



TRICHLOROSILANE (TCS) PRODUCTION TECHNOLOGY SOLUTION

Reduces Capital Investment and Operating Costs by 10 to 15 Percent

Hydrochlorination is GT Advanced Technologies' newest trichlorosilane (TCS) production technology solution available to the semiconductor and solar industries. Producing TCS via hydrochlorination technology not only reduces capital investment by 10 to 15 percent, it also lowers annual operating costs by 15 percent.

The basis for this substantial savings is a result of removing the electricity intensive STC converter from the process, in both equipment and operation. Tying this differentiated technology to the GT Advanced Technologies family of chemical vapor deposition (CVD) reactors can drive down the cost of production and amplify ROI.

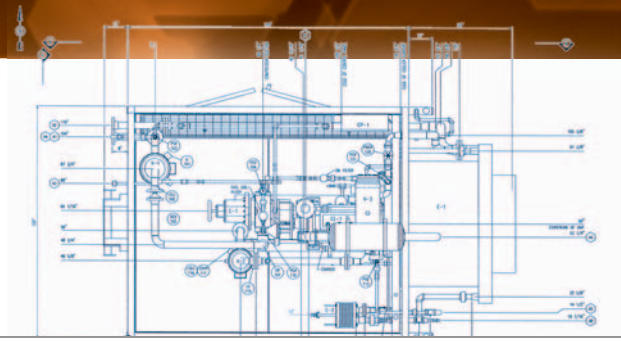
Deliverables Include:

- Basic engineering package (BEP)
- Equipment
- Modular process plant
- Operating instructions



The process for hydrochlorination begins with the introduction of hydrogen, metallurgical grade silicon (MG-Si) and silicon tetrachloride (STC) into a fluidized bed reactor. Hydrogenation of STC to trichlorosilane (TCS) and transformation of MG-Si to TCS proceeds according to the following general reaction at the operating conditions >20 bar(g) and >500°C:

$$3\text{SiCl}_4 + 2\text{H}_2 + \text{Si} \rightarrow 4\text{HSiCl}_3$$



Hydrochlorination and TCS Purification Plants

About GT Advanced Technologies

GT Advanced Technologies leverages its core crystalline growth and materials expertise in polysilicon, photovoltaic and sapphire to deliver sustained value to our customers. Our innovative ideas and industry experience enable the evolution and commercialization of products that elevate performance, improve quality and lower manufacturing costs.

Learn more at www.GTAT.com

The Right Resource for Today's Economic Climate

Sold as a basic engineering package (BEP), a GT Advanced Technologies customer benefits from improvements in schedule and cost control with this TCS Production Unit approach. The customer would engage an engineering, procurement and construction (EPC) firm to complete the detailed design and manage the actual installation of the facility. GT Advanced Technologies will support the EPC during the engineering phase. Training is provided for operations personnel in preparation for start-up and GT Advanced Technologies will assist with commissioning of the plant. Expertise for shipping readiness, container filling and transportation is available.

Hydrochlorination BEP

GT Advanced Technologies' technology solution for the hydrochlorination process includes hydrochlorination BEP and critical equipment. Hydrochlorination is a high temperature, high pressure process whereby silicon tetrachloride and hydrogen are reacted with MGSi to make TCS. Factors such as existing infrastructure and experience of the end user provide strong indications whether direct chlorination or hydrochlorination are more attractive. All the support offered with a hydrochlorination BEP is also offered with a direct chlorination BEP.

Polysilicon Production Solutions

GT Advanced Technologies offers complete state-of-the-art manufacturing capability necessary to produce polysilicon. By providing comprehensive packaged systems and stand-alone components, GT Advanced Technologies helps lower total cost-of-ownership and reduce time-to-market. Polysilicon production solutions include:

- Trichlorosilane (TCS)
- Monosilane (SiH_4)
- SDR CVD Reactor
- Filament Production
- Polysilicon Processing
- Integrated Gas Feed and Heat Exchanger Module
- Process and Product Analytical Techniques
- Project Support Engineering



Worldwide Headquarters
243 Daniel Webster Highway, Merrimack, NH 03054 USA
Phone: +1 603.883.5200 Fax: +1 603.595.6993
www.gtat.com

Polysilicon Equipment Sales & Service
101 E. Front, Suite 401
Missoula, MT 59802 USA
Phone: +1 401.728.6200
Fax: +1 406.728.6230
Polysilicon@gtat.com

Regional Sales Offices
Beijing
Hong Kong
Korea
Shanghai
Taiwan