# TABLE OF CONTENTS

**THE NEW SORG® 340S+ FOREHEARTH**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development</td>
<td>03</td>
</tr>
<tr>
<td>Facts and 340S® Achievements</td>
<td>04</td>
</tr>
</tbody>
</table>

**CHARACTERISTICS OF THE NEW SORG® 340S+ FOREHEARTH**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refractory Superstructure and Bracing</td>
<td>04</td>
</tr>
<tr>
<td>Cooling System</td>
<td>07</td>
</tr>
<tr>
<td>Gas Heating System</td>
<td>09</td>
</tr>
<tr>
<td>Control</td>
<td>10</td>
</tr>
</tbody>
</table>

**340S+ OPTIONS**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forehearth Top Electrodes</td>
<td>10</td>
</tr>
</tbody>
</table>

**WHY 340S+**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>
THE NEW SORG® 340S+ FOREHEARTH

DEVELOPMENT

For over 40 years, SORG has a global reputation as a reliable partner for forehearth systems. Over the past decades we have consistently improved the technology and set milestones in forehearth equipment. Examples include:

- incorporating the working end into the glass conditioning system
- developing the VMC heating system
- introducing the CONTI-DRAIN® drainage system for forehearths

In 2006, SORG acquired the Bucher Emhart Glass forehearth program including the 340 forehearth. Since then, more than 270 installations have been executed successfully.

In 2009, the 340 forehearth was improved and rebranded as the 340S®. This introduced a new generation of technology combining the advantages of the Emhart Glass forehearths together with the SORG’s. Additional equipment was refined and integrated into the 340S® system including provisions for:

- stirrers
- sidewall boosting
- OMT (Oxygen Metering Trim)
- CONTI-DRAIN®

SORG has been developing forehearth technology together with end users continuously for decades. This enables us to provide the solutions our customers need for successful production. Technological advances, reliability, lower service costs and lower total cost of ownership. These are key factors of SORG forehearth technology.

In order to keep pace with the higher requirements customers have regarding glass conditioning, SORG has now improved on the 340S® forehearth. Its successor is the new 340S+.
The proven 340S® forehearth serves as the basis for this exciting new product. All forehearth zones of the 340S+ can be delivered in the common widths of 36” to 60” – they have a modular design and are engineered using advanced 3D tools. One of the essential features of the original 340 forehearth was the unique dual cooling system, with a combination of direct and indirect air cooling. This has been retained – as well as the principle of the roof block design with three separate longitudinal sections. The design of the heating section also contributes to excellent thermal homogeneity – even for forehearths without electric boosting. Conventionally, most equalizing zones are six feet long. The 340S+ design for longer forehearths and higher tonnages offers equalizing zones eight feet long to meet increased requirements. In the equalizing zone there is only one baffle in the middle of the refractory superstructure which allows for optional separated left/right firing.
The design of the new one-piece superstructure not only shortens construction time, it also makes heating-up of the forehearth easier. The indirect waste gas channels at the side were retained as well as the central indirect chimney in the middle for waste gas and direct cooling air. The use of fibers in the superstructure insulation have been minimized and utilized in a targeted manner. The fibers used are nonhazardous (REACH decree (EG No. 1272/2008). The modified steel bracing shortens construction time as well. Each 340S+ refractory superstructure cover plate is individually fixed. The insulation is partially protected with sheet metal covering.

Practical experience led to easier forehearth height adjustment. Instead of many single height adjustments, it is now possible to adjust the forehearth height at only two points in the front.
COOLING SYSTEM

The cooling system of the 340S+ is a combination of indirect and direct air cooling. Primary cooling is achieved by indirect air cooling. The sealing of the cooling plates between the two systems is improved to prevent air infiltration from the indirect cooling systems into the firing chamber.

Principally the 340S+ was designed that indirect air cooling alone will be sufficient. A direct cooling system is foreseen in the refractory material and can be retrofitted on demand. This is enabled by combining it with the effective STW working end cooling which provides optimum forehearth entry conditions.

The largest modification from the 340S® to 340S+ regards the cooling air supply. In new 340S+ forehearths, the complete cooling air for all forehearth and working end zones, including possible bottom cooling will be served by only one fan – and not by two or even more fans as was previously the case. This fan is frequency controlled to ensure a stable cooling air supply at different forehearth loads. Cooling air is backed up by a second standby fan.

THE ADVANTAGES ARE:

- stable, controlled cooling air supply
- secured operation by standby fans
- only one fan for all cooling zones (less space requirements, fewer platforms)
- only one motor instead of many – i.e. less energy consumption
- reduced amount of maintenance by only one filter and one fan
- lower investment costs
- lower operating expenses
- less spare parts
- more flexibility regarding placement (clean cooling air)
GAS HEATING SYSTEM

We retained the proven VMC gas heating system which was developed 25 years ago and is still the leading technology. This system has successfully equipped more than 3400 heating zones. The forehearth heating is fitted with the globally accepted SORG® steel-ceramic burner nozzles.

The special design of the 340S+ superstructure allows a separated left/right heating of all forehearth zones. The left/right heating is standard for forehearth widths of 42 inches and larger. For smaller widths it can be obtained optionally.

For each zone, an OMT (Oxygen Metering Trim) system can be connected to all SORG® air/gas stations at any time. This can also be retrofitted during operation.

OMT ADVANTAGES ARE:

- constant and reproducible air/gas ratio
- robust hardware, no flame- or injection control necessary
- ideal for melting zone of coloring forehearts
- can lead to significant energy savings
- display with indication of lambda value
CONTROL

The temperatures of the single zones will be controlled by a combination of heating and cooling using modern and proven algorithms. The SORG® control system provides the possibility to optimize individual components automatically, i.e. a side wall boosting for the equalizing section. Moreover, it is of course possible to integrate the 340S+ to the Esili™ Expert System.

SORG® 340S+ FOREHEARTH OPERATING RESULTS

- 135 t / 24h
- UVAG green glass
- THI 97,40 % without boosting!

340S+ OPTIONS

As for the previous generation, the 340S+ offers the possibility to add several options to cover special demands:

- CONTI-DRAIN® system: removes zirconium cords
- OMT (Oxygen Metering Trim) system: stable O₂ ratio
- sidewall boosting in equalizing zone: improving thermal homogeneity
- stirrers in equalizing zone: disperses cords
SORG has delivered more than 1750 conditioning systems to numerous factories worldwide. By combining the know-how of our employees, the longtime experience of service staff and ongoing dialogs with customers, SORG has an exceptional position in the glass industry. Based on this, we successfully developed many products in the glass conditioning field which were established in the market during the past decades. Now we have improved the successful 340S® forehearth to create the new 340S+ generation. Of course, every SORG® forehearth will be tailored to the customer’s specific requirements. The forehearth and all available options are available from one source, including excellent service and individual attention.

**WHY THE SORG® 340S+ FOREHEARTH?**

The 340S+ forehearth offers an additional option which can be retrofitted:

**FOREHEARTH TOP ELECTRODES**

This is the newest solution for multi-color sites, where in addition to flint, colored glass will be produced occasionally.

To improve the thermal homogeneity of colored glass, the new SORG® forehearth top electrodes can be installed from above into the equalizing zone for the required period. Then the electrodes can easily be removed when no longer required.