONFIGURATION

Oxy-fuel combustion systems are now a practical and well tested application for use in glass melting furnaces

Glass Service has developed the technology and have supplied a number of complete oxy-fuel combustion systems to glass manufacturers.

The oxy-fuel combustion technology can be used for special glasses as well as for standard soda lime glass with several advantages:

- Reduced of energy consumption
- Increased glass pull



- Reduction of spares required for the furnace
- Reduced pollution
- Reduced NOx
- Reduction of carryover from the raw materials
- Easy to achieve the high temperatures required for special glasses, such as borosilicate glasses, etc.
- Lower capital investment compared to regenerative or recuperative furnaces as no regenerators or metal recuperators are required
- Lower investment in refractory materials and lower refractory installation cost
- Continuous firing (compared with regenerative furnace)
- Easy control and adjustment of the temperature profile along the furnace longitudinal axis

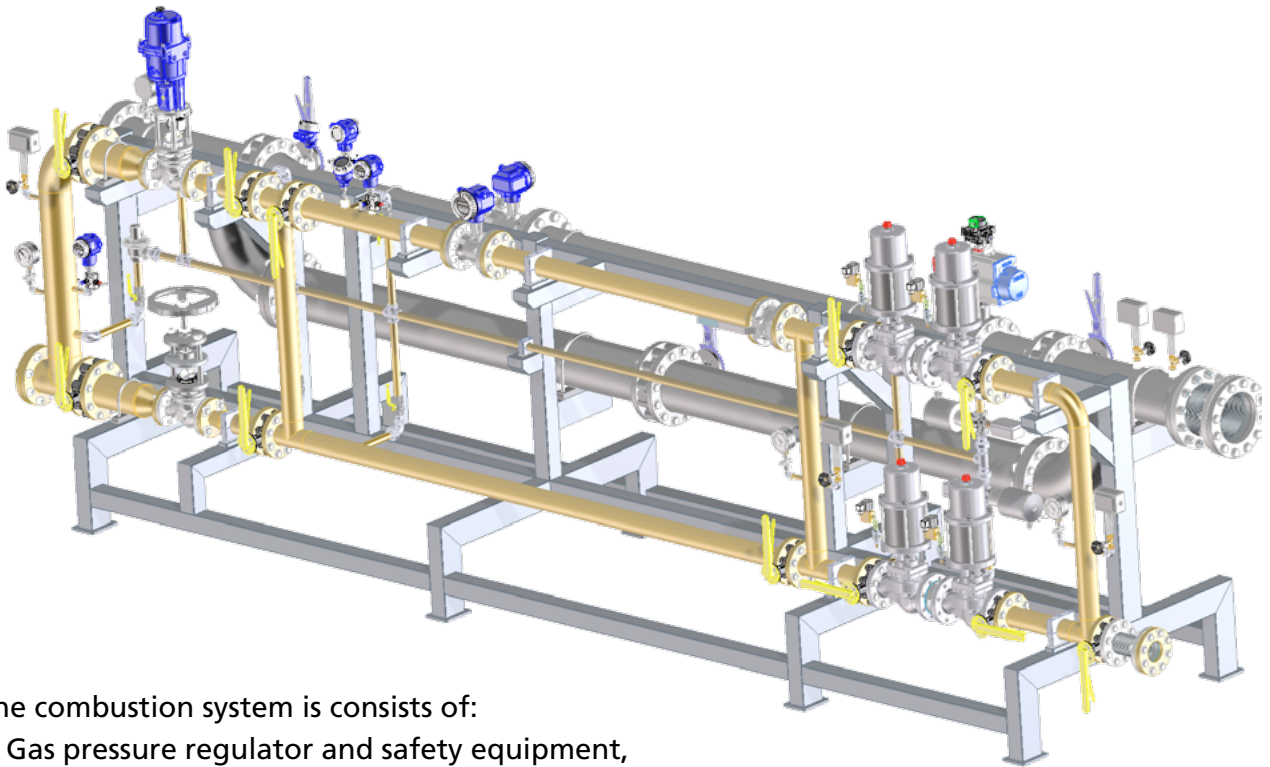
Glass Service combustion systems can operate with several oxygen sources:

- Cryogenic liquid tank
- VPSA producers
- VSA producers

Glass Service oxygen skid can operate either at high pressure or low pressure input (VPSA and VSA) for instance, 500mbar.



