STEULER KCH

Surface Protection Systems

Innovative materials and lining techniques for industrial corrosion protection

Focus on Progress

STEULER 1908

1917 brings the establishment of a second pillar: acquisition of a wall tiling factory in Mühlacker, Germany – today Steuler-Fliesen GmbH.

1965 Expansion: Steuler Plant Construction is expanded to become a separate, independent division.

1970 is the year Steuler combines the structural construction material concrete and plastic to create the thermoplastic lining Bekaplast; development of the liquid film Oxydur UP 82.

1975 sees the patent for the Steuler self supporting ceramic dome for reaction towers.

1910 sees the construction of a factory building in Höhr-Grenzhausen with one furnace. In-house manufacturing of acid-resistant brick begins; a next step in development sees the production of refractory brick.

1908 marks the beginning of Steuler-Industriewerke with the development of the world's first acid-resistant cement. This innovation paves the way for Georg Steuler to build large-scale chemical plants.

1867 marks the establishment of the company through a lien to mine Westerwälder clay "at the lignite mine Berggarten" in Siershahn.

1926 sees the construction of a fireclay factory, production of acid-resistant and refractory grade brick.

1936 brings the acquisition of the specialty corrosion construction company Keramchemie in Andernach.

1974 is the date for the start of in-house production of rubber linings.

1867 KCH

1966 sees not only the making of thermoplastic constructions but also the production of components made of fiberglass reinforced polyester and epoxy resins.

Steuler has become well known around the world for its Industrial Corrosion Protection unit, which includes the fields of Surface Protection, Refractory Systems and Plastics Engineering. Together, they create a unique combination of innovative material developments and lining technologies.

Steuler Plant Construction/Environmental Technology implements custom-tailored, turnkey plants all around the world, always with an eye to protecting the environment. A further pillar of the company is the Steuler Tile Group. Modern, design based and exclusive wall, floor and decor tiles are manufactured for the global market at four different sites.

The traditional company Keramchemie (KCH) has also been developing over the decades to become a successful, internationally active corrosion protection provider, headquartered in Siershahn, Germany.

2010 aacquisition of the KCH activities by Steuler.

2004 comes the development of wet electrostatic precipitator bundles with conductive interior walls.

1985 marks the development of refractory chrome-corundum brick for toxic waste incineration plants.

2008 Steuler celebrates its 100th anniversary.

1999 brings the acquisition of the Westerwälder Korrosionsschutz GmbH (WKS).

2000 acquisition of the HAW Linings GmbH.

With the integration of KCH, Steuler is taking a further significant step in its corporate evolution. For clients of the two brands, which have been in competition to date, excellent new prospects have opened up: The joint range of corrosion protection products and services allows even greater synergies to be attained for both clients and large scale international projects.

Whether it is protective linings, rubber linings, industrial flooring, brick and tile linings, or mechanically anchored thermoplastic linings; STEULER-KCH develops complete solutions for every application. Refractory lining systems and equipment, tanks or piping made of thermoplastics and duroplastics complement and complete the portfolio.

There is even an experienced project and installation team available for the safe and secure sealing of swimming pools.

STEULER-KCH – Your global partner for industrial corrosion protection

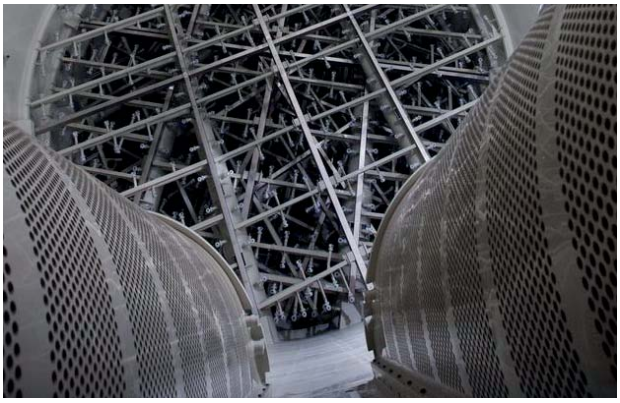
Innovative material developments and lining technologies have made Steuler one of the world's leading providers of industrial corrosion protection. The close connection between the divisions Surface Protective Systems, Refractory Systems, Plastics Engineering and Pool Construction has created a unique complete package of lining technology and experience. With our competence in engineering technology and our experience in the field, we understand the chemical and physical demands of plants and process equipment.

