

STEULER Plastic | Linings

SELF-SUPPORTING
AND DURABLE

KERA[®] DUROPLAST

Focus on Performance

STABLE AND HIGHLY CHEMICALLY RESISTANT – A UNIQUE MATERIAL

Whether hydrogen chloride gas is being split into its chemical components by electrolysis, phosphoric acid is being converted into white acid for the food industry or tyre cord and textile products made from viscose are being spun in hot acid: KERA® is the material of choice for chemical processes where maximum chemical resistance at high temperatures is required. Extensive experience with the high-performance thermosetting plastic suggests that it can rightfully be regarded as one of the most successful materials used in chemical plants.

KERA® is a phenolic or furan-resin-based thermosetting polymer that offers the possibility to custom-design the shape of your vessels, process equipment and pipelines. The material can be reinforced with glass and/or carbon fibres as well as special fillers and offers excellent chemical resistance to numerous chemicals, and in particular, non-oxidising acids and many solvents. In contrast to composite systems, its chemical resistance is not just due to the lining material, but is on all surfaces and through to the core. KERA® is a material that is media and temperature resistant throughout. Besides basic storage vessels, KERA® can also be used for absorbers and absorption towers including all the installed components, such as trays and support plates.

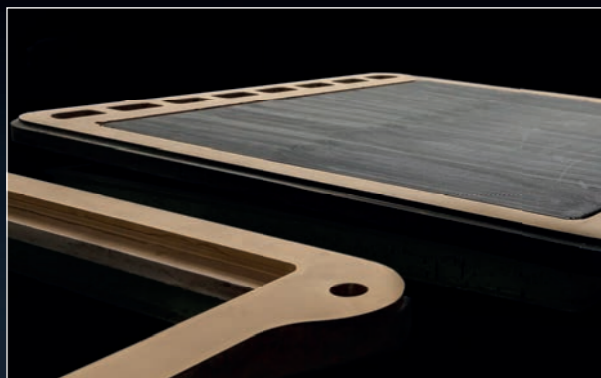
This material offers a convincing alternative to other materials where strict safety requirements must be met and large physical or chemical loads must be dealt with. Due to its outstanding properties, KERA® materials are suitable for a wide range of applications. By choosing Steuler, you have a partner at your side who can expertly employ these properties to your economic advantage.

Benefits:

- Custom design
- High rigidity
- With or without glass-fibre and/or carbon-fibre reinforcement
- Outstanding chemical resistance
- High temperatures of up to 140 °C max. 170 °C
- Easy to repair on site

Numerous applications in:

- Chemical industry
- Metal processing industry
- Chlorine-alkali electrolysis
- Pickling and acid regeneration plants
- Titanium dioxide production
- Metal ore processing
- Isocyanate manufacture
- Flue-gas scrubbers
- Acid concentration plants
- Pulp and paper industry
- Fertiliser industry
- Spun viscose fibre industry
- High-purity chemicals
- Process gas incineration plants



Stable, self-supporting and dimensionally accurate electrolysis frames made from KERA® SP 30.



Hydrochloric acid (HCl) is separated during electrolysis with KERA® frames into chlorine gas and hydrogen.

THE IDEAL MATERIAL FOR A WIDE RANGE OF APPLICATIONS

KERA® SP 30

- Chemically resistant to non-oxidising acids and many solvents
- Glass-fibre reinforced phenolic resin

KERA® SP 20

- Chemically resistant to non-oxidising acids and many solvents
- Stands up very well to cyclic thermal and mechanical stresses
- With glass and carbon-fibre reinforced phenolic resin

KERA® SP 21

- Highly chemically resistant to non-oxidising acids and many solvents
- Very good anti-static properties
- Well suited for use with highly flammable materials
- Also approved for media containing hydrogen fluoride
- Carbon-fibre-reinforced phenolic resin

KERA® FU 23

- Highly chemically resistant to non-oxidising acids and many solvents
- Also approved for alkaline environments as well as hydrofluoric acid
- Very good anti-static properties
- Carbon-fibre-reinforced furan resin



Rollers made from KERA® SP 20 used for cellulose processing, with 20 % sulphuric acid (H₂SO₄) as the process medium and a working temperature of 70 °C.



Packing support made from KERA® for use in various columns.

