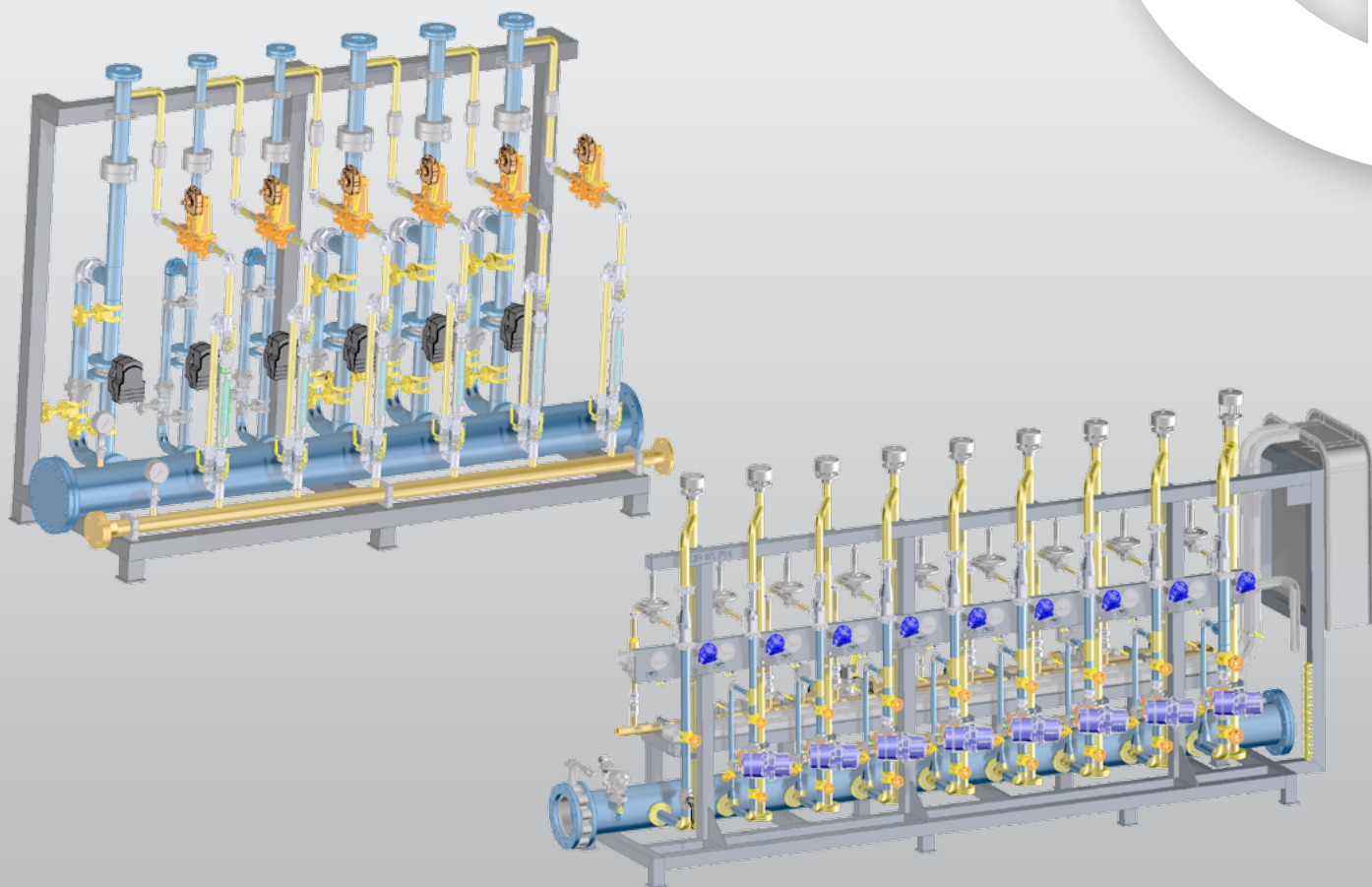




SOLUTIONS FOR THE GLASS INDUSTRY

FOREHEARTHS & DISTRIBUTORS COMBUSTION SYSTEM





GENERAL DESCRIPTION

An energy efficient forehearth and distributor combustion system is essential for consistent quality production in the glass industry.

Good control is essential, particularly in the case of special or coloured glasses (e.g. green, amber) where a stable redox condition in the forehearth superstructure is essential for good quality production.

The forehearth and distributor combustion system developed by **Glass Service** is the result of 22 years of experience supplying to the glass industry.

The system used is the premix gas/air type and can be used with natural gas or LPG.

The combustion system satisfies the demands of today's glass industry:

- Correct combustion ratio in the full range of flow (3 - 50 mbar manifold pressure)
- Linear flow valve control characteristic
- Stable ratio condition during burner pressure fluctuations
- Stable ratio conditions after a burner nozzle change or cleaning
- Easy and precise manual setting of the gas/air ratio for each zone
- Wide range of flows and sizes (from DN25 to DN100)



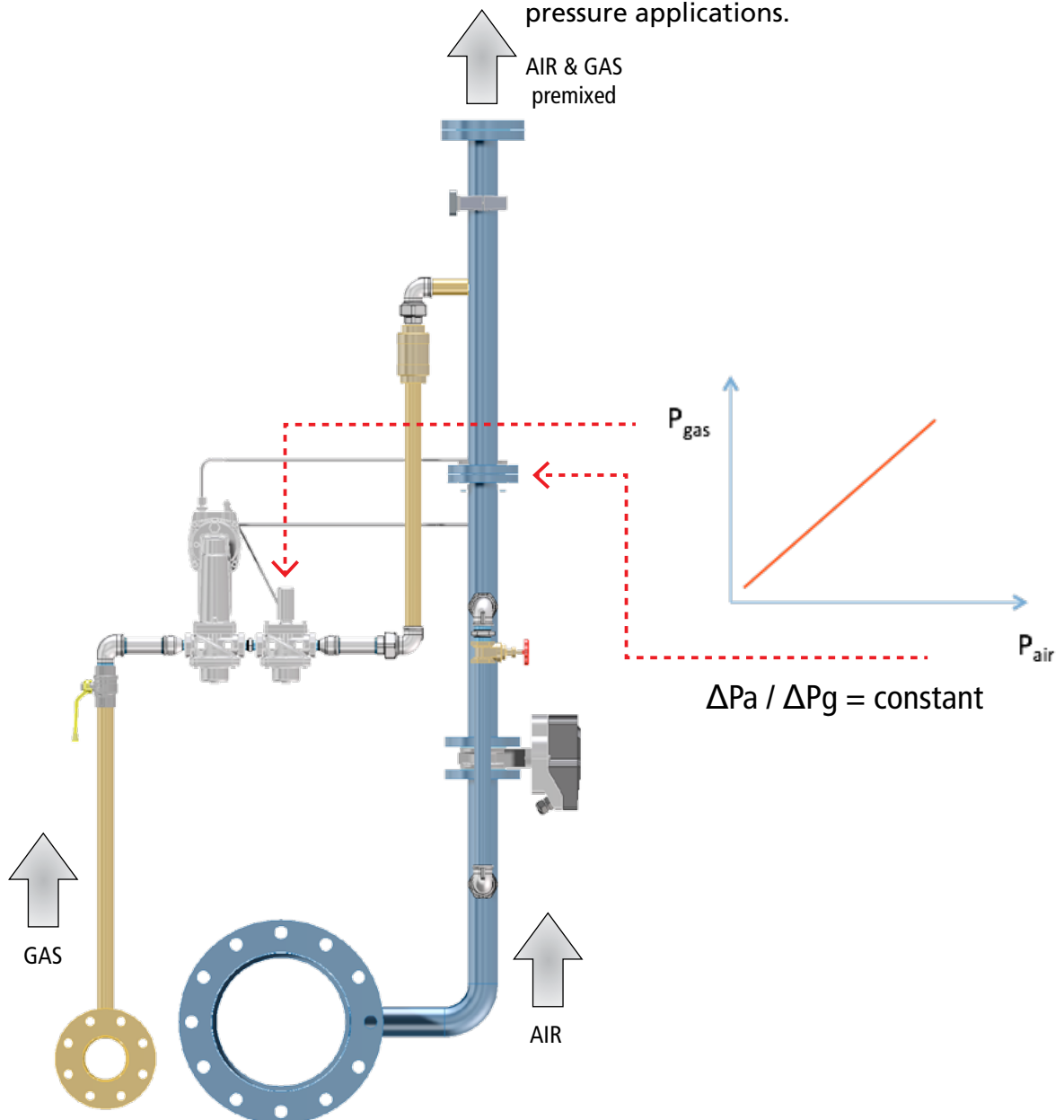
GADP COMBUSTION SYSTEM

The GADP combustion system is based on the constant ratio between the DP (differential pressure) at the air orifice plate and the gas regulation valve.

The GADP is not influenced by burner pressure fluctuations or by dirty or blocked burner nozzles.

The GADP technology is recommended for use in medium and high burner flow applications. In the case of high flows, a butterfly air valve can also be used.

The manifold pressure available using GADP is from 6 to 50 mbar and **Glass Service** is able to supply burner system for both low and high pressure applications.



- Special glass
- Table ware
- Colouring forehearth
- High ratio stability even when burners are dirty or blocked





STANDARD MIXER-ZERO GOVERNOR (ZGT)

The mixer Venturi and zero governor has been the common standard in the glass industry for many years and is used in all glass types including tableware, containers and special glasses.

That system is based on the constant gas/ air ratio at the burner.

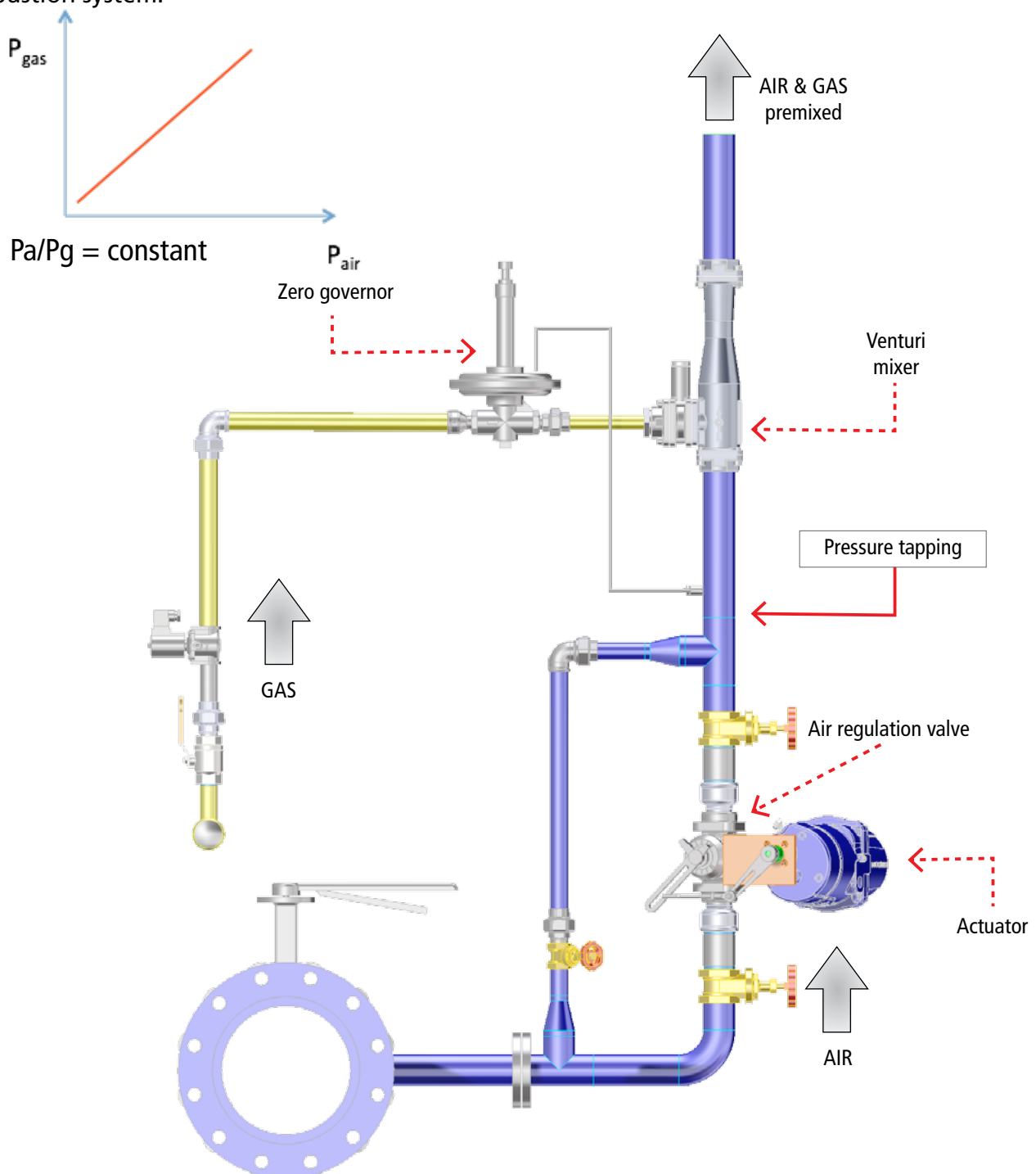
Glass Service has developed a new ZGT combustion system based on the traditional system but with a number of changes technically that improve the quality and performance of the combustion system.

The **Glass Service** solution increase the system performance and the stability of the gas/air ratio.

Glass Service use a specially designed air valve that can be adjusted to give the required maximum flow using a manually adjusted curtain.

The max air flow can be set zone by zone during installation to set the servomotor valve to the max value (100% opening).

The full stroke of the servomotor and valve increases the loop control stability.




The zero governor pressure tapping upstream of the Venturi mixer increases the gas/air ratio range and reduces the risk of gas leakage should the zero governor be damaged.

The pressure range using ZGT is from 3 to 50 mbar and **Glass Service** is able to supply both

low and high pressure burner systems.

Because of the stability across the full range and in particular at low pressure and low flow, this system is highly recommended for use in the container industry.



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- Linear air valve
 - Manual max air valve flow setting
 - High loop control stability
 - High ratio stable on full operating range
 - Pressure tapping upstream the mixer
 - Ratio independent control single zone
 - Recommended for container industries



The forehearth & distributor combustion skid designed by **Glass Service** are compact and easy to instal.

The combustion system is preassembled on the skid ready for installation, complete with all up to date equipment necessary for the best performance.

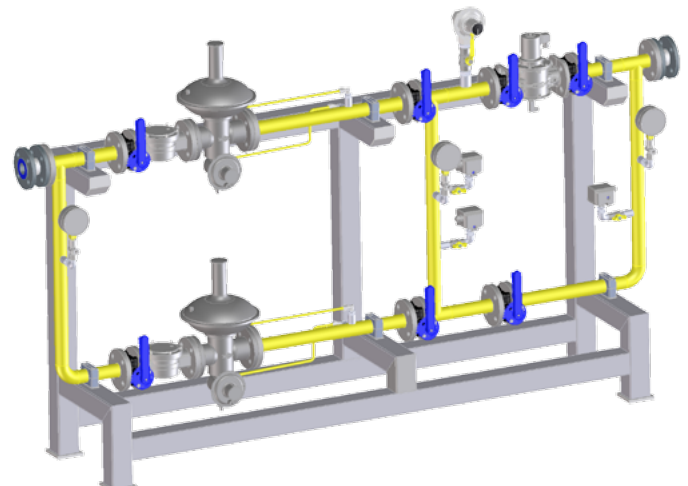
For each zone the required technology is installed (ZGT; GADP; OMN).

Other equipment are also installed for best performance.

- Pressure indicator for each zone
- Pressure transmitter for each zone
- Explosion relief valve for each zone
- Gas flow meter for each FH or Distributor
- Mix test analysis connection for each zone
- Air pressure switch
- Gas pressure switch
- Skid cabling and local junction box

Glass Service can also supply all of the combustion air fans skid mounted, with inverter drive for pressure stability, or direct drive.

Glass Service can also supply the gas governor redundancy skid.



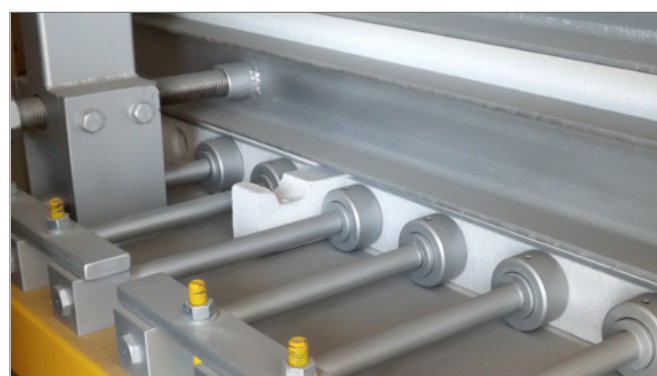
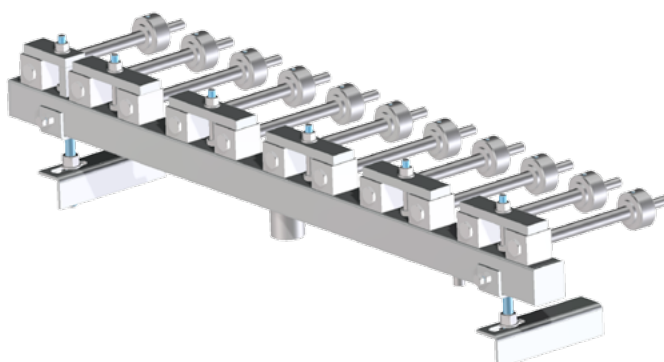


Glass Service developed the foreheart and distributor burner technology along with the necessary manifolds and mountings for the forehearth casing.

The burners are totally sealed to the refractories.

The burner nozzle are available in several sizes as standard production, with different nozzle diameter available on request.

1/4 inches	6,3 mm
3/8 inches	9,5 mm
9/32 inches	7,1 mm
5/16 inches	7,9 mm



The burners are manufactured in special high temperature resistant steel.

The burners are supplied complete with manifolds and he brackets that allow 3 directional movement for better installation and adjustment after heat-up.

Each manifold is supplied with long flexible connection and manual shut off valve for burner maintenance.



STANDARD REQUIREMENTS

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



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



PED
97/23/EC

Or GOST standard for Russian market



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

- 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

GCS-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



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