CARBOGUARD®
Carbon Fiber-Reinforced Process Equipment

More safety and reliability
SGL Group developed carbon fiber reinforced graphite and silicon carbide (SiC) parts to ensure the operational reliability and the safety of its equipment. This technology is named CARBOGUARD. For more than 30 years, hundreds of customers around the world have benefited from the unmatched reliability and performance of the CARBOGUARD equipment in the toughest process conditions.

Application
CARBOGUARD increases the operational reliability of DIABON graphite and other materials (e.g. SiC tubes for FLUROSIC®) enabling higher efficiency and throughput. It extends the range of application under high-stress conditions like temperature or pressure shocks. CARBOGUARD is mainly used for tube sheets, headers, column sections and especially for tubes.

Technological benefits
CARBOGUARD shows the following key features:
► Enhanced mechanical strength
► 30 to 40% higher bursting pressures
► Leakage protection up to 3 – 5 bar differential pressure
► Shatter guard
► Higher efficiency

Customer benefits
CARBOGUARD improves the mechanical properties of graphite and SiC components. This will allow our customers to operate their equipment with:
► Highest possible safety
► Longer life time
► Significantly reduced shut downs for maintenance
► Lower total cost of ownership

DIABON® graphite tubesheet with CARBOGUARD®
Unmatched technological leadership

SGL Group as the technology leader stands for unmatched quality of its carbon fiber-reinforced components.

- Highly pretensioned carbon fibers are wrapped around DIABON graphite or SiC components.
- Fully automated wrapping technology ensures maximum thermal conductivity of tubes and reproducible high quality.

Details of technological benefits

Increased bursting pressure by 30 – 40%

Components with CARBOGUARD are more resistant to steam hammers and high operating pressures. For example, the bursting pressure at room temperature of CARBOGUARD graphite tubes is 30 to 40% higher than the one of non-reinforced DIABON tubes. This allows a substantial reduction in the number of broken tubes in the most demanding applications such as the concentration of industrial phosphoric acid.

Leakage protection up to 2 – 5 bar of differential pressure

Should a longitudinal crack occur as a result of over stressing, the reinforced tube will not allow any major leakage up to a differential pressure of some 2 to 5 bar. Only a hairline crack will usually occur and is held tightly closed by the pretensioned fibers. Hence, the reinforcement prevents spilling out of process media from the crack and uncontrolled release of product in large quantities. Usually the piece of equipment can continue to be operated without interruption until the next planned shutdown resulting in less downtimes.

Shatter Guard

Should a CARBOGUARD component like a tube or a column segment crack as a result of over stressing by e.g. pressure surge, CARBOGUARD will prevent the uncontrolled release of debris and hence lower the risk of damages to surrounding parts.

Improved mechanical stability for large components

Large graphite components such as column sections or tube sheets of heat exchanger can also be equipped with CARBOGUARD. Damages by over stressing can be reduced significantly especially in the toughest process conditions where risk of temperature or pressure shocks exist.

Breaking behaviour of a silicon carbide tube without (left) and with CARBOGUARD® (right)

Large graphite column component with CARBOGUARD®

This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should therefore not be construed as guaranteeing specific properties of the products described or their suitability for a particular application. Any existing industrial property rights must be observed. The quality of our products is guaranteed under our “General Conditions of Sale”.

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