PHYSICAL DATA

		SP 30	SP 20	SP 21	FU 23
Density	g/cm ³	1,6	1,5	1,4	1,7
Tensile strength	N/mm ²	13	20	15	20
Elongation at break	%	0,23	0,5	0,3	0,3
Young's modulus from tensile test	N/mm ²	4400	5100	6000	7800
Flexural strength	N/mm ²	35	40	40	34
Young's modulus from flexural test	N/mm ²	3800	4500	5000	5500
Coefficient of linear expansion	10 ⁻⁶ /K	20	20	17	25

CHEMICAL RESISTANCE

Non-oxidising acids: Hydrochloric acid, hydrofluoric acid, hydrobromic acid, phosphoric acid, acetic acid +

Oxidising acids: Nitric acid, perchloric acid -

SiO₂-dissolving acids: Hydrofluoric acid +

Salts: Sodium chloride, potassium chloride, iron chloride, copper sulphate, potassium cyanide +

Caustic solutions/bases: Caustic soda solution, caustic potash solution, calcium hydroxide -

Aliphatic hydrocarbons: Hexane, heptane, octane, isooctane +

Aromatic hydrocarbons: Benzene, aniline, toluene, xylene +

Chlorinated hydrocarbons: Carbon tetrachloride, dichlorobenzene, monochlorobenzene +

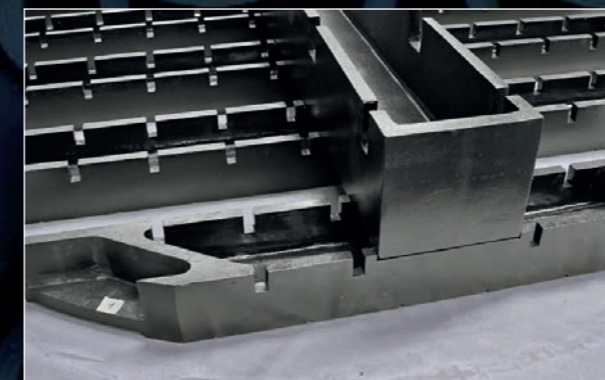
Esters: Ethyl acetate, methyl acetate, isobutyl acetate 0

Ketones: Acetone, butanone 0

Alcohols: Ethanol, methanol, isopropyl alcohol 0

Oils/fats +

+ resistant 0 conditionally resistant - not resistant



Support grids made from KERA® for use in various process stages of columns.



Complete HCl absorber made from KERA® SP 30 / FRP for extreme operating environments. In this case, 32 % hydrochloric acid (HCl), operating temperatures of up to 120 °C, designed for an operating pressure of -1.0 / + 0.5 bar.

Bubble cap tray for a phosphoric acid process stage. The tray is made from KERA® SP 20, the cap from KERA® SP 21.

KERA® materials can be easily manufactured into specifically customised process equipment, self-supporting components and piping systems without having to accept standardised compromises. KERA® is always formed to create custom shapes in its uncured state. The time-consuming construction of complicated moulds is unnecessary. Complex components can be created in separate moulds and then joined together to form complete components or process equipment. Following curing in the autoclave, the result is a finished, self-supporting construction (depending on application) that can endure temperatures of 140 °C, and even 170 °C for a short time, without deforming. The stiffness of the construction can be significantly increased by way of an additional reinforcing laminate. Its chemical resistance is comparable to that of high-performance thermoplastics like highly chlorinated and fully fluorinated plastic liners. KERA® is also a cost-effective alternative to components made from graphite.

PROCESS EQUIPMENT— COMPONENTS — PIPES — **STABLE AND RELIABLE**

The material is highly resistant to weathering and ageing. Should it become necessary to perform modifications, upgrades or repairs, they can also be carried out simply and easily on-site. This is made possible with an installation kit comprising of acid-hardened cement that can even be processed by your own workers. These are just a few of the reasons why KERA® represents a viable alternative to metallic materials, especially in the chemical industry.

You can always rely on Steuler Linings: A wealth of expertise in manufacturing and processing combined with reliable service. Focusing on the individual needs of our customers, our engineers and technicians design and construct process vessels, storage tanks, piping systems and special components exactly according to specification. We deliver efficient solutions of the highest quality with the added bonus of project planning, installation and maintenance services — everything from one source. We advise and develop with you the ideal solution — from concept to on-site implementation.



Sulphuric acid process vessel made from KERA® SP 20 in the viscose fibre industry. The many individual segments are precisely assembled and securely bonded together on site.



Stable, self-supporting pipelines with maximum chemical resistance.



Distributor plates from KERA® 21 for a production plant for white phosphoric acid.

STEULER

Plastic | Linings

Together with our subsidiaries and representatives, Steuler offers a worldwide network to our clients that develops and implements comprehensive system solutions.

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CIMA S.r.l.

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