Systems – Solutions for Corrosive Processes

Process Technology

Broad Base. Best Solutions.
SGL Group – The Carbon Company – is one of the world’s leading manufacturers of carbon-based products. We have a comprehensive portfolio ranging from carbon and graphite products to carbon fibers and composites.

Our core competencies include a wide knowledge of raw materials, specialized production expertise and in-depth application and engineering know-how. As a result, we have built up a comprehensive technology and product portfolio. We operate on a global scale and are close to our customers anywhere at any time. Supported by this broad base, we offer our customers the best solutions. That is what SGL Excellence stands for.
Our Business Line Process Technology is focused on supporting the technical processes of our globally operating customers in the chemical industry, metal manufacturing and environmental protection technology. A maximum degree of know-how and expertise in corrosion protection, a global presence and full-package systems from a single source: that’s what our customers need – and get from us:

- Long-standing experience and a high level of expertise in process technology
- Comprehensive process, material and design know-how on graphite and PTFE
- Closeness to customers: cost-effective manufacturing to international and local standards at our production sites in Europe, America and Asia and worldwide customer service
- A consistently high standard of quality

Our comprehensive range of products and services extends from process equipment and components made from DIABON® graphite and POLYFLURON® virginal, paste-extruded PTFE, through LICUFLON® skived PTFE sheet-lined steel equipment, FLUROFLEX® bellows, FLUROPIPE® pipe systems, FLUROSIC® silicon carbide heat exchangers and DIABON® graphite or exotic metal pumps, to the planning and assembly of complex systems.
Partnering with Our Customers
in the Pursuit of Success

As an experienced material and equipment supplier, SGL Group can rely on its wide-ranging expertise to ensure the success of its customers. Moreover, the team spirit of our highly qualified, motivated workforce together with our worldwide network of subsidiaries guarantee perfect solutions for our customers around the globe. Sustainable development is a key concept at SGL Group. It is vital that our Systems and equipment designers show respect for the environment, especially in terms of energy consumption and use of materials.

Our systems – combined equipment for corrosive media
We offer customized Systems for your projects by using our expertise in materials and equipment made from DIABON and LICUFLON, and combining it with our process knowledge and value-added engineering. SGL Group can support you in the treatment of all corrosive media by drawing on its vast experience in handling:
- Hydrochloric acid
- Sulfuric acid
- Flue gas with corrosive constituents
- Acidic gases, e.g. from waste incineration
These Systems rely on our decades of experience in corrosion-resistant DIABON and LICUFLON equipment and material.

Our process equipment
SGL Group offers a wide range of innovative products made from our superior materials DIABON and LICUFLON:
- Heat exchangers
- Quenchers
- Columns
- Vessels
- Synthesis units
- Burner systems
- Pumps

Our materials
Our expertise in corrosion protection helps us to continuously improve our superior materials:
- DIABON: its unique chemical and physical properties open up a wide spectrum of applications for the manufacture of our high-end equipment.
- LICUFLON: PTFE-lined steel columns and vessels with the lowest permeation rate available.

Our commitment
Throughout the world the chemical industry is coming under the increasing pressures of competition and costs. Long-term success in the face of this competition will depend on the willingness of companies to address these technological and economic challenges. As a supplier of state-of-the-art, commercially optimized Systems, SGL Group is your ideal partner to gain the decisive edge over your competitors. SGL Group has a unique combination of materials, products and expertise at its disposal to provide you with solutions for:

HCl gas and hydrochloric acid
- Absorption of HCl gas
- Production of HCl gas from hydrochloric acid
- Stripping processes
- Concentration of hydrochloric acid

Engineering systems, general plant layout and CAD plant design
Sulfuric acid
  ▶ Dilution and concentration of H₂SO₄

Exhaust gas and flue gas
  ▶ Heat exchange (cooling/heating)
  ▶ Cleaning of flue gas
  ▶ Quench process and recovery of hydrochloric acid

You in our focus
When it comes to Systems our customers perceive us as a reliable long-term partner – and not just a supplier.
Customer satisfaction is one of our most crucial goals and success criteria. This means that we place great emphasis on advising customers so that they receive the product that meets their exact needs.
Systems are designed in accordance with the needs of our customers. Thermal and mechanical details are developed by our engineers using the most reliable and updated CAD and process simulation tools.

