


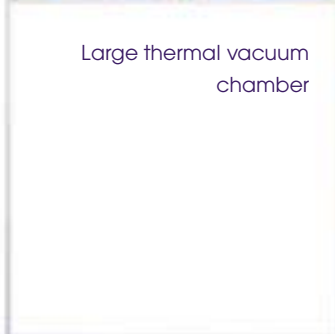
thermal vacuum chambers

	<p>Cylindr. length from 1 m to approx. max. 10 m</p> <p>Finish vacuum test chamber Outside: standard stainless steel surface Inside: electro-polished</p> <p>Integral leak rate 1 x 10⁻⁵ mbar x l x sec⁻¹</p>	<p>■ Vacuum pumps:</p> <ul style="list-style-type: none"> - multi-stage rotary vane pump, oil-free - Roots pump set, oil-free - Turbomolecular pump - Cryo-pump - Cryogenic baffle, LN₂-cooled copper plate mainly to pump H₂O vapour <p>Effective pumping speed acc. application</p> <p>■ Control system The complete electrical and instrumentation equipment for the high vacuum pump system and the thermal system.</p>
<p>Thermal-vacuum test chamber</p>	<p>Technical Data:</p> <p>■ Vacuum chamber Vertical or horizontal design</p> <p>Diameter from 1 m to approx. max. 5 m</p>	<p>■ Thermal heating/cooling system</p> <p>Operating temperature range: Acc. application from 77 K / 400 K</p> <p>Temperature deviation ± 2 °C for heat carrier liquid</p> <p>Heat carrier liquid: Inert liquid</p>
<p>UHV-Chamber open</p>		
		<p>UHV-Chamber, total leak rate 5x10⁻¹⁰ mbar l/s</p>
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Thermal vacuum chamber



Large thermal vacuum chamber



Pressure-shock-resistant sterilisation chamber



SGI-process thermal vacuum chambers



Open Thermal vacuum chambers



Pressure-shock-resistant sterilisation chamber



Open Thermal vacuum chamber



General aspects of SGI- Thermal vacuum chambers

Thermal vacuum chambers are used in industrial thermal vacuum processes or for use in space research centres for scientific experiments. In space simulation chambers materials and components are tested and proofed. In order to fulfil all these requirements the SGI thermal vacuum chamber comprises one complete functional system with thermal shrouds, high vacuum pumping set, instrumentation and electrical control, pre-assembled and workshop test.

Based on the experience of many thermal vacuum chambers SGI can deliver systems with

- oil free pump- sets
- closed loop thermal circuits with inert liquid
- closed loop GN2 circuits
- open loop LN2 cooling

The thermal system is designed to cool and to heat the shrouds resp. to dissipate the heat of the test specimen as well as possible energy from infrared sun simulation. SGI designs customer sized LN2 or GN2 thermal systems for this application.

Special features of SGI- Thermal vacuum chambers

- **High vacuum chambers:**
 - Horizontal and vertical arrangement
 - Acc. customer requirements
 - Degassing rate of polished surface: 6×10^{-2} mbar l/s

- **Thermal shrouds and circuits:**
 - For heating/cooling several processes are available
 - LN2 cooling with system open to atmosphere
 - GN 2 cooling/heating system using a closed circuit
 - Inert media cooling/heating system in a closed circuit

Data for cooling/heating with GN2 or LN2

- **Dissipated energy:**
 - GN2 mode: Up to 10 kW
 - LN2 mode: Up to 20 kW
- **Encountered energy:**
 - LN2 mode: Max. 1000 W/m²
- **Encountered energy:**
 - LN2 mode: 90 K
- **Temperature range:**
 - GN2 mode: 100 K-400 K
- **Constancy across shrouds:**
 - GN2 mode: ± 5 K stationary state
 - LN2 mode: ± 3 K stationary state
- **Heating/cooling rate:**
 - 1 K/min

- **High-vacuum pump set:**
 - Oil-free pre- pumps and turbo- or cryo pumps
 - Ultimate vacuum inside the chamber: 1×10^{-7} mbar
 - Pump down time in the range of 10 hrs assumed
 - the chamber was filled with nitrogen

- **Operating condition:**
 - Fully automatic test run PLC controlled

Description of SGI- Thermal vacuum chambers

The vacuum chamber is made completely of stainless steel. The surface parts of the chamber which are exposed to vacuum will be in a clean, metallic polished condition with a surface emission of $\epsilon \leq 0,1$.

The radiation shrouds can be made of stainless steel or copper.

The inside surface of the shrouds will be painted with two layers black colour to get a thermal emission $\epsilon > 0,90$. The outside surface of the shrouds will be polished to get a thermal emittance of $\epsilon = 0,1$.

The design of the shrouds will include proper supports, which prevent the risk of causing leaks and thermal conductivity to chamber wall. The design of SGI-Prozesstechnik allows easy removal of the shroud.

After manufacturing all parts will be checked with a He-leak detector.

The SGI thermal circuits can work within a wide temperature range based on the use of different types of cooling/heating liquids or the use of liquid nitrogen.