- Reduction of energy consumptions
- Reduction of the space required
- Pollution reduction
- NOx reduction
- Appropriate solution for special glasses (borosilicate glasses, fibre glasses, etc.)

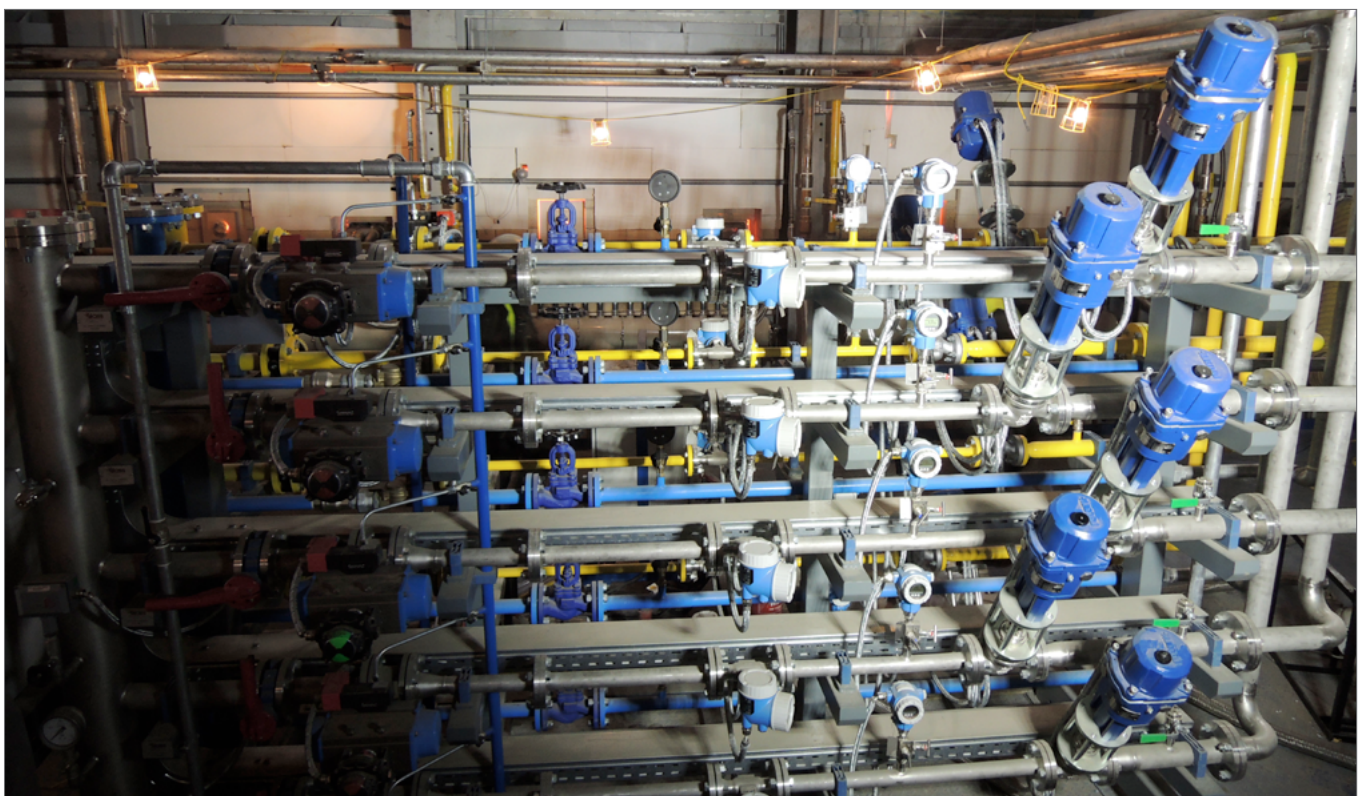


The combustion system is consists of:

- Gas pressure regulator and safety equipment, (safety shut off valves, pressure switch, etc.)
- Oxygen pressure regulator and safety equipment (safety shut off valves, pressure switch, etc.)
- Gas and oxygen flow control for each burner
- Compressed air burner cooling
- Burners
- Control system

The gas and oxygen flow control must be very accurate and **Glass Service** have developed a high precision flow control system using Vortex instruments to controls the oxygen and gas flows.

The system takes into consideration variations in the temperature and pressure and compensates for variations at each burner.





Glass Service design and supply oxy fuel burners for low pressure gas and oxygen and for low and high flow rates.