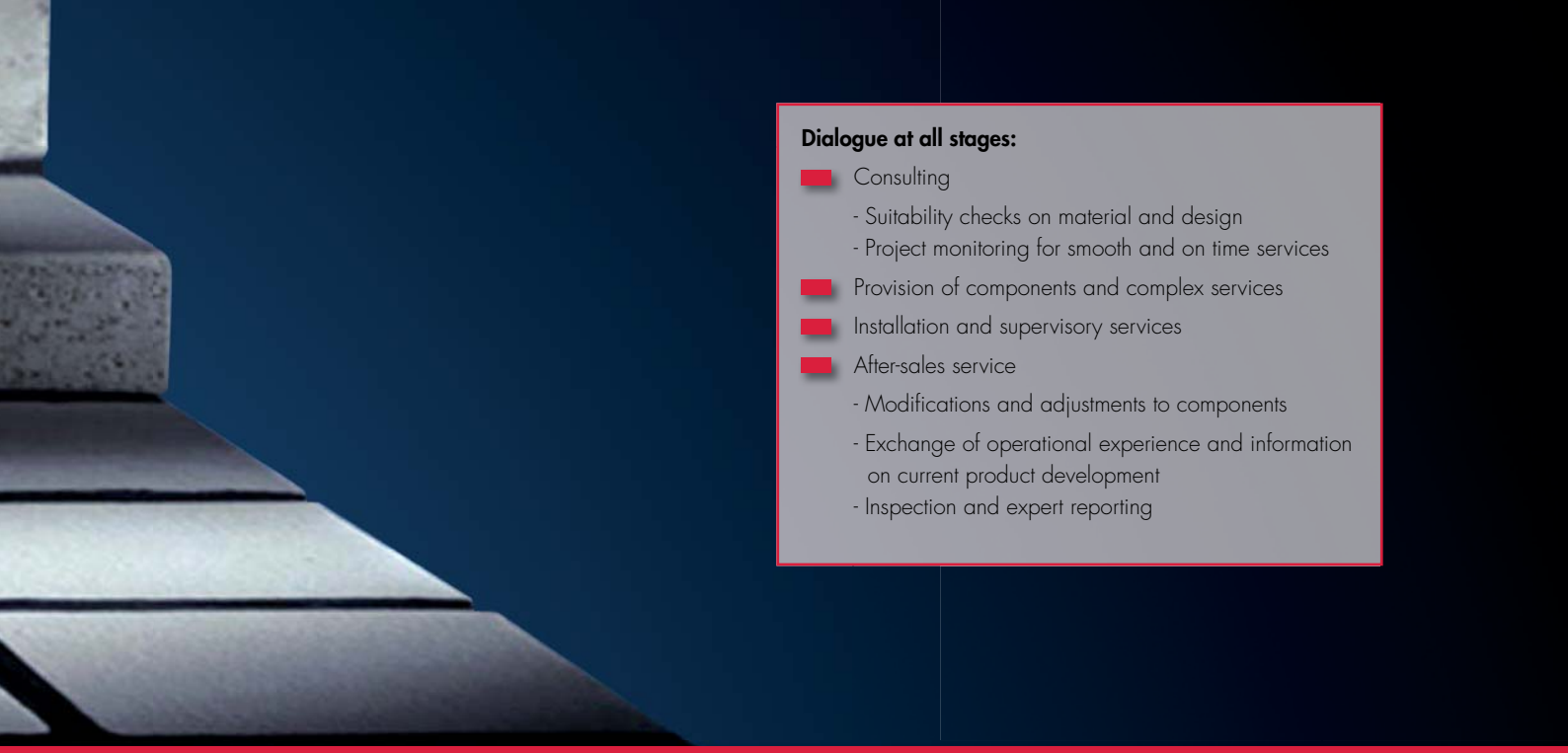
Surface protection systems

The STEULER-KCH range of surface protection systems includes coatings, rubber lining, brick lining and tiling which provide protection for industrial surfaces against corrosion. The scope of services provided by STEULER-KCH naturally include advising customers regarding the planning and design of corrosion and surface protection measures as well as expert processing of materials and execution of installation work.

Plastics engineering

The product portfolio of STEULER-KCH Plastics Engineering includes piping systems, tanks, vessels and process equipment exposed to high chemical, thermal and mechanical stresses. These items are manufactured either from fiber glass-reinforced plastics with or without an inner liner, or from fiber-reinforced phenolic resin materials to ensure reliable and long-lasting chemical resistance.





Dialogue at all stages:

- Consulting
  - Suitability checks on material and design
  - Project monitoring for smooth and on time services
- Provision of components and complex services
- Installation and supervisory services
- After-sales service
  - Modifications and adjustments to components
  - Exchange of operational experience and information on current product development
  - Inspection and expert reporting

From our vast range of materials, we select, together with our clients, the most technically effective and most economically suitable lining system. Plant and equipment made of corrosion-resistant duroplastics and thermoplastics round out our range of products and services.

Refractory systems

STEULER-KCH is among the major innovators and market leaders in refractory systems on the international market. Manufacturing encompasses shaped non-alkaline products based on raw materials from fire clay to corundum, including chrome corundum, zircon and silicon carbide as well as unshaped, semi-finished products. STEULER-KCH offers specialised refractory solutions, from research, development and engineering as well as in-house manufacturing and assembly of systems.

Pool construction

STEULER-KCH's swimming pool operation is the first name to call with regard to sealing public or private swimming pools for customers all over the world. The STEULER-Q^7 system is regarded as the top product for swimming pool construction and may be the safest lining system for pools any-where. In particular, thermal baths, brine facilities, mineral and sea water baths with their inherently more corrosive contents can benefit from the long-term sealing provided by the system. Hotel pools, health spas and even ambitious private pools trust in the special properties of the STEULER-Q^7 system.

ASSEMBLY / INSTALLATION

CONSTRUCTION AND ENGINEERING

RESEARCH AND DEVELOPMENT
FULL PRODUCTION FACILITIES

Materials and Engineering: Complete solutions, including installation

STEULER-KCH develops, manufactures and installs corrosion resistant materials and innovative lining technologies for a broad variety of requirements.

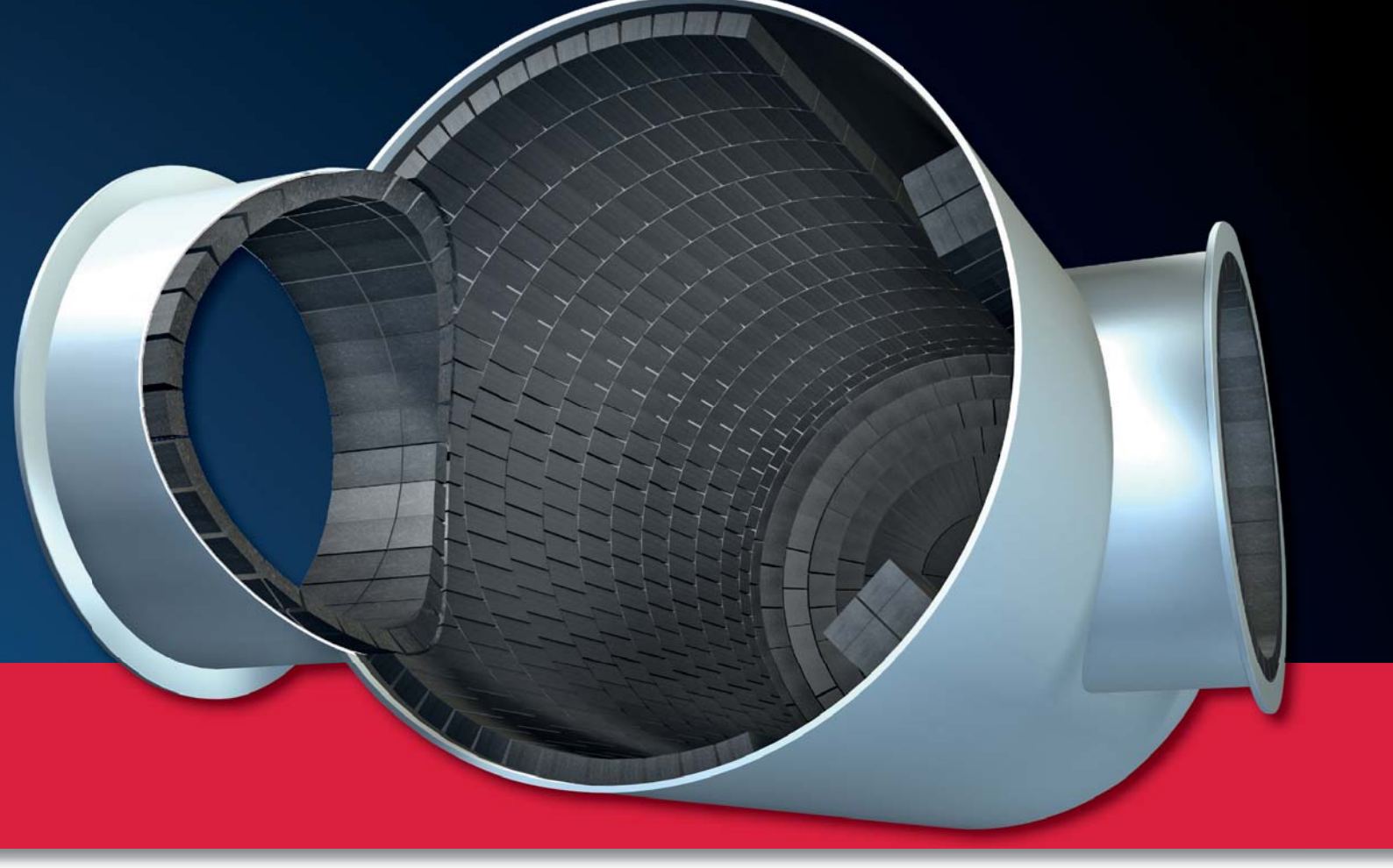
STEULER-KCH is a complete service provider, offering customized systems encompassing research and development, consulting, design and production all the way through to installation and servicing, from one source. The advantage for our customers is that they are dealing with only one supplier who is capable of providing a solution for just about every type of plant environment and requirement – this offers greater efficiency, safety and reliability in project execution.