Advantageous Systems
  ▶ Customer-oriented approach
  ▶ Expertise in processes and their simulation
  ▶ Corrosion and design know-how
  ▶ Tailored engineering and products
  ▶ Modular design for optimal flexibility
  ▶ Guaranteed performance
  ▶ Worldwide leading quality standards
  ▶ Most reliable operation
  ▶ Lowest life-cycle costs
  ▶ Highest safety standards

Our service
We are continuously working on improving our project and order processing strategies and methods, focusing our attention on deadlines, quality and costs to ensure increased customer satisfaction. Our supplies include:
  ▶ Project management
  ▶ Engineering
    Corrosion expertise
    Processes
  ▶ Equipment
  ▶ Electrical instrumentation
  ▶ Piping
  ▶ Plant design
  ▶ Materials
    DIABON
    LICUFLON
    POLYFLURON
    All other necessary materials
  ▶ Delivery
    Equipment
    Electrical instrumentation
    Piping
    Steel structure
    Skid-mounted Systems
  ▶ Services
    Construction supervision
    Commissioning supervision
    Operator training
    Maintenance training
    Spare parts
    Repairs
HCl Gas and Hydrochloric Acid
Absorption of HCl Gas

The absorption of hydrogen chloride in water or dilute hydrochloric acid is a central operation in the production of hydrochloric acid. This technique is often used for gases from:
- HCl synthesis units
- Chemical production plants (e.g. MDI/TDI or metallurgical processes)
- Waste incineration units.

HCl gas is brought into contact with water. In well-designed processes, the absorption assures clean flue gases and high HCl concentrations in the product acid. The absorption is a highly exothermic process which heats up gas and absorption liquid. Therefore, the absorption is often performed in combined equipment – DIABON heat exchangers and DIABON columns. Depending on the HCl concentration in the feed gas, the absorption is either isothermal or adiabatic.

Isothermal absorption
Isothermal absorption is more economic for higher-concentration HCl gases. Therefore, a water-cooled DIABON falling-film absorber is used for the main absorption with simultaneous cooling of the produced hydrochloric acid. The falling-film heat exchanger can be operated in a co-current or counter-current mode. In co-current absorption, both liquid and gas are fed at the top of the heat exchanger. The acid solution and the gas with unabsorbed HCl leave the absorber at the bottom outlet. This gas is scrubbed in a downstream absorption column. The weak acid leaving at the bottom is used as absorption liquid for the falling-film absorber.

An appropriate design with trays or packing ensures that the specified emission limits are met.
**Adiabatic absorption**

Adiabatic absorption is normally applied for low-concentration HCl gases with constituents such as solvents that need to be vented.

The HCl-containing gas is fed to the bottom of a DIABON/LICUFLOON column, while the absorption liquid is fed at the top. Gas and liquid flow are counter-current to ensure optimum absorption. The height, diameter and internals are designed in such a way that the desired acid concentration is obtained and the purity of the vent gas is maximized. The heat of absorption generates an elevated temperature of overheads and bottoms product, thus evaporating additional amounts of water. This water can be removed in a subsequent DIABON condenser. The hot acid stream is cooled in an integral or separate heat exchanger.

**Capacity and available sizes**

Our Absorption Systems are proven solutions for a capacity of 0.5 to 400 t/d of 100% HCl per unit and for product concentrations in the range of 25 to 38% HCl.
Many processes like the production of fumed silica (highly dispersed SiO₂) with the intermediate product SiCl₄ or the production of bisphenol require HCl gas as feed. Beside the direct synthesis of HCl gas from H₂ and Cl₂, HCl gas can be produced by distillation of hydrochloric acid solution.

