**CSG Series - Clean Steam Generator**  
*(Unfired Steam Generator)*

**Description**
The Spirax Sarco Clean Steam Generator (CSG) is designed to provide sterilization grade clean steam from suitably treated feed water using plant steam as the energy source. Units using other primary fluids on the heating media can be provided to special order. The skid mounted CSG units are supplied with water level control, primary steam control and other essential equipment required for efficient operation. The units are factory assembled and tested to allow for minimal installation time, trouble-free commissioning and operation. Common application for Clean Steam Generator are for humidification, sterilization, food processing, pharmaceuticals, laboratories and clean room applications.

**Materials**

<table>
<thead>
<tr>
<th>No.</th>
<th>Part</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CSG vessel</td>
<td>Stainless steel 316</td>
</tr>
<tr>
<td>2</td>
<td>Steam coil / 'U' tube bundle</td>
<td>Stainless steel 316</td>
</tr>
<tr>
<td>3</td>
<td>Tube head (Plant Steam)</td>
<td>Carbon steel</td>
</tr>
<tr>
<td>4</td>
<td>Clean steam piping / Accessories</td>
<td>Stainless steel 316</td>
</tr>
<tr>
<td>5</td>
<td>Plant steam piping / Accessories</td>
<td>Carbon steel / Equal</td>
</tr>
<tr>
<td>6</td>
<td>Gaskets</td>
<td>Laminated graphite / spiral wound SS304</td>
</tr>
<tr>
<td>7</td>
<td>Frame / skid</td>
<td>Carbon steel</td>
</tr>
<tr>
<td>8</td>
<td>Control Panel – NEMA 1</td>
<td>14 g steel</td>
</tr>
<tr>
<td>9</td>
<td>Insulation – CSG Vessel</td>
<td>2&quot; thick mineral Fibre / Smooth aluminum cladding</td>
</tr>
<tr>
<td>10</td>
<td>Condensate cooler (Optional equipment)</td>
<td>Stainless steel 316L</td>
</tr>
</tbody>
</table>

All clean steam wetted components will be stainless steel.
Pressure / Temperature Limits

<table>
<thead>
<tr>
<th></th>
<th>Primary side – Plant steam (Tube Bundle)</th>
<th>Secondary side – Clean steam (Shell Side)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMA (Maximum allowable pressure)</td>
<td>150 psi g (10.3 bar g)</td>
<td>150 psi g (10.3 bar g)</td>
</tr>
<tr>
<td>TMA (Maximum allowable temperature)</td>
<td>366 °F (185.5 °C)</td>
<td>366 °F (185.5 °C)</td>
</tr>
<tr>
<td>PMO (Maximum operating pressure)</td>
<td>125 psi g (8.6 bar g)</td>
<td>80 psi g (8.6 bar g)</td>
</tr>
<tr>
<td>TMA (Maximum operating temperature)</td>
<td>353 °F Saturated (178.2 °C Saturated)</td>
<td>323 °F (162.2 °C)</td>
</tr>
<tr>
<td>Hydrotest pressure</td>
<td>195 psi g (13.4 bar g)</td>
<td>195 psi g (13.4 bar g)</td>
</tr>
</tbody>
</table>

Standards
- Pressure Vessel & Tube Bundle is designed and fabricated in accordance with ASME Section VIII Div. 1 and CRN registered.
- Control Panel is CSA certified and with native Bacnet firmware
- Package is assembled & Tested in TSSA approved facility

Recommended water quality
Spirax Sarco CSG’s are capable of producing clean steam when supplied with make-up feed water deionized, reverse osmosis water or softened dechlorinated potable water.

<table>
<thead>
<tr>
<th>PH</th>
<th>6.5-8.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardness</td>
<td>Absent</td>
</tr>
<tr>
<td>Chlorine</td>
<td>Absent in all forms</td>
</tr>
<tr>
<td>Conductivity</td>
<td>&lt;600 ppm total dissolved solids</td>
</tr>
</tbody>
</table>

Standard documentation
- General arrangement drawing
- Control Schematic
- Operation – Maintenance Instruction
- ASME Data Report for Vessel
- CRN certificates for components / fittings

Testing
Spirax Sarco CSG generators are subjected to hot & wet functional test as per Factory Acceptance Test. All CSG series generators are Hydro tested & leak tested in factory.

Optional equipment
- Blow down / condensate cooler
- Automatic surface blowdown based on conductivity
- Steam meter and water meter
- Clean steam separator

Control panel and automation

Touchscreen control panel displays
- Operating pressure psi g
- Pressure set point psi g
- Feed water valve status
- High water cutoff valve status
- Plant steam cutoff valve position (%)
- Level indication (%)
- Enable disable switch status
- Startup / normal mode display
- High-Low water alarms
- High pressure alarms
- Trend log for valve position and clean steam pressure
- Controls overview

All controller variables available through Bacnet communication protocol

Control panel features and alarms
- Password protected user level
- Remote start stop
- On-Off switch
- High pressure cut-out and alarm
- Low pressure alarm
- Control loop configuration screen
- Controller output (PID)
- Conductivity blowdown functionality – Optional feature
- Native Bacnet communication
  - General alarm output
    - Low water
    - High water
    - Low pressure
    - High pressure
  - Run/Stop digital input from BAC

Capacities
See new TI-CSG-Capacity
Clean steam generator schematic

Legend

- Control Valve
- Isolation Valve
- Globe Valve
- Check Valve
- Solenoid Valve
- High Limit Cutoff Valve
- Steam Trap
- Strainer
- Vacuum Brake
- Differential Pressure Transmitter
- Pressure Indicator / Gauge
- Pressure Transmitter
- Instrument Air
## Dimensions / weights (approx inches / lbs)

<table>
<thead>
<tr>
<th>Model #</th>
<th>Vessel Size Dia. X L (inch)</th>
<th>L Length (Inch)</th>
<th>W Width (Inch)</th>
<th>H Height (Inch)</th>
<th>Dry weight (lbs)</th>
<th>Operating weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSG-xx -60-xx</td>
<td>20&quot; x 48&quot;</td>
<td>90</td>
<td>56</td>
<td>84</td>
<td>2000</td>
<td>2400</td>
</tr>
<tr>
<td>CSG-xx -120-xx</td>
<td>24&quot; x 60&quot;</td>
<td>110</td>
<td>56</td>
<td>88</td>
<td>2200</td>
<td>3000</td>
</tr>
<tr>
<td>CSG-xx-205-xx</td>
<td>30&quot; x 72&quot;</td>
<td>116</td>
<td>56</td>
<td>92</td>
<td>2600</td>
<td>3975</td>
</tr>
<tr>
<td>CSG-xx-395-xx</td>
<td>36&quot; x 96&quot;</td>
<td>120</td>
<td>56</td>
<td>96</td>
<td>3250</td>
<td>5800</td>
</tr>
</tbody>
</table>

Minimum bundle withdrawal space 48.0" ~ 96.0"