A perfect combination down to the last detail: with materials, know-how and service for a long life expectancy, retention of value and guarantee of functionality in production plant and operational facilities. STEULER-KCH operates worldwide and always in keeping with our motto "We handle corrosive media".

- Access to our own and external research and development departments
- Product specification, testing and consulting with the client
- Purchasing, delivery and logistics
- Engineering, in-house construction department, installation drawings
- Turnkey installation, monitoring of installation work / Quality assurance and management / Training by supervisors / SCC Certification

Above: Corrosion-resistant lining for sulphuric acid plant.

Above: Complete solutions for power stations and the energy supply industry.



Modernisation and optimisation

STEULER-KCH is a specialist company for the renovation and all-round improvement of existing plants. Instead of investing in completely new machinery, it often pays to integrate new developments into existing systems in order to remain at the cutting edge of technology. Such investment proves its worth thanks to improved processing performance and plant safety.

- To reduce down times acid absorption towers are partially lined before they are lifted into their final position by a heavy-duty crane.
- Partial replacement of acid-proof lining systems
- Dismantling and reassembly scrubbers and piping
- Retrofitting of spray nozzle arrays and piping in flue gas scrubber installations

Above: Partial replacement of acid-pro of lining systems.

Above: Acid absorption towers are partially lined before they are lifted into their final position

Requirements:

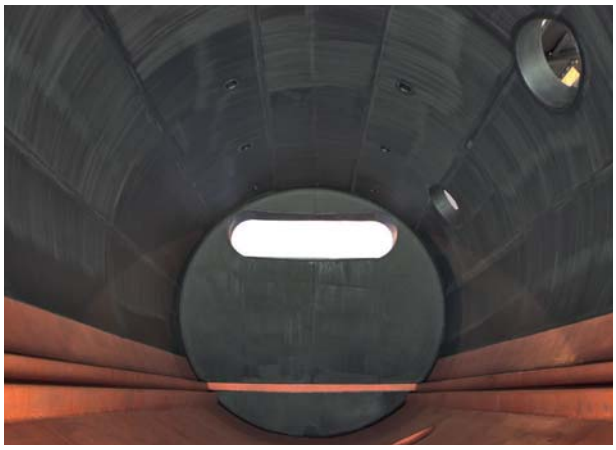
- Long-term chemical resistance and lightness
- Long-term thermal resistance
- Long-term mechanical resistance
- Adhesion to substrate surface (steel, concrete)
- Resistance to ageing
- Anti-adhesive properties and decontamination capability
- Crack bridging abilities (for concrete structures)
- Pre-defined thickness
- Repeatable testing for tightness

Workshop and On-site Rubber linings

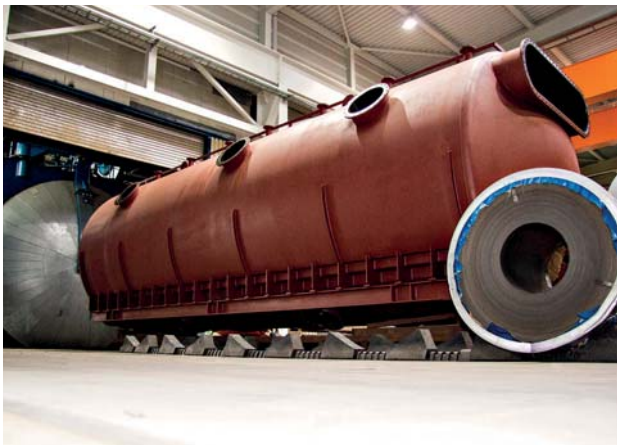
The wide range of stresses on components in processing plants means that effective corrosion protection is essential. Rubber lining provides not only the ideal protection for steel structures such as tanks, pipes, reaction towers and gas scrubbers but is just as effective for concrete items (such as drainage channels). That applies not only to chemical attack from acids, alkalis, salt solutions, various chemicals or water vapour, where exposure can be made more serious by elevated temperatures or temperature fluctuations, but also to frequent mechanical stresses (pressure, abrasion).

STEULER-KCH has developed an extensive range of materials for workshop or on-site rubber lining. This forms the basis for individual selection of rubber qualities to match the different applications and the particular stresses involved.

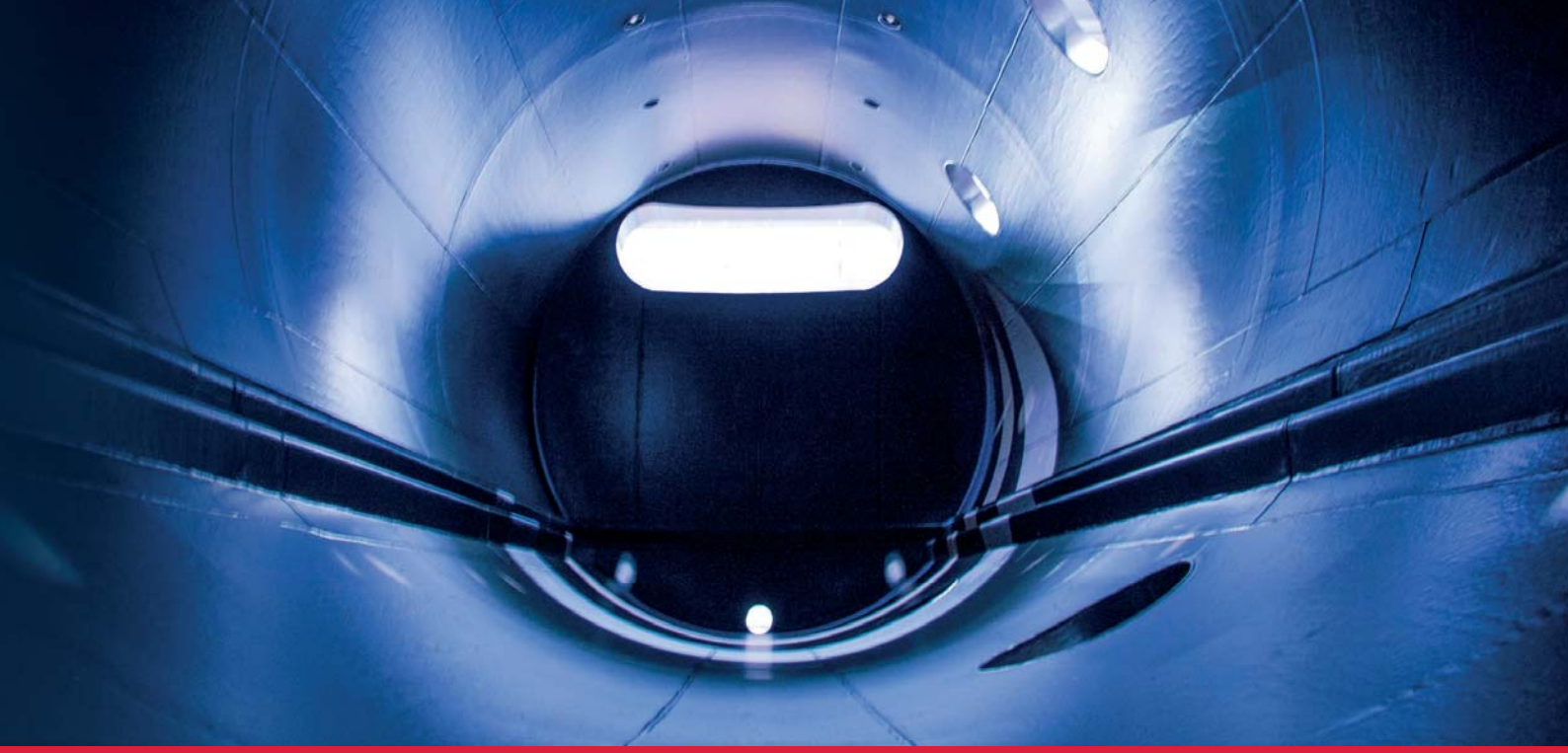
In selecting suitable materials, it is usually necessary to consider multiple criteria. Use of rubber linings for steel structures in contact with media is specified in the DIn En 14879 standard. The requirements for steel components are also included in this set of standards. In general as corrosion protection under these stresses, soft rubber linings with a nominal thickness of at least 4 mm and hard rubber linings of at least 3 mm thick are required.



Above: Prepared vessel during the rubber lining.



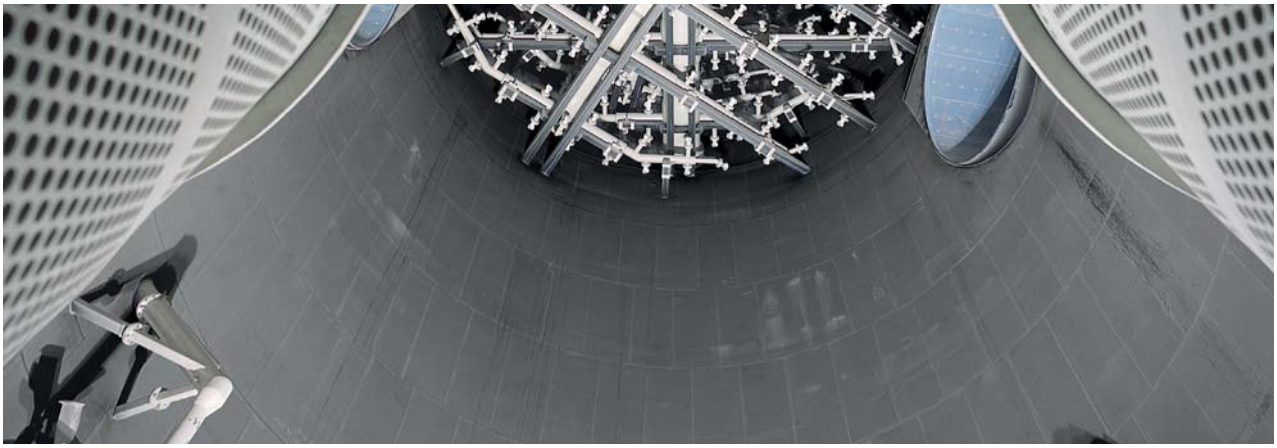
Above: The vulcanised vessel being removed from the autoclave.



The chemical resistance, i.e. the way the material withstands the effects of chemical attack by the media for example by hydrolysis or oxidation, is a prime consideration. To handle long-term or permanent attack by corrosive media on components requiring protection, materials need to be selected which are also capable of coping with permeation. This is particularly relevant for chemicals with small molecules (hydrochloric acid, ammonia, water) where operating temperatures are higher than the ambient temperature, since permeation is accelerated as the temperature rises.

Rubber linings:

- Rubber grades for steel and concrete structures based on butyl (IIR), bromo-butyl (BIIR), chloro-butyl (CIIR), chloroprene (CR), hypalon (CSM), natural rubber (NR) polymers as well as special grades
- Autoclave rubber linings including steel components are also supplied by STEULER-KCH
- Self-vulcanizing, pre-vulcanized and hot water qualities



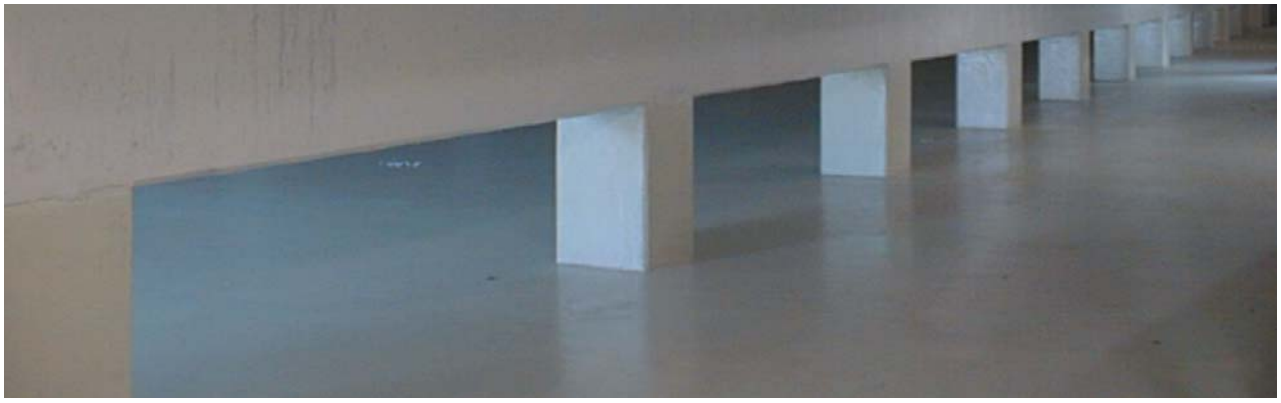
Above: Rubber-lined flue gas desulphurisation scrubber with rubber lining of support structure for nozzle arrays.

Industrial flooring for High Chemical, Mechanical and Thermal Stresses

A precise analysis of the substrate, operational loads or stresses and the efficiency required determine which components will be used and how the STEULER-KCH floor coating or lining system will be constructed. Floor linings and acid-protection brick or tile from STEULER-KCH protect concrete substrates from corrosive attack, prevent penetration by chemicals and hazardous agents into the substrate and thus contribute to maintaining the value of plant and equipment. Practice proven solutions for expansion joints, trench connections and constructions but also sealing details for foundation sockets and hall structures round out the various flooring systems we offer.

Temperature fluctuations, dampness, chemical stresses, heavy crane loads, scratches during production or maintenance work – industrial flooring from STEULER-KCH securely handles all such stresses. Such special surface features as evenness and anti-skid properties improve plant operation and increase occupational safety. In many areas, additionally properties such as electric conductivity, tightness against liquid ingression, colour design, physiological tolerance, crack bridging, resistance to aging and weathering as well as imperviousness to water vapour are also specified.

Many of our floor topping systems can be applied in a variety of RAL similar shades and in a beautiful, high-quality look by spreading the topping with chips or colourful sands. Special grades for the food processing and pharmaceutical industries are available as are electrically conductive systems for the electronics and other industries. For stress under highly concentrated chemicals or constant liquid loading, acid-resistant brick and tile offer a high level of security.



Above: Chemically and mechanically highly stressable floor coating in a zinc winning plant.