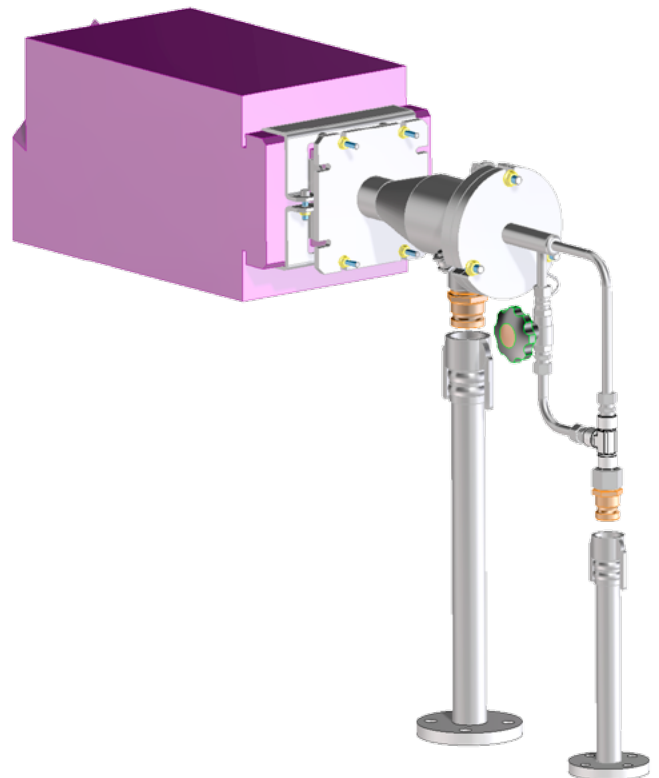
The burners are designed to produce different flame patterns according to the application. For example, cylindrical flames for low flow rates (special glasses), or flat flames for larger flow rates such as container furnaces.

All **Glass Service** burner designs have low momentum flames without any peak temperature. This special design feature for glass melting furnaces avoids localised high temperatures on the furnace crown and the potential to create rat holes.

The burner radiation is concentrated in the visible spectrum range improving the radiated energy transmission to the melted glass and the furnace efficiency.

Burners have the following characteristics:

- Low flame momentum
- High flame radiation in the visible spectrum (500-2000 nanometres)
- Stepless regulation of the flame length to give the correct flame length to suit the furnace
- Easy removal for maintenance
- Compressed air cooling for burner shut off
- Easy removing cam lock pipe connection



- Cylindrical or flat flame available
- High temperature operation
- Low momentum burners
- High flame radiation in visible spectrum
- Stepless external regulation of the flame length
- Easy removal of burners for maintenance

CYLINDRICAL BURNERS

Power	From 200 to 600 kW
Pressure input max flow natural gas	100mbar
Pressure input max flow oxygen	100mbar
Regulation flame length	From 0,5 to 2 m
Natural gas/oxygen ratio	From 2 to 3

FLAT FLAME BURNERS

Power	From 300 to 1300 kW
Pressure input max flow natural gas	100mbar
Pressure input max flow oxygen	100mbar
Regulation flame length	From 1 to 3 m
Natural gas/oxygen ratio	From 2 to 3





STANDARD REQUIREMENTS

The **Glass Service** combustion skids are designed and built according to the latest European standards



- EN 746-2
- EN 15001
- ATEX zone II if required



- SIL2 safety

Or GOST standard for Russian market



The equipment design and the materials used in the construction are in accordance with EU standards and best practise.

- Certified valves
- Certified gas pipework
- Certified gas fittings
- Certified welding and X-ray welding control for gas pipework
- Powder coating of pipework
- Certified gas sealing
- Certified leakage testing



CUSTOMERS WORLD WIDE

OCS-17-01-E



turn key project

batch plants

furnaces:

recuperative

regenerative

gas fired

oil fired

oxy-fuel fired

mixed fuel

electric

forehearth:

colouring forehearth

combustion systems

day tanks

mini melters

boosters

bubblers

metallic recuperators

batch chargers

stirring machines

glass level controls

frit dosing and transport

control cabinets

SCADA and DCS

cooling systems

robotics

gathering - 4 or 5 axis

services:

installation and supervision

commissioning

training

preheating

technology transfer

assistance

laboratory and analysis

refractory consulting

project financing



GLASS SERVICE s.r.l.

via Cascina Lari 56028 San Miniato (PI) ITALY

tel. +39 0571 4442

www.glassservice.it