

Hard Compound **KALCRET**

Cast or Trowelled
Wear Protection
for System Components
and Pipes



kalenborn

The Wear Protection People

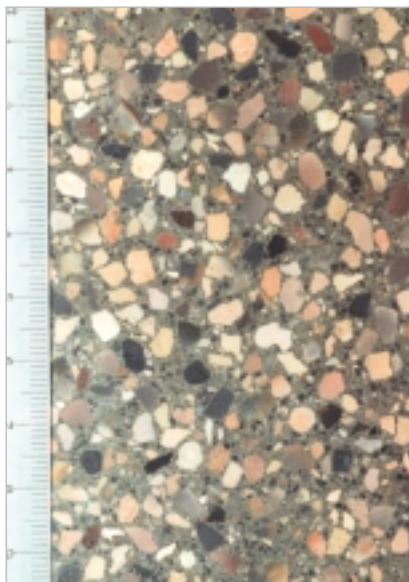
KALCRET Hard Compound

Cast or Trowelled Wear Protection for System Components and Pipes

KALCRET hard compound is the general term for cement-bonded wear-protective materials. These are based on inorganic materials of high compressive strength and wear resistance.

The high density is attained by a well-balanced particle size distribution of the individual components. The pores between the cement particles are filled by the addition of superfine particles of micro silica.

The high compressive strength of KALCRET is reached after 2 days. For repair work the compressive strength after 1 day is sufficient.



Structure of KALCRET:
strong cement matrix,
hard aggregate materials 0 - 4 mm
(bauxite, corundum or silicon carbide).

The mixture, which includes defined additives, is made up of:

- hard aggregate materials
- cement binder
- micro silica

For improved structural strength defined amounts of steel fibres are added. Expansion joints are added when using KALCRET for higher temperatures.

With regard to chemical resistance, KALCRET is more stable than concrete. On the other hand KALCRET should not be used as acid protection.

Combinations with other Wear-Protecting Materials

KALCRET is very suitable for combination with other materials from the Kalenborn program such as

- ABRESIST
fused cast basalt
- KALCOR
fused cast corundum
- KALOCER
high alumina ceramics



Raw meal duct in a cement plant.



Hot gas cyclone at 1000 °C/1932 °F.



Lining of a vertical mill.

Advantages of KALCRET

- high strength and abrasion resistance to wear caused by sliding friction
- large-surface lining
- varying lining thickness depending on the stress due to wear
- can be used at high temperatures
- high thermal shock resistance
- oxidation stability
- even complicated geometries feasible
- ideally suited for repairs
- can be installed at the site by the local available staff
- complete wear protection program
- optimal solution due to the combination with other wear resistant materials from Kalenborn



Typical Applications

Applications

- bunkers
- channels
- chutes
- cyclones
- deflector hoods
- dust collecting ducts
- gas purifying systems
- hoppers
- hydraulic conveying systems
- pipes
- pipe bends
- pneumatic conveying systems
- separators
- silos
- tanks

Industries

- aluminium plants
- cement industry
- coal fired power plants
- glass factories
- iron/steel production
- mineral wool production
- mining
- non-ferrous metal mining and beneficiation
- refuse incinerating plants

Working with KALCRET



Packing

Normally, KALCRET is packed in 25 kg bags.

Provided the hard compound is stored in a dry environment, it can be kept at the site up to 12 months after production.

Working of KALCRET

Proper working of the hard compound KALCRET requires a careful preliminary treatment of the surfaces to be lined:

- an appropriate metal wire mesh shall be fixed to the steel as well as to the concrete surfaces

- concrete surfaces shall be cleaned (to be free from oil and grease) and previously wetted

Complying with the specified water/cement factor is of great importance to reach the high strength for the hard compound. Only that quantity of water should be added into the system which is required for the chemical reaction.

Forced circulation mixers shall be used to ensure good mixing. Wetting the superfine particles requires mixing periods of approximately 10 minutes.

The workability of KALCRET differs noticeably from that of conventional cement mortars. KALCRET that is applied by trowelling requires relatively great force for manual compacting. Castable KALCRET requires vibrators for compaction.

When used for temperatures above 100 °C / 212 °F, a specific heat-up curve has to be observed to prevent spalling of the lining due to the steam that is generated.