Requirements:

- Long-term chemical resistance and tightness
- Long-term thermal resistance
- Long-term mechanical resistance
- Adhesion to substrate surface (steel, concrete)
- Resistance to ageing
- Non-slip properties and decontamination capability
- Ability to bridge cracks (for concrete substrate)
- Physiologically harmless
- Electrical dispersion capability

Resins based on polyurethane, epoxy, vinylester, unsaturated polyester and furane are processed to trowel, self levelling, broadcast and laminate systems. STEULER-KCH offers co-ordinated system build up (primers, adhesive and leveling layers, intermediate layers, top and abrasion resistant layers, sealers) with a variety of fillers and reinforcements – crack-bridging ability, easy to apply, without pores.

Coatings with General Building Regulation Approval Issued by the DIBt

In many industrial sectors, providing proof to government authorities that special protection measures for surfaces and installations in production and storage areas were carried out is generally more of a rule than an exception. STEULER-KCH are able to provide the most technically appropriate and economical solution from our multitude of coating systems with general building regulations approval. you can count on our support from planning and design, material selection and all the way through to final acceptance.

In addition, many of our coating systems having building regulation approval also meet supplementary criteria, such as being slip-resistant, fit for traffic or electrically discharging.

our range of coating systems with general building regulations approval has been developed for an extremely wide range of practical situations. Many systems can also resist higher chemical concentrations over longer periods or meet occupational safety regulations.

As a recognised specialist operation according to the German Water Management Act, we are also aware of our responsibility for proper installation by our trained specialist installers.

Above: Self-levelling industrial flooring in the food industry.

Above: Decorative floor covering with a coloured chip surface.

Tile Linings

With acid-proof ceramic tiles and bricks as well as carbon materials in both standard and special formats combined mortar and grout based on synthetic resins and potassium silicate materials from STEULER-KCH high-quality combined flooring and tiling systems are produced.

Ceramic tiles systems from STEULER-KCH feature low open porosity and high chemical resistance. The high mechanical stability and good anti-abrasive properties offer safe protection for sealing layers when used on floors or areas subject to abrasion. Technically expert service also includes proper design of detailed items in the installation such as connection to stainless steel components such as gutters and drains or wall connections.

Traffic with high loads, scratching in the prouction or during maintenance - STEULER-KCH industrial floorings securely handles all such stresses. Such special surface features as evenness and anti-skid properties improve operations and increase occupational safety.

Above: Thermoplastic gutters mechanically anchored into the foundations with special detailed solutions for connection to tiled industrial floor.

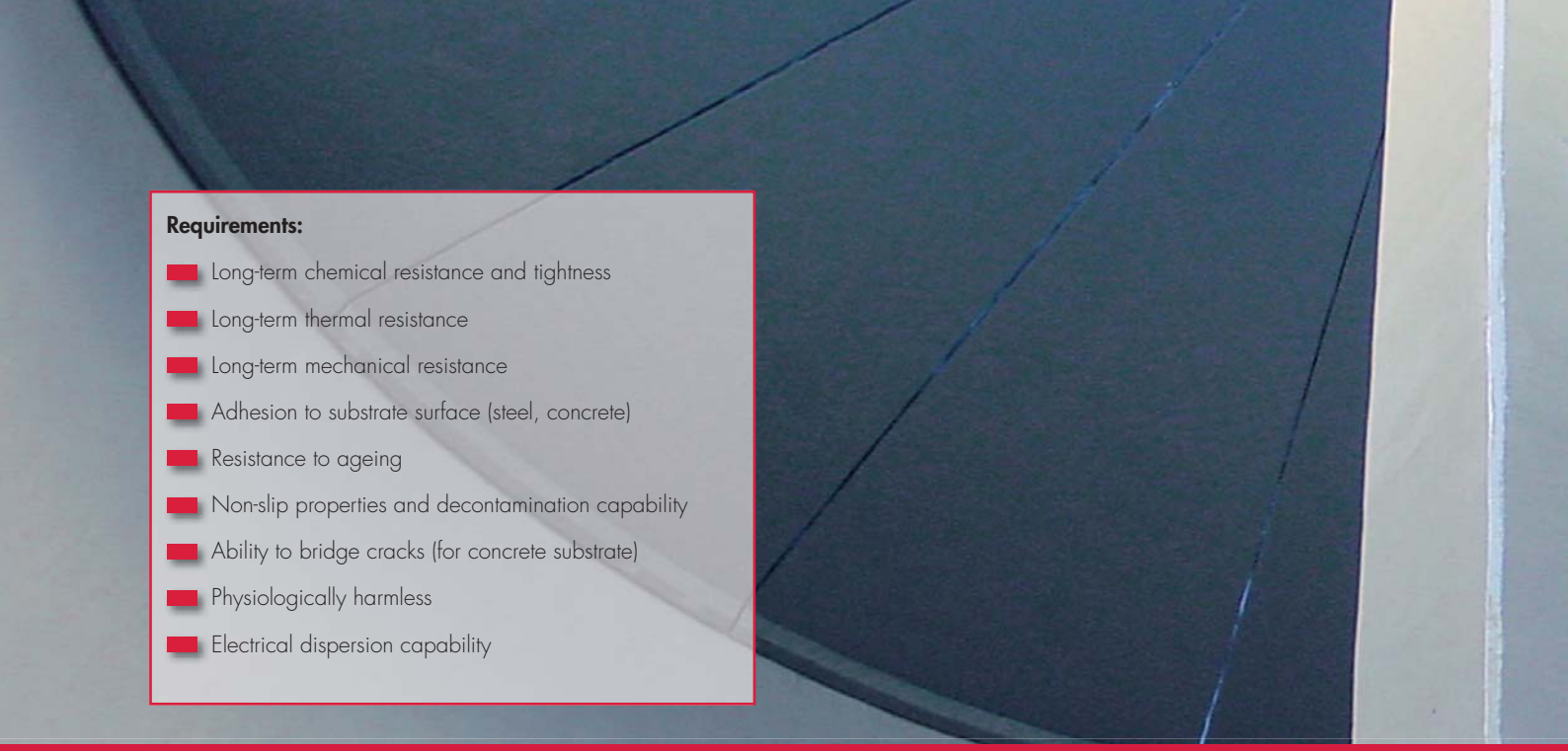
Above: Expert service also requires expert manufacture of the detailed bonding elements.

Tiling in the pharmaceuticals and food industries

In companies making pharmaceutical products or food, the floor is always a functional component of what is a complex technical system. It is equally important that legal stipulations for work safety and hygiene are observed as well as the good manufacturing practice guidelines and technical production requirements. Ceramic coverings such as tiles are the first choice for protection against severe stresses. Two factors are especially important for proper installation: the tiles laid and the grouting used must be made of resistant materials. Underneath the ceramics, there must also be a resistant sealing layer to protect the underlying structure. This prevents media penetrating into the substrate and damaging the structure over the long term. When there are no damaged areas, there are also no problem zones in terms of hygiene.

Above: Ceramic tiles are laid on chemically resistant sealing layers using equally resistant synthetic resin mortar and grouting.

Above: Tiling in the food industry.



Requirements:

- Long-term chemical resistance and tightness
- Long-term thermal resistance
- Long-term mechanical resistance
- Adhesion to substrate surface (steel, concrete)
- Resistance to ageing
- Non-slip properties and decontamination capability
- Ability to bridge cracks (for concrete substrate)
- Physiologically harmless
- Electrical dispersion capability

Plant and Tank Coatings for High Chemical, Mechanical and Thermal Stresses

Components in processing plants are subject to a wide variety of corrosive stresses. In particular, they are subjected to chemicals such as acids, alkalis, salt solutions, organic solvents, various other chemicals and water vapour, whereby the corrosive potential may often be increased due to high temperatures or temperature fluctuations. Tanks, pipes, reaction towers, gas scrubbers etc. are also frequently subject to mechanical stresses such as pressure or abrasion.

