The SiTec technology package Vent Gas Recovery System [VGR] is specially designed for environmentally friendly polysilicon production. The VGR system is applicable for both Direct Chlorination and Hydrochlorination processes, separating vent gases into three product streams to be recovered and returned into different steps of the polysilicon production process:

- Recovered hydrogen \([H_2]\) to be reused in the deposition and conversion process
- Recovered hydrogen chloride \([HCl]\) to be reused in the trichlorosilane \([TCS]\) Synthesis
- Mixture of liquid chlorosilanes \([TCS, silicon tetrachloride [STC]]\) to be further separated by distillation and reused in the deposition and conversion process

The VGR System enables a closed-loop polysilicon production and achieves the highest recovery rates [>99%].

**Benefits**

- Commissioning and start-up supervision included
- Low investment costs
- Optimized design reduces operating costs
Vent Gas Recovery System

The complete gas recovery process within the VGR system is subdivided into the following process steps:

- Cooling of the vent gas streams
- Condensation of the chlorosilanes
- Compression of the remaining gases
- HCl absorption
- HCl distillation
- Hydrogen purification with a combined PSA/TSA\(^1\) process

\(^1\) Pressure Swing Adsorption / Temperature Swing Adsorption

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### Technical Data

**Vent Gas Recovery System**

<table>
<thead>
<tr>
<th>Specific power consumption [including chiller unit]</th>
<th>7 - 14 kWh/kg Polysilicon(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery rates</td>
<td></td>
</tr>
<tr>
<td>TCS+DCS</td>
<td>&gt; 99 %</td>
</tr>
<tr>
<td>STC</td>
<td>&gt; 99 %</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>&gt; 99.5 %</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>&gt; 99.9 %</td>
</tr>
<tr>
<td>Estimated operating hours per year</td>
<td>8,500 h/a</td>
</tr>
<tr>
<td>Operating range</td>
<td>~ 0 – 100 %</td>
</tr>
</tbody>
</table>

\(^2\) depending on process

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### Features

- Guaranteed performance
- VGR System can be adapted to any production capacity, direct chlorination or hydrochlorination processes
- Advanced design to eliminate carbon impurities
- Highest recovery rates for all components of the vent gas stream are achieved by applying ultra-low temperature processes
- SiTec’s special activated carbon ensures high purification of recovered hydrogen
- Best quality equipment material prevents any contamination and secures high purity of polysilicon
- Optimized interface design with SiTec 24 Pair CVD Reactor and High Pressure STC-TCS Converter
- The SiTec VGR System can also be adapted for SiTec 18 Pair CVD Reactor and STC-TCS Converter
- Proven track record

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### Services

- Commissioning and start-up supervision included
- Low investment costs
- Optimized design reduces operating costs

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SiTec GmbH is a leading company providing an Integrated Engineering and Technology Package for solar and microelectronic grade polysilicon.

Our proven technology has been realized in numerous projects in China, South Korea, India, North America, Europe, CIS and Middle East.