Since KALCRET is characterized by intense reaction after mixing, suitable measures have to be taken to avoid evaporation of the mixing water.

The KALCRET mixture has a pot-life at 20 °C / 68 °F of approximately 1 hour.

Installation

KALCRET can either be applied at the Kalenborn works or at site. For installation on site, a comprehensive range of tools and equipment is available.

Expert Advice

Many varying factors determine which Kalenborn products will be suitable to solve the specific wear problem.

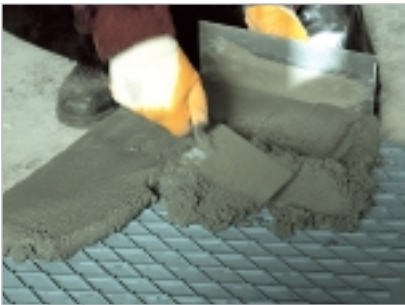
Our experts will give you comprehensive advice and submit proposals tailored to the particular requirements.



KALCRET Trowelled Compound

This compound allows protection on vertical, inclined and curved surfaces.

KALCRET and added steel fibres are homogeneously mixed, applied manually to the correspondingly prepared sub-surface with typical bricklayer's tools,



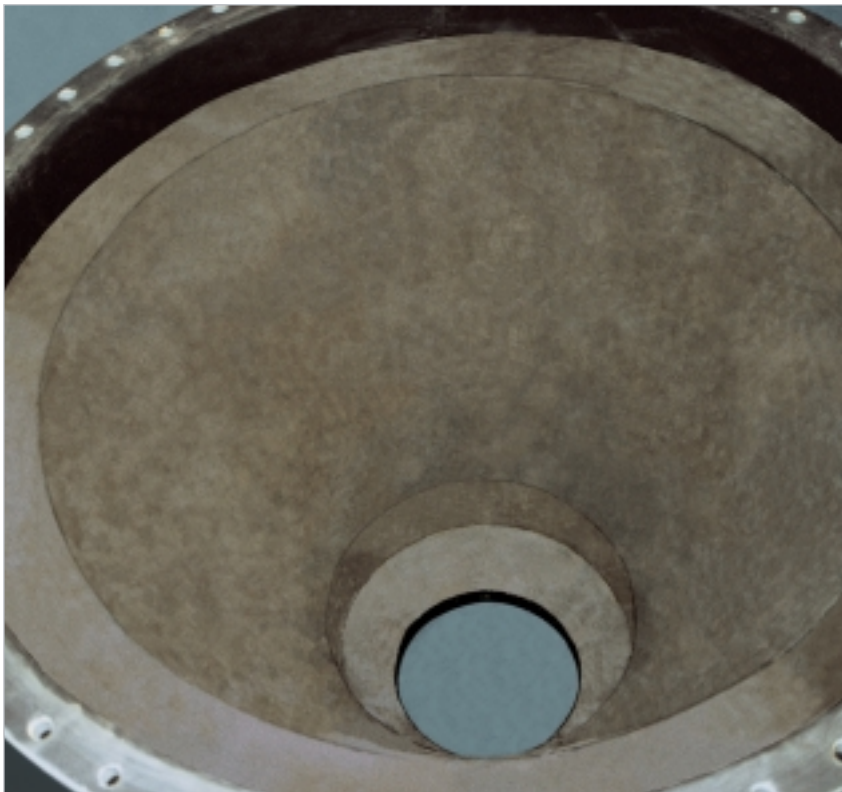
compacted by hand or vibrators and smoothed. This method makes most geometries feasible.

The use of formwork for vertical and inclined surfaces is not necessary.

All surfaces require spot attachment of metal wire mesh to ensure good adhesion to the sub-surface.

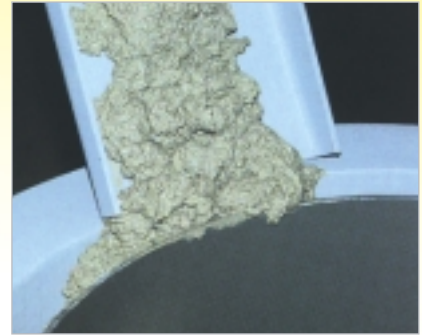
Concrete surfaces shall be thoroughly cleaned and all loose particles removed. The concrete surfaces should be wetted prior to the application of KALCRET.