In the course of the last few years STEULER-KCH has developed a complex range of suitable synthetic resin coatings. In selecting suitable materials, it is usually necessary to consider multiple criteria. For more demanding conditions, where plant components are in contact with media, DIn En 14879 is particular in specifying organic coatings with a minimum thickness of 1 mm.

The chemical resistance, i.e. the way the material withstands the effects of chemical attack by the media for example by hydrolysis or oxidation, is a prime consideration. To handle long-term or permanent attack by corrosive media on components requiring protection, materials need to be selected which are also capable of coping with permeation. This is particularly relevant for chemicals with small molecules (hydrochloric acid, ammonia, water) where operating temperatures are higher than the ambient temperature, since permeation is accelerated as the temperature rises.

Situations may not only require different products but may also require varying methods of application.

High performance trowel applied coatings utilising filler materials to protect against severe chemical and mechanical exposure, based on epoxy resin and vinyl ester as well as polyurethane resin for floor coverings on concrete substrates.

Above: Coated absorber head in a flue gas scrubber plant.

Spray applied coatings on the basis of polyurethane, vinylester, unsaturated polyester and epoxy also flake linings and sprayable laminate coatings on the basis of vinylester, polyurethane and epoxy as well as special vinylester based coatings with high temperature resistance and epoxy coatings with drinking water approval.

Laminate linings with glass fibre and synthetic fibre reinforcement on the basis of furane resin, vinyl ester resin, unsaturated polyester resin and epoxy resins offering high rigidity and excellent chemical resistance for the protection of steel and concrete structures.

Coating systems conforming to Germany's WHG

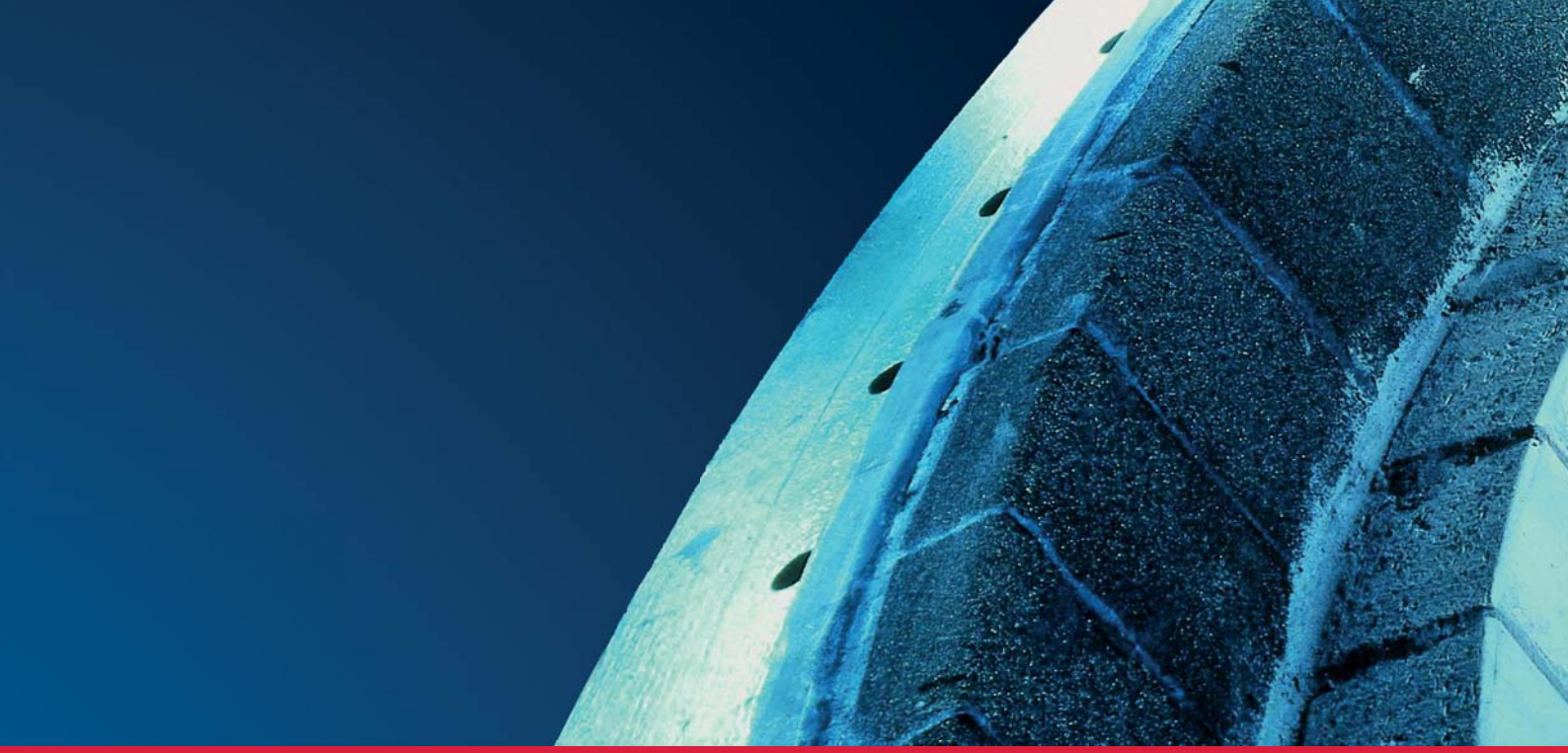
Protection of ground water in accordance with the German (WHG) is the primary objective when it comes to protecting tanks and basins, as well as floors, drainage channels and sumps in plant and other buildings against corrosion, thereby preventing penetration of liquids with the potential to cause a hazard to water courses.

When coating concrete components, it may also be necessary for a material to be capable of bridging cracks. If equipments are subject to liquids which are flammable or combustible for some of the time, health and safety laws require that the material must also be sufficiently capable of conducting away electrical current in order to eliminate hazards due to electrostatic charging. The WHG-conformant coatings and sealing sheets developed by STEULER-KCH have been tested for their suitability by authorised testing institutions in keeping with approval guidelines laid down by Germany's building institute the DIBt, taking into account their required chemical and physical properties, and have been granted DIBt certification.

As a recognised specialised applicator according to section 19 of the WHG, we are also aware of our responsibility for proper installation by our trained specialist installers.

Above: Coated vessel in the non-ferrous metal industry.