Desorption
HCl gas is produced by distillation of hydrochloric acid solution with a concentration of 25 – 35% under pressure.
For this purpose, the HCl solution is fed at the top of a DIABON or LICUFLON column.

To minimize the consumption of steam and cooling water, the feed stream to the column is heated with hot, azeotropic acid in a DIABON plate heat exchanger serving as an interchanger (recuperator). The heat supply to the column can be ensured by an integrated DIABON falling-film evaporator or an external DIABON reboiler. An HCl-rich gas is generated at the top of the column.
Water is removed from the gas stream, increasing the concentration of the HCl gas in the first DIABON condenser and in subsequent DIABON gas coolers. After passing through a LICUFLON high-performance demister, a moisture content of 5 – 10 ppm in the product gas can ultimately be achieved.

The bottom product (azeotropic acid) has a concentration between 16 and 20% HCl, depending on process conditions. It can be fed back to the absorption process and preheats the strong acid feed in the DIABON interchanger (recuperator).

Advantages of our HCl distillation plants
- Production of highly pure, dry HCl gas with low inert gas and moisture contents
- No compressor necessary for a pressure up to 6 bar g
- Gas pressure and temperature in accordance with customer’s requirements
- Minimized consumption of steam and cooling water by optimal design
- No risk of explosion

Capacity and available sizes
Distillation Systems can be fabricated in all standard sizes up to very large diameters. Distillation units have proven references for capacities of 2 to 200 t/d of 100% HCl per column.

Production of HCl gas from hydrochloric acid by absorption/desorption process
Evaporation and Concentration of Hydrochloric Acid

In industrial processes hydrochloric acid solutions are often polluted or diluted. To re-concentrate these solutions, either simple evaporation or distillation can be used.

**Evaporation**

One of the major standard operations in environmental protection technology is the evaporation of liquid wastes. DIABON heat exchangers are used in the evaporation of dilute acids, aggressive flue gas scrubbing water, landfill leachates and industrial effluents.

Evaporation Systems are used if salts or other high-boiling substances have to be removed from HCl solutions. HCl and water are evaporated. The waste products are retained in the concentrate.

**Concentration**

- Concentrated hydrochloric acid can be produced from diluted solutions. These hydrochloric acid solutions can be concentrated by distillation to the azeotropic concentration (approx. 20%).
- Even higher concentrations > 20% can be achieved by means of a
  1. Two-Pressure Distillation System, i.e. shift of the azeotropic point by pressure change
  2. Extractive Distillation System, i.e. shift of the azeotropic point by adding CaCl₂, MgCl₂ or H₂SO₄.

These processes can also be used to separate HCl solutions > 20% into water and HCl gas or highly concentrated HCl solutions.

**Two-Pressure Distillation System**

HCl gas > 99% under pressure (up to 6 bar g) or concentrated acid is produced by distillation of hydrochloric acid solution. The process uses the specific properties of hydrochloric acid, i.e. the azeotropic concentration of hydrochloric acid is dependent on the pressure.

In the low-pressure column (< 1 bar abs), water is removed from the azeotropic effluent of the high-pressure column. This higher-concentration bottom product is fed to the high-pressure column (> 1 bar abs), in which HCl gas is evaporated by an external DIABON reboiler (thermosyphon). The produced gas is subsequently dried in several downstream condensers and a high-performance LICUFLON demister.

To minimize the consumption of steam and cooling water, the hot effluent from the high-pressure column heats up the cold azeotropic acid from the low-pressure column (DIABON interchanger). Moreover, the vacuum column can also be heated with the hot vapors of the high-pressure column.

**Extractive Distillation System (CaCl₂, MgCl₂ or H₂SO₄)**

CaCl₂, MgCl₂ or H₂SO₄ can be used to modify the chemical equilibrium in such a way as to enable selective distillation.

<table>
<thead>
<tr>
<th>Comparison of Systems</th>
<th>CaCl₂/MgCl₂ extractive distillation</th>
<th>H₂SO₄ extractive distillation</th>
<th>Two-pressure distillation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating requirement*</td>
<td>No specific differences</td>
<td>No specific differences</td>
<td>Slightly higher demand</td>
</tr>
<tr>
<td>Cooling requirement</td>
<td>Similar to two-pressure</td>
<td>Slightly higher demand</td>
<td>Similar to CaCl₂/MgCl₂</td>
</tr>
<tr>
<td>Max. pressure</td>
<td>4 bar g</td>
<td>4 bar g</td>
<td>Highest pressure</td>
</tr>
<tr>
<td>Extractive agent</td>
<td>CaCl₂/MgCl₂</td>
<td>H₂SO₄</td>
<td>None</td>
</tr>
<tr>
<td>Process</td>
<td>Crystallization – a serious problem</td>
<td>H₂SO₄ corrosion</td>
<td>Extended control &amp; instrumentation</td>
</tr>
</tbody>
</table>

*) for feed solution 18 % HCl, in/out 25°C
The feed containing the extractive agent is depleted from HCl in the extractive distillation column. This diluted extractive agent solution is reconcentrated in a DIABON evaporation stage and then re-used.

If traces of other substances become trapped and enriched in the extractive agent circuit or if the use of these chemicals is undesirable, the preferred option is to use two-pressure distillation for recovery of HCl from hydrochloric acid solutions.
Hydrochloric acid or chlorine are used in the production of chlorinated organic chemicals like methyl chloride. The hydrochloric acid by-product can be contaminated with undesirable volatile constituents such as chlorine or chlorinated organic substances. These impurities have low boiling points and can be removed by stripping or rectification in a single process step.

In this process, the feed stream enters at the top of a DIABON or LICUFLON stripping column. Column internals ensure intensive contact between the liquid and the upward-flowing stripping medium. The temperature is often over 100°C so that DIABON rings or a graphite packing are used.

As a result, low-boiling organic substances and a small amount of hydrogen chloride are vaporized. The purified hydrochloric acid leaves the system at the bottom of the column. The stripping medium is air, live steam or steam produced in an evaporator. Overhead vapors can be condensed with DIABON heat exchangers in order to separate recyclable liquid phases.
Capacity and available sizes

Our stripping units operate successfully up to a feed stream of 300 t/h of hydrochloric acid.

HCl stripping process with steam stripping column for purification of hydrochloric acid
Sulfuric Acid – Dilution and Concentration of $\text{H}_2\text{SO}_4$

Dilution of sulfuric acid
In many sectors of industry, there is a continuous demand for sulfuric acid:
- Chemical industry (pigment, fertilizer, wholesale trade, etc.)
- Steel and metallurgical industry (pickling, metal refining, etc.)
- Automotive industry (batteries)
Concentrated, viscous sulfuric acid (98 – 99%) is produced by sulfur burning. However, most technical applications need diluted sulfuric acid. The sulfuric acid dilution process is very exothermic. After dilution, the temperature can rise up to 180°C. Dilution is carried out in a DIABON or LICUFLON mixing device. The liquids are pumped by DIABON pumps through a static mixer or a DIABON multi-pass heat exchanger to ensure complete mixing. The dilution can be performed continuously – see flowchart – or in a batch process.

Advantages
- Sulfuric Acid Dilution Systems with DIABON heat exchangers produce a homogeneous acid of a constant quality and temperature.
- High safety standard

![Sulfuric acid dilution system](image)

Complete pre-assembled module for dilution of sulfuric acid and tempering of electroplating baths
Concentration of sulfuric acid

Sulfuric acid is diluted in many industrial processes such as gas drying. A concentration system is used to minimize sulfuric acid waste or recycle concentrated H$_2$SO$_4$.

In graphite equipment, sulfuric acid can be concentrated up to about 80% in vacuum evaporation. At higher concentration and temperatures over 170°C, the sulfuric acid starts to oxidize graphite and FLUROSIC silicon carbide can be used instead.

The concentration process can be done in a loop with natural or forced circulation. A DIABON pump feeds H$_2$SO$_4$ or forces the sulfuric acid through a DIABON heat exchanger overheating the liquid. Vapor and liquid are separated in an evaporation chamber.

Alternatively, a DIABON falling-film evaporator can be used. In this DIABON equipment, vapor and liquid separate in the bottom outlet chamber of the DIABON heat exchanger.

The process is very energy-intensive. In order to save energy, several evaporation stages at different pressure levels can be used. Two- and three-stage Concentration Systems can achieve 45% to 65% lower steam consumption compared to a single-stage design.

The optimum DIABON equipment maximizes energy efficiency, improves resource recovery and reduces waste.

Capacity and available sizes

Sulfuric Acid Dilution Systems have been built for capacities ranging from 0.5 to 100 m³/h of diluted H$_2$SO$_4$.
Exhaust Gas
and Flue Gas

Exhaust gas treatment
Due to the aggressiveness of the substances involved, corrosion problems can occur in almost any process aimed at preventing pollutant emissions and recovering harmful substances from exhaust gases. By combining our expertise in the field of exhaust gas cleaning and heat recovery with our range of corrosion-resistant materials, we can offer tailor-made engineering solutions for your particular problem:

- Equipment and Systems for cooling and reheating flue gases
- DIABON cooler for very hot gas – inlet temperature up to 1,000°C for water-cooled heat exchangers.
- Systems for recovering heat from the exhaust gases of larger heating plants.

See also our brochure “DIABON Economizers for Heat Recovery”

- Equipment and complete Systems for cleaning hydrogen halide-containing exhaust gases and recovering hydrogen halides.
- DIABON quenchers for cooling and DIABON absorbers for subsequent absorption of pollutants from flue gases and exhaust gases.
- Plant components and equipment for thermal decomposition of waste, including subsequent exhaust gas cleaning and recovery of acid components.

Flue gas heat exchanger
DIABON modular heat exchangers for flue gas treatment are used in the power generation industry and in waste incineration in combination with wet scrubbing processes. In these processes, hot flue gases are cooled to condensation temperature in a DIABON heat exchanger, scrubbed, and then reheated in the same heat exchanger.

Modular heat exchangers are operated as gas/gas heat exchangers or as condensers to achieve proper heat transfer and complete condensation. The saturated flue gases can be cooled in the condensers below the dew point. DIABON is an optimum material for such applications, due to its excellent thermal conductivity.

The corrosive substances contained in the gases, such as HCl, HF, SO₃, and other water-soluble substances, e.g. Hg, are absorbed in the condensing water. As a result, the condensate is very corrosive. Since our DIABON heat exchangers are resistant to almost all concentrations of these gaseous or condensed substances, there is no risk of corrosion at material temperatures up to 300°C. Damage by pitting, crevice corrosion or stress-corrosion cracking is unknown with DIABON.

DIABON graphite compared to other materials

<table>
<thead>
<tr>
<th>DIABON</th>
<th>Compared to</th>
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<tbody>
<tr>
<td>Higher temperature tolerance</td>
<td>fluoropolymers</td>
</tr>
<tr>
<td></td>
<td>(massive solid, coating, lining)</td>
</tr>
<tr>
<td>Diffusion is almost inexistent</td>
<td>fluoropolymers</td>
</tr>
<tr>
<td></td>
<td>(massive solid, coating, lining)</td>
</tr>
<tr>
<td>Small defects cause no failures</td>
<td>fluoropolymers (coating, lining)</td>
</tr>
<tr>
<td></td>
<td>or glass-lined materials</td>
</tr>
<tr>
<td>Lower brittleness and sensitivity to shocks</td>
<td>glass and glass-lined materials</td>
</tr>
<tr>
<td>Almost universal corrosion resistance*)</td>
<td>metals, fluoropolymer-lined steel glass, glass-lined materials</td>
</tr>
</tbody>
</table>

*) See our brochure “DIABON® Graphite for Engineered Process Equipment”
Specific performance requirements for heat exchangers

Flue gas heat exchangers used in condensation processes are therefore classed as heavy-duty equipment and have to meet very demanding requirements:

- A leak-tight design must be guaranteed even at high temperatures. This requirement is critical during startup and shutdown, when the material is subjected to additional stress and attack due to thermal expansion and corrosive condensates.
- In the cooling of flue gases, condensation of sulfuric acid and hence severe corrosion can occur at temperatures of approx. 160°C, resulting in the destruction of non-resistant materials in the equipment.

- In the temperature range in which water condenses, the HCl and HF gases present in the flue gases are absorbed as hydrochloric and hydrofluoric acid respectively.
- Combinations of the phenomena described above can occur during startup and shutdown if all the temperature ranges are passed through slowly and corrosive vapors flow through the heat exchanger.

Gas/gas heat exchanger of modular design fabricated with DIABON® graphite for cooling flue gas with fresh air
Characteristics of Our DIABON® Flue Gas Heat Exchangers

The sealing between tube and tube sheet must withstand thermal stresses and also be resistant to high temperatures and corrosion. This requirement is fully met by the DIABON joining technique. As the tubes and tube sheets are made of the same material, variations in temperature have no adverse consequences; no stresses due to thermal expansion arise. The tubes of DIABON heat exchangers are joined to both tube sheets without seals. The ends of the tubes, and the holes in the tube sheets, are conical in shape. These conical components are cemented together with an adhesive consisting of synthetic resin and DIABON cementing powder. The joint produced is gas-tight and used under normal conditions up to a material temperature of approx. 200°C. If specially impregnated material is used, service up to approx. 300°C is possible.

The combustion gases are passed through the inside of the tubes. Owing to the high gas velocity, no dust deposition problems occur even if the electrostatic dust precipitator fails. The cleaned gases pass through the shell space of the heat exchanger. To ensure trouble-free operation, the gases should be free from salt droplets. The steel structure is lined with a resistant material, which is selected according to the gas composition and temperature.

Experience shows that flue gas heat exchangers fabricated from DIABON ensure high operational reliability and long service.
Quench Process and Recovery of Hydrochloric Acid

Gases from incineration units often contain considerable amounts of hydrogen chloride and elemental chlorine. To facilitate the treatment of these exhaust gases in downstream systems, they must be reliably cooled to temperatures close to the saturation point (60 – 90°C), either immediately after incineration, after heat recovery in a steam generator or after passing through a DIABON flue gas heat exchanger. In addition, recycling of the HCl gas as industrial-grade hydrochloric acid is desirable. Finally, in order to meet the emission requirements, any Cl₂ present in the flue gases must also be removed.

Systems made from DIABON graphite fully meet these requirements. On its way to the stack, the gas flows through a DIABON pipe quencher, a DIABON or LICUFLON absorption column operated with fresh water, and finally through an alkaline absorption unit for Cl₂ removal, which is operated with water, NaOH and a reducing agent (e.g. Na₂SO₃).
In the DIABON quencher, the top-fed gas causes evaporation of the circulating liquid. Gas and liquid flow together through the quenching pipes, which allow the gases to be quickly and reliably cooled to temperatures close to the saturation point. The liquid is circulated by DIABON pumps and can be cooled in a DIABON heat exchanger. This increases the HCl recovery rate if the temperature of the HCl solution is too high after the absorption stage.

In the first absorption column, the HCl gases are absorbed in counter-current by fresh water. This column is usually operated at atmospheric pressure. The HCl solution is added to the circulating quenching liquid. In the second absorption column (packed section), the inert gases are absorbed in counter-current by a mixture of water, NaOH and a reducing agent (e.g. Na₂SO₃).

- The first absorption column ensures complete saturation of the gases after quenching and complete absorption of hydrochloric acid.
- The quencher can be combined with a DIABON falling-film absorber for removal of higher heat loads (high concentration of HCl in waste gas) or with a DIABON plate heat exchanger in the quencher circuit for lower heat loads.
- In certain cases, high hydrochloric acid concentrations can only be attained by means of an integral distillation stage.
- In subsequent treatment stages, highly pure hydrochloric acid can be produced by removal of chlorine or metal salts.