The use at higher temperatures necessitates the selective provision of expansion joints.



KALCRET Cast Compound

This material will be particularly useful for wear protection of flat surfaces. Normally, simple formwork will be adequate.



Vertical and inclined surfaces require appropriate formwork.

The castable material is mixed as specified, cast into the prepared formwork and compacted with a vibrator. Slow casting and compaction of smaller quantities results in uniform wear protection.

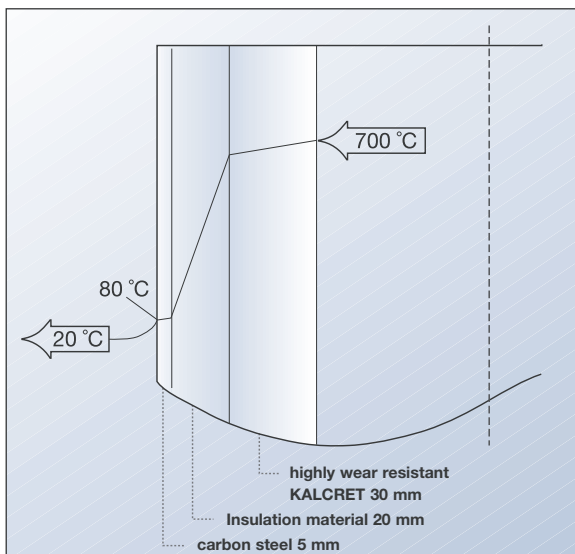
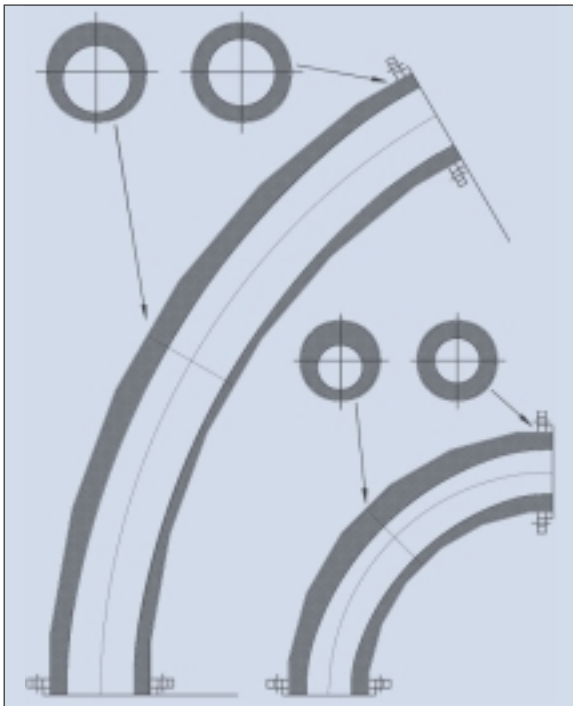
The formwork can be stripped after approximately 24 hours but the KALCRET lining still requires protection against evaporation of water too quickly.

Prefabricated Products

KALCRET Pipes and Bends

Pipes and bends with an inside diameter of more than 40 mm can be lined with KALCRET.

Pipes and bends up to 600 mm inside diameter are lined with KALCRET cast compound while lining with KALCRET trowelled com-



ound is more economical for pipes and bends of larger diameter.

The advantage of the KALCRET wear protection is that the lining can be made thicker in the outer radius of the bend where it is subject to higher wear (asymmetric cross section).

Thanks to the production process, the manufacture of radii is highly flexible. Even particularly small radii can be fabricated.

All pipe connections of the well-known Kalenborn program can be used. Wear can be monitored with the aid of KALDETECT.

Benefits:

- minimum inside diameter down to 40 mm
- radii of more than 500 mm (variable)
- pipe length up to 5,000 mm
- jointless lining with a minimum thickness of 20 mm
- asymmetric cross section possible
- connections as defined in standard specification Rd 6a
- wear monitoring by KALDETECT

Use at High Temperatures

Systems lined with KALCRET and characterized by a specific wall construction are offered for use at high temperatures. A particular insulation material has been mounted between the steel shell and the wear-resistant KALCRET hard compound.

Benefits:

- temperature difference up to 620 °C/1,148 °F at a wall thickness of 55 mm
- low weight thanks to minimized dimensions
- use of cost-effective carbon steel as structural material
- excellent wear protection at extremely high temperatures up to 1,000 °C/1,832 °F

Prefabricated Shapes of KALCRET

Prefabricated shapes of the KALCRET hard compound have performed well in actual practice. Tile shapes are prefabricated at Kalenborn from the cast compound and provided with fastening devices, such as weld-on bolts.

The shapes are compacted on a vibrating table. The size of the shaped elements is limited to one easily handled. Dimensions of 300 x 1,000 mm at a thickness of 30 mm are realistic.

Benefits:

- Minimized engineering and minimum number of different shapes while achieving a „jointless“ lining.
- High density and thus high abrasion resistance of the prefabricated shapes. The consistent quality available in shop fabricated pieces reduces the „man factor“.
- Drastically reduced installation periods; prefabricated shapes allow quick and precise installation over large surfaces.
- Lining can be used immediately after installation, with no need for curing.
- Installation of linings of KALCRET prefabricated shapes is not a problem during the winter months at outside temperatures below 5 °C/41 °F. The costly heating of uncured components is not necessary.

Lining of Preheater Cyclones in a Cement Plant

Our Solution: KALCRET shapes prefabricated by Kalenborn, fitted with insulation and mechanically fastened to the steel plates have been the solution to these requirements.

That answer simultaneously offered high wear resistance, high thermal insulation and short installation periods. The complete installation of more than 200 m² was carried out in less than 2 weeks. The system was able to resume operation immediately.

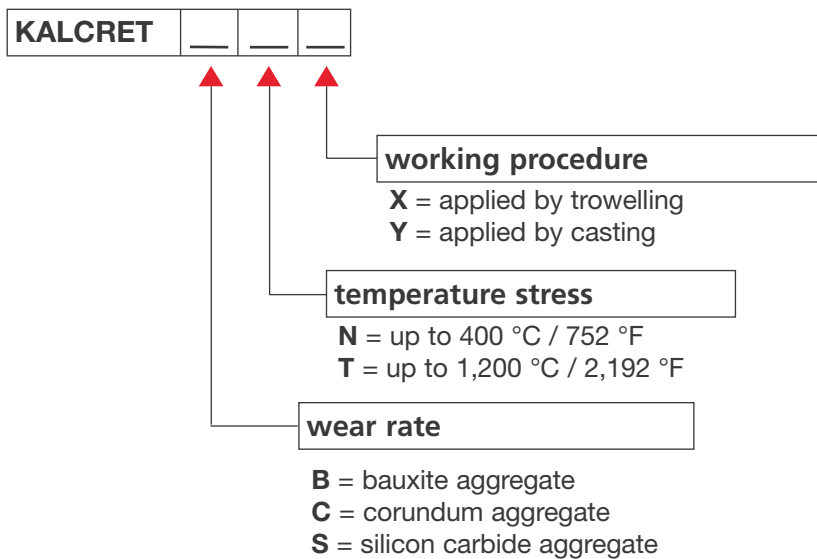


Range of KALCRET Products

	KALCRET BN	KALCRET CN	KALCRET SN	KALCRET BT	KALCRET CT	KALCRET ST
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All compounds can be installed either by trowelling (X) or casting (Y).

hard aggregate	bauxite	corundum	SiC	bauxite	corundum	SiC
particle size mm	0...4	0...4	0...4	0...4	0...4	0...4
density g/cm ³	2.8	2.9	2.8	2.8	2.9	2.8
compressive strength - 28 days N/mm ²	190	185	150	180	175	140
bending tensile strength - 28 days N/mm ²	26	26	20	25	25	18
max. application temperature °C / °F	400 / 752	400 / 752	400 / 752	1,200/2,192	1,200/2,192	1,200/2,192
wear rate acc. to Böhme cm ³ /50 cm ²	< 4	< 2	< 1	< 4.5	< 2	< 1



Example 1

KALCRET **B** **N** **X**

B = bauxite aggregate
N = for temperatures up to 400 °C / 752 °F
X = can be applied by trowelling

Example 2

KALCRET **S** **T** **Y**

S = silicon carbide aggregate
T = for temperatures up to 1,200 °C / 2,192 °F
Y = can be applied by casting

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