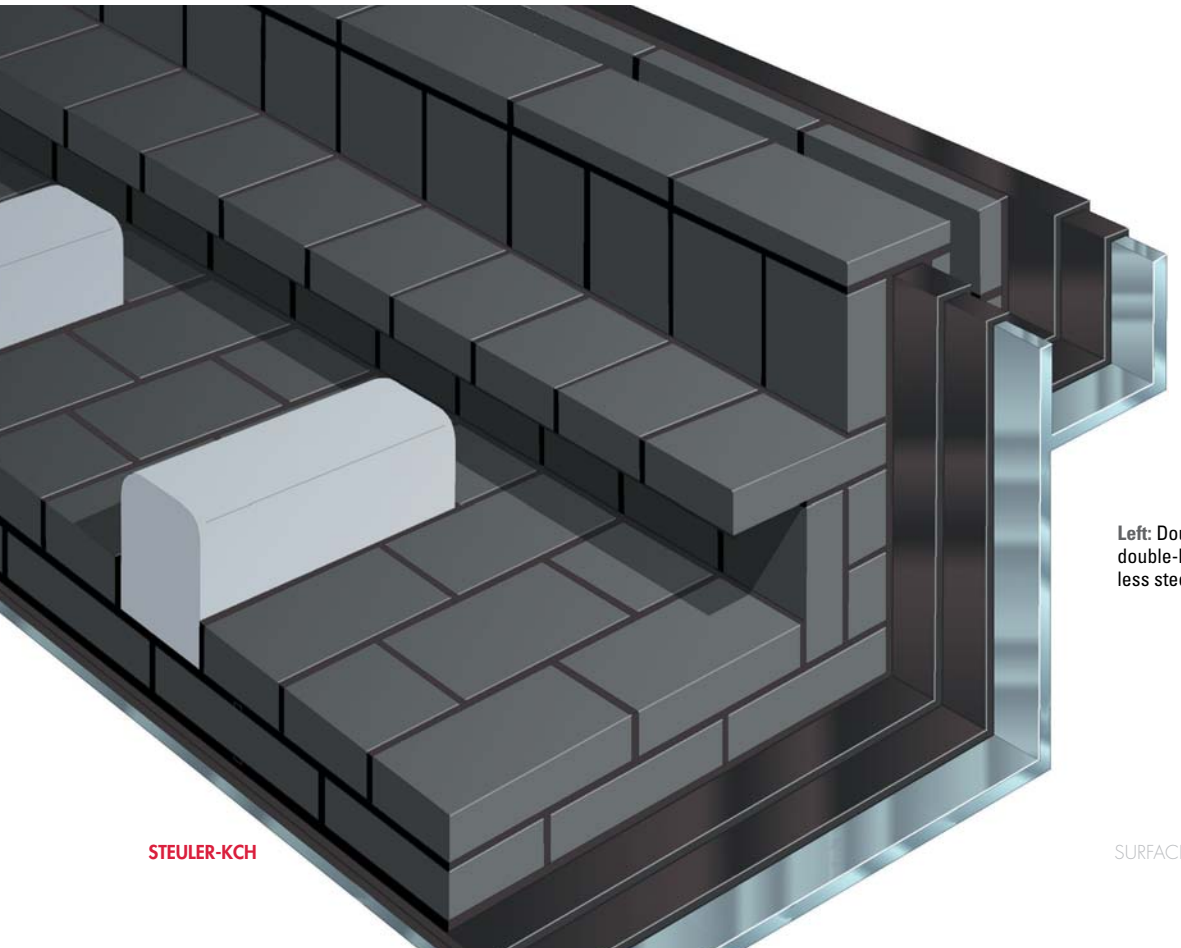
Above: Coated storage tanks in the fertiliser industry.



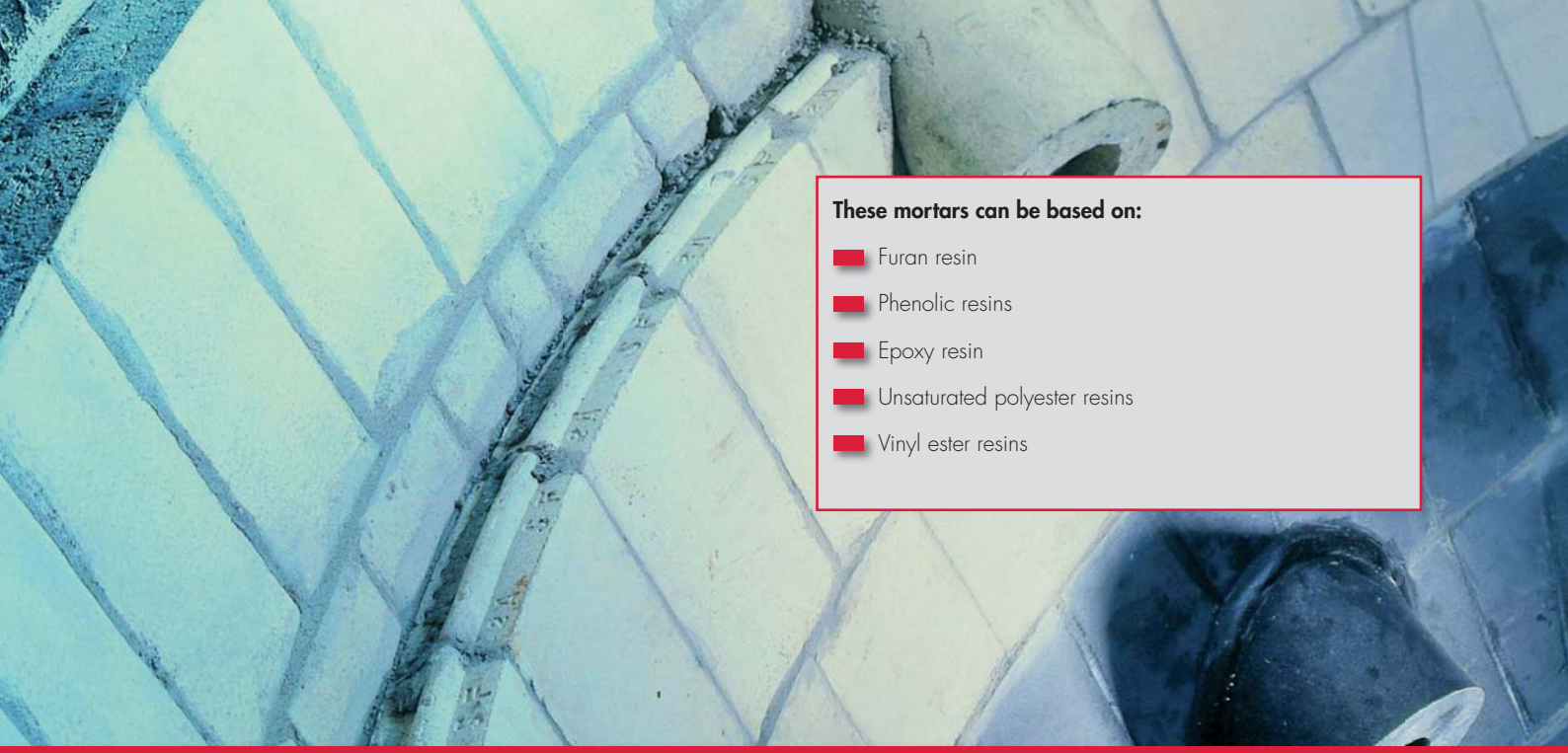
Brick Linings

Acid-proof mortars are materials which form the bed and joint in the case of combination linings or vessel brick linings consisting of a membrane and tile or brick lining. They bond the ceramics to the sealing layer in the form of an acid-poof bed as well as connecting the ceramic tiles or bricks to one another.

Nowadays for this case, innovative synthetic resins and water glass mortars are the key materials.



Left: Double-layer rubber lining and double-layer carbon lining in a stainless steel pickling tank.



These mortars can be based on:

- Furan resin
- Phenolic resins
- Epoxy resin
- Unsaturated polyester resins
- Vinyl ester resins

Combination linings and floors primarily use ceramic tiles or bricks (as specified in DIn En 14879) of a thickness adapted for the expected me-chanical or thermal stresses.
Mortars are sorted into groups based on the method used for laying the tiles:

Bedding and jointing mortar
Due to their material properties, bedding and jointing mortars are suitable for tiles and bricks linings applied using various application methods such as full bed and joint and hollow joint application.

Thin Bed Mortars
Thin bed mortars are applied to the substrate using a toothed trowel. In this bed defined thickness the tiles are applied using the hollow joint method.

Wet Grouting Mortars
Wet grouting mortars are applied as joint material between the hollow laid tiles.

Above: Coated sewage separator with additional ceramic protection.

Above: Gas inlet nozzles and self-supporting dome made of acid-proof ceramic material.

System BEKAPLAST™ – The mechanically anchored lining systems for the highest requirements

The ideal combination of stability, safety and resistance
The exceptional feature of the BEKAPLAST™ System is the anchor system on the back of the sheet, with special studs increasing in size in a conical shape. They create an inseparable mechanical bond between the thermoplastic lining and the concrete, and additionally prevent differential expansion. BEKAPLAST™ can be repaired repeatedly, ensures high impact durability, and is resistant even to biogenic corrosion, high and low temperatures and thermal shock.

BEKAPLAST™ has been successful on the market for over 40 years. From problem solutions in the chemical industry and municipal sewage systems, whether it be new installation or repair of tank or shaft linings through to tank construction – potential BEKAPLAST™ applications are as diverse as today's demands on modern, future oriented lining technology.

A wide variety of special material grades are also available.

BEKAPLAST™ HDPE: This polyethylene material is resistant to a wide range of acid and alkaline solutions. BEKAPLAST™ HDPE can be supplied as an electrically conductible material and is environmentally safe.

BEKAPLAST™ PP: This material is a highly heat-stabilised polypropylene in accordance with DIn 16971. one of the remarkable features of this material is its resistance to aqueous saline solutions, alkalis and acids. BEKAPLAST™ PP is temperature-resistant up to a permanent temperature of nearly 90° C.

BEKAPLAST™ PVDF: The material with the highest chemical and permeation resistance based on Polyvinyliodenefluorid is used especially when chlorinated hydrocarbons are present.

BEKAPLAST™ PVC: The high impact durable material also offers extreme chemical resistance and a high level of stiffness.

Above: Waste water collection shaft lined with natural-finish HDPE BEKAPLAST™.

Above: BEKAPLAST ™ collection tank in a manufacturing facility.

Above: Inside view of the sump area of a concrete/BEKAPLAST™ Flue Gas Desulphurisation plant with internals.

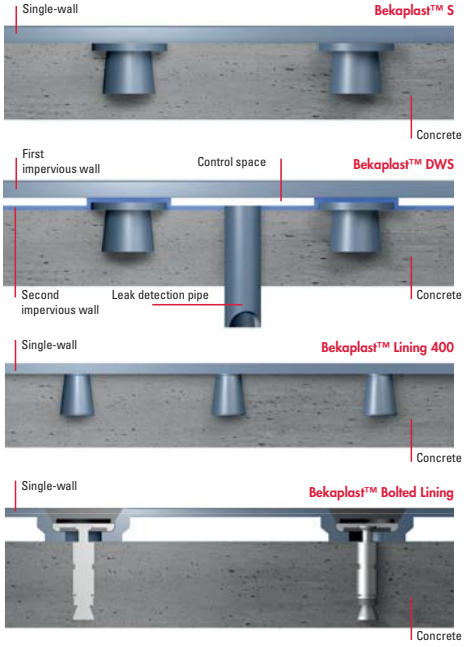
A variety of STEULER-KCH systems are available:

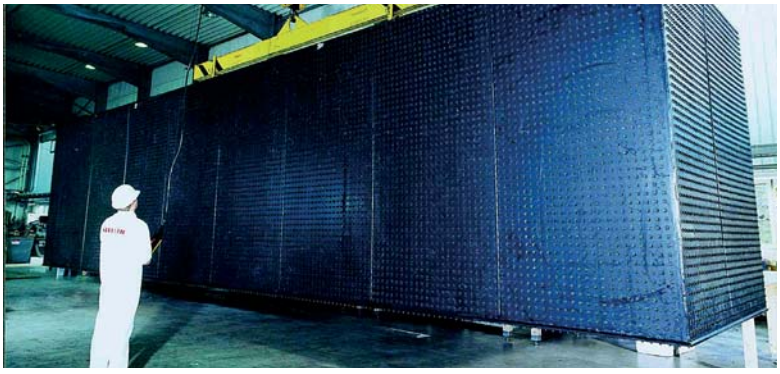
BEKAPLAST™: For sewage, reaction and processing tanks and towers, highly loaded channels in chemical plants, ventilation systems, municipal sewage systems, electrolysis cells, lignite coal bunkers and pipes. There is a Certificate from the DIBt, the German Institute for Civil Engineering, available for uses in storage, filling and transhipment facilities.

BEKAPLAST™ DWS/LS: Double-wall lining with pre-defined leakage gap to collect and display leaking fluids. Areas of use include concrete tanks that have to be monitored for tightness.

BEKAPLAST™ LINING 400: Municipal sewage systems, shafts and tanks in sewage plants, channel pipes, etc.

BEKAPLAST™ Bolted Lining: Especially well-suited for retrofitting linings and for re-lining procedures. Bolted Lining is very well suited for lining steel tanks and concrete structures. It is not necessary to remove the old coating or lining.





Above: Pre manufactured BEKAPLAST™ pickling bath for reduced renovation time.

Above: BEKAPLAST™ Lining 400 lined drinking water tank.

Alphaplast S.A.
Spain

CIMA S.r.l.
Italy

Ditescor S.A. de C.V.
Mexico

Shanghai STEULER-KCH Anticorrosion Engineering Co. Ltd.
China

STEULER-KCH Australia Pty. Ltd.
Australia

STEULER-KCH Austria GmbH
Austria

STEULER-KCH France S.A.R.L.
France

STEULER-KCH GmbH / Jordan LLC
Jordan

STEULER-KCH Maroc S.A.R.L.
Morocco

STEULER-KCH Nordic AB
Sweden

STEULER-KCH Polska Sp. z o.o.
Poland

Steuler New Caledonia S.A.R.L.
New Caledonia

Steuler Técnica S.L.
Spain

STEULER-KCH
Branch Saudi Arabia

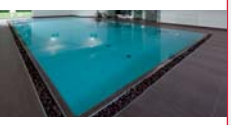
Tecresa Tecnicas de Refractorios S.A.
Spain

Together with its international subsidiaries and representatives, STEULER-KCH offers its customers a worldwide network which develops and implements comprehensive system solutions.

SURFACE PROTECTION
Lining and flooring systems
Cements, jointing materials, brick and rubber linings

PLASTICS ENGINEERING
Equipment, piping and tanks made of duroplastics and thermoplastics
Thermoplastic lining systems

REFRACTORY SYSTEMS
High temperature refractory linings



POOL CONSTRUCTION
STEULER-Q^7-System

Siershahn site

Höhr-Grenzhausen site

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Focus on Progress