DIABON quench processes for the recovery of hydrochloric acid can handle different loads regarding flow, concentrations and waste gas constituents. The processes comply with the requirements of all current international emission regulations.
Capacity and available sizes
Quenchers can be fabricated up to very large diameters. This enables very large flue gas flow rates (up to approx. 200,000 Nm³/h) to be treated in a single unit. Depending on the chosen design (e.g. with or without a cooling ring), DIABON quenchers can be used at temperatures from 150 up to 1,600°C.
The obtainable HCl concentration in the recovered acid depends on the composition of the flue gas. Normal concentrations are 15 to 30%.
Customer Service
with a Full Package of Benefits

Our continuing partnership with customers is based on the excellent services and system solutions we provide. These are a key part of our commitment.

All items of SGL Group’s DIABON process equipment are quality products, manufactured in our own plants from high-grade materials using the latest technologies. If a product still fails to meet your requirements, SGL Group’s worldwide network of service centers will be on hand to help. We see every problem as a fresh opportunity. Give us the chance to prove it.

Spare parts and repairs
SGL Group’s responsibility for its products doesn’t end when customers take delivery of DIABON equipment. In fact, we give our customers systematic support all the time it’s in use. This support is a key part of our customer service.

The long service life of our graphite equipment depends crucially on its high quality and the servicing and/or cleaning it gets when in contact with highly corrosive and contaminated media.
Quality Management

by Process Technology

As a manufacturer of carbon and graphite products, process equipment and systems for the chemical industry and environmental protection technology, SGL Group maintains a targeted quality management system designed to attain and meet the product quality standards demanded by customers. Our quality management system meets the requirements of DIN EN ISO 9001:2000 and Pressure Equipment Directive 97/23/EC Annex III, Module H/H1 and has been certified by the approved associations of DQS and TÜV SÜD. In process equipment construction, Quality Management is responsible for the testing and approval of semi-finished graphite products, impregnating resin, cement components, outsourced parts, process equipment and components.

Synthetic resin impregnation, cementing and assembly are all subject to continuous monitoring. Appropriate marking of the semi-finished graphite products before and after synthetic resin impregnation, during machining and thereafter until assembly of the complete equipment or plant provides comprehensive evidence of the semi-finished products employed. Consequently, they meet the traceability requirement of specification AD 2000-Merkblatt N2 for pressure vessels made from electrographite and hard burned carbon. The conditions for synthetic resin impregnation of the semi-finished graphite products and those for cementing of the components are stipulated, monitored and checked.

Evidence of the quality characteristics of the material grades employed, as required by specification AD 2000-Merkblatt N2, is provided in a report issued by the testing laboratory of TÜV SÜD Industrie Service GmbH.
Process Technology Brochures

- Process Technology – We Combat Corrosion – from Process Equipment and Components to Complex Systems
- DIABON® Graphite for Engineered Process Equipment
- DIABON® Shell and Tube Heat Exchangers
- DIABON® Block Heat Exchangers
- DIABON® Plate Heat Exchangers
- DIABON® Economizers for Heat Recovery
- DIABON® and LICUFLON® Columns and Column Internals
- DIABON® Hydrogen Chloride Synthesis Plants
- DIABON® and Exotic Metal Pumps
- DIABON® Safety Disks
- Systems – Solutions for Corrosive Processes
- ECOPOR® Porous Reactors

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The data contained herein represent the current state of our product knowledge and are intended to provide general information on our products and their application spectra. In view of the variety and large number of application possibilities, these data should be regarded merely as general information that gives no guarantee of any specific properties and/or suitability of those products for any particular application. Consequently, when ordering a product, please contact us for specific information on the properties required for the application concerned. On request, our technical service will supply a profile of characteristics for your specific application requirements without delay.