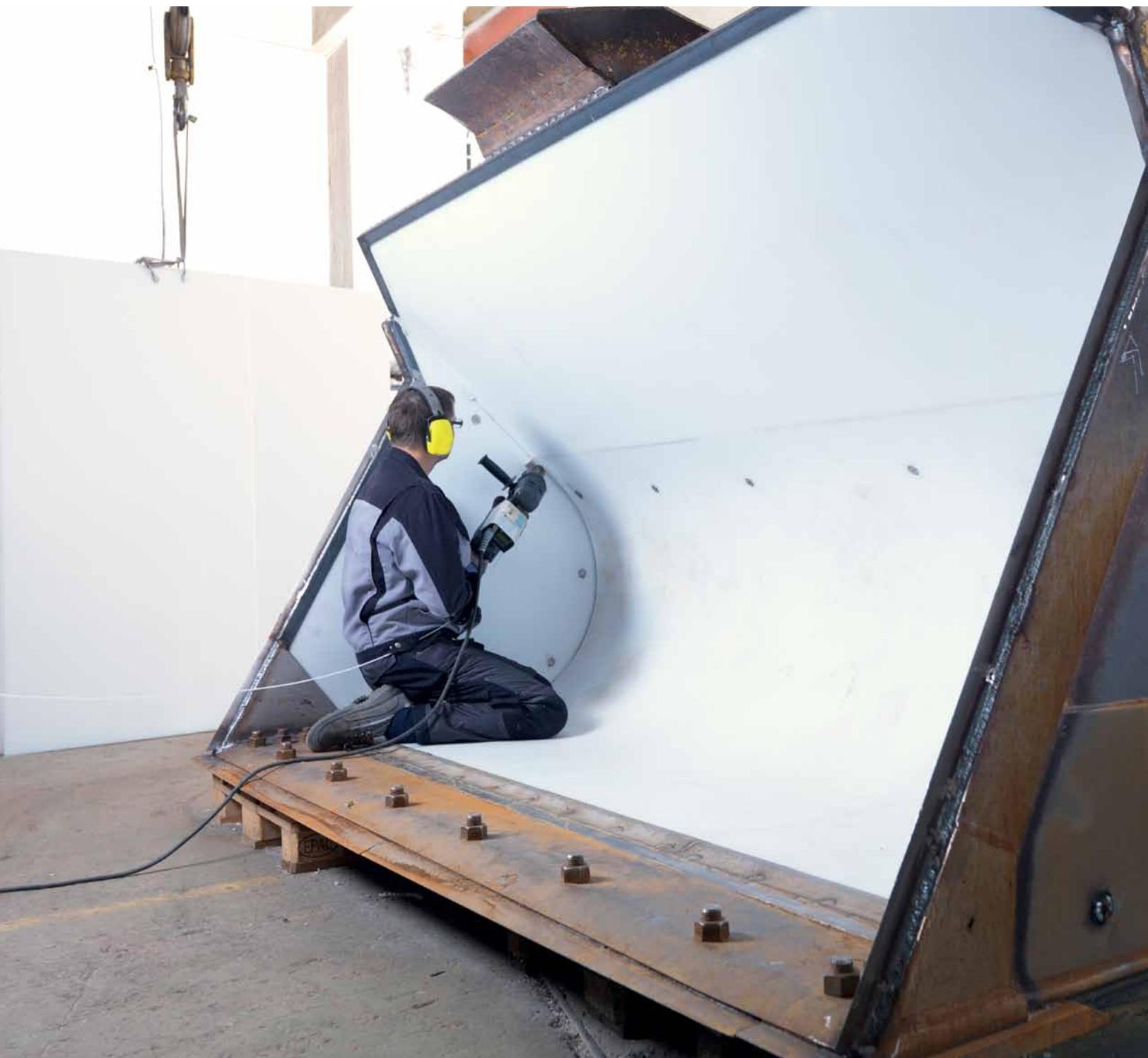


»» Slide Promoting Linings

for Production and
Conveying Systems



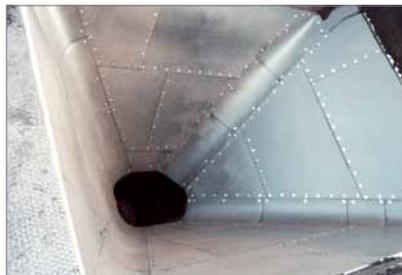
>> Slide Promoting Linings Enhance the Production Flow

Bunkers, chutes, troughs or similar equipment used for the storage and transportation of fine grained bulk materials often suffer problems of flow.

The sliding properties of typical wall materials, such as concrete or steel, are in most cases inadequate to ensure mass flow for the utilization of the complete storage volume. Depending on the bulk material being handled, sticking and/or material accumulations will develop. Clogging, reduced storage volumes or plant interruptions may occur which require costly flow promoting efforts.

In actual practice, these flow promoting efforts reach from manual tapping to expensive air blast guns and mechanical discharge machines.

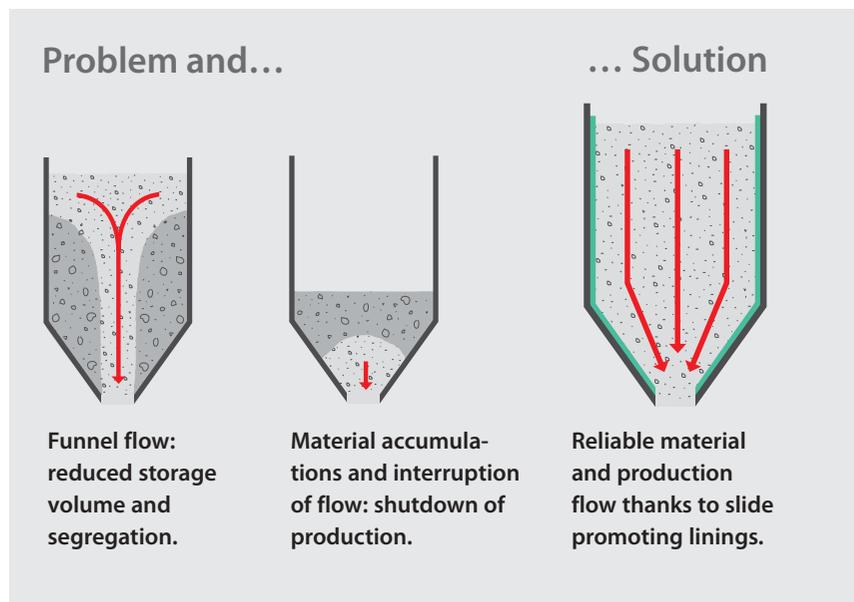
Even newly built installations can have these problems which cannot be avoided by structural measures, such as steeper sliding surfaces. The situation is even more complicated for plants that are already in operation.



Significant improvements can be achieved by selective measures to reduce wall friction and to avoid adhesion, i.e. by the use of slide promoting linings.

Kalenborn uses different materials for that purpose and offers the most suitable lining and fastening techniques.

Bunker for fine coal:
The slide promoting lining ensures the material flow without sticking and clogging.



KALEN

KALEN synthetic sliding material is highlighted by extremely good, material specific sliding properties. It serves primarily for slide promotion.

KALINOX

KALINOX sliding steel reaches sliding properties approximately as good as KALEN. In addition, it features good wear resistance against abrasive material.

KALCERAM

KALCERAM hard ceramics are used for slide promotion wherever more intense abrasion and sticking constitute a twofold problem.

>> KALEN Linings

Thermoplastic Synthetic Materials Featuring Slide Promoting Properties

KALEN linings are characterized by good corrosion resistance, an excellent surface finish and low weight.

Types available

The range of KALEN products mainly includes following different polyethylene (PE) types:

KALEN-250

(high molecular weight)

KALEN-500

(high molecular weight)

KALEN-1000

(ultra high molecular weight)

KALEN-1006

(ultra high molecular weight)

Depending on the specific application, other synthetic materials are used and installed as linings: e.g. KALEN-PP (polypropylene) at temperatures up to 100 °C or KALEN-PVC (polyvinyl chloride) in case of a particular chemical condition. Material modifications with anti-static properties and low flammability are offered as well.



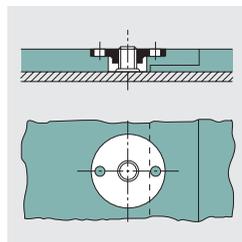
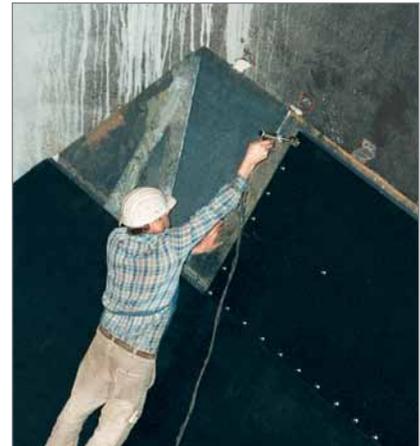
Shaped in a furnace, KALEN linings cut to size adapt themselves to curved surfaces.

Fixing and installation

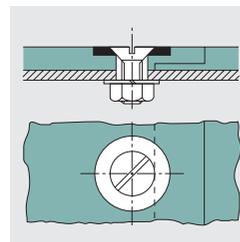
Fixing depends on the component to be protected and the properties of the material chosen. Generally, mechanical fixing methods have proven particularly successful.

Kalenborn offers different types of bolts, doweling methods and specific weld studs with special nuts.

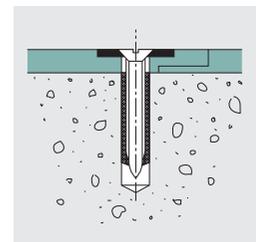
To avoid joints, particular types of KALEN allow welding of the sheets.



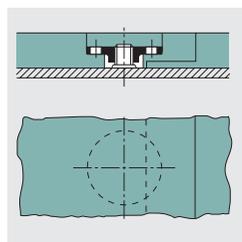
Fixing on steel by means of weld studs with special self-locking two-hole nuts.



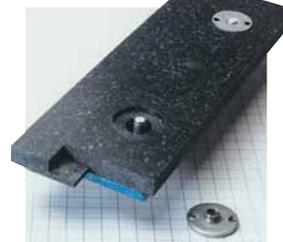
Fixing on steel by means of countersunk bolts with nut and lock washer.



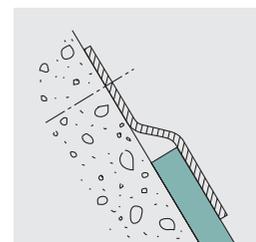
Fixing on concrