Every distributor and forehearth concept is a unique compromise between the customer’s requirements and the technical feasibility. The aim of our tailor-made design is to achieve glass characteristics which are almost perfectly aligned for further glass forming processes.

**GCS SERIES 100 DISTRIBUTORS**

**Design & Dimensions:**
- width from 500 mm up to 1.500 mm (> 1.300 mm with restricted entrance)
- length individually adapted to the available space and the amount of connected forehearths
- differentiated control sections for accurate temperature adjustment
- optimally calculated distances from the furnace centreline to each forehearth to minimise the risk of current short-circuiting and to optimise the forehearth entrance temperature
- higher superstructure at the entrance zone – crown execution
- different kind of refractory material
- restricted entrance to minimise glass level fluctuations

**Glass bath depth:**
- flint glass 600 mm up to 800 mm at the entrance area
- green and amber glass 450 mm up to 550 mm
- graded glass bath depth to obtain the optimal residence time for each forehearth

**Cooling systems:**
Several cooling systems are available which are individually adapted to each distributor’s design:
- radiation openings
- direct cooling system (left & right at the entrance zone)
- indirect cooling system (installed as top or bottom cooling)

**CORA** mixture heating system
- stable gas air ratio
- safety switch-off system
- fully automatic lambda control (optional)
- also used at each connected forehearth (GCS Series 200 & 300)

**Measurement and control system**
- fully automatic temperature control
- different types of measurements available for each zone (thermocouples & optical measurements)

**Features:**
- blind connection for the subsequent installation of an additional forehearth possible
- opening available for our glass level measurement “Optibeam”
- tailor-made for optimised glass conditioning
- different cooling systems are available

**Forehearths GCS Series 200**

The system with radiation and waste gas openings

**Design & Dimensions:**
- standard length from 14 – 50’; other lengths as well as Y-type also available
- standard glass depth of 6”
- the superstructure is designed to obtain the best possible effect from the combustion system onto the glass
- lowered central section creates flame turbulences for better heat-transmission to the outside glass
- modular construction system, to achieve optimum thermal homogeneity combined with minimum energy output
- used for low to medium tonnage

**Radiation and waste gas openings:**
- radiation openings are provided in the forehearth superstructure of the cooling zones
openings are sized according to the required cooling demand and located at the beginning of the zone
openings are used for the escape of waste gases and in the case of low forehearth pull

the heat radiation through the opening is variable by way of adjustment of the damper
all damper mechanisms operate with manually adjustable winches
if required, the damper mechanisms can be automatically controlled via PLC
bottom cooling works according to the same principle as top cooling
cooling channel is located under the channel blocks
cooling direction is against the glass flow
by default the channel is planned in the bottom refractories to have the opportunity to install a blower later on, if requirements might change.

Centerline bottom cooling:
bottom cooling works according to the same principle as top cooling
cooling channel is located under the channel blocks
cooling direction is against the glass flow
by default the channel is planned in the bottom refractories to allow for the installation of a blower at a later stage, should requirements change.

Cooling air:
amount of cooling air is controlled by a blower with butterfly flap and actuator
control receives a variable command from the temperature control loop of the heating zone

Forehearth GCS Series 300

Design & dimensions:

the GCS Series 300 is based on the GCS Series 200 with an additional forced cooling system in order to create more cooling capacity
this is needed if high tonnage loads as well as high tonnage differences are required at a forehearth
two centreline cooling methods available: One method is to cool the glass from the top, the other to cool the glass from the bottom via the channel blocks.

Centerline top cooling:

superstructure of the cooling zone is constructed with a channel in the centre above the glass surface, whereby cooling air provided by a fan can be blown through the channel
this channel stretches across approx. 75% of the length of the cooling zone
slots lead towards the glass surface under the cooling channel
these slots are separated from the channel by refractory plates
amount of cooling air is controlled by a blower with butterfly flap and actuator
the most effective way to cool the centreline is against the glass flow direction.

Features

- high flexibility regarding tonnage variations
- thermal homogeneity: for flint glass ≥ 99%, for amber glass ≥ 98% (incl. forehearth boosting)
- HORN drainage system “VARI-DRAIN”
- stirrer system
- forehearth boosting

Features

- HORN drainage system “VARI-DRAIN”
- stirrer system
- forehearth boosting
- fast and effective cooling with radiation flaps

Features

- high flexibility regarding tonnage variations
- thermal homogeneity: for flint glass ≥ 99%, for amber glass ≥ 98% (incl. forehearth boosting)
- HORN drainage system “VARI-DRAIN”
- stirrer system
- forehearth boosting
### General Information

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### Direct and Indirect Cooling

<table>
<thead>
<tr>
<th></th>
<th>GCS 100</th>
<th>GCS 200</th>
<th>GCS 300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct cooling</td>
<td>O</td>
<td>-</td>
<td>O</td>
</tr>
<tr>
<td>Indirect cooling</td>
<td>O</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Radiation and waste gas openings</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Key:**
- X: included
- O: available
- -: not included

### Steelwork
- Assembly of the forehearth follows conventional design
- Substructure refractories are enclosed in steel casings
- Superstructure is held together by bracing work

### Refractories
- Designed for today's technical requirements to achieve optimum thermal homogeneity combined with minimum energy requirement
- Channel blocks of zircon mullite, AZS or alumina material
- Channel block joints are backed up with zircon mullite split tiles and surrounded with suitable graded insulation material
- Specially shaped roof blocks in the superstructure ensure the best possible heating of the glass
- Forehearth superstructure in sillimanite material and backed up with suitably graded insulation material

### Temperature Measurement and Control System
- Temperature measurement effected over different available types of thermocouples
- Single loop controllers or PLC is used for the temperature control
- Metering and control instrumentation is housed in a control panel, which is supplied completely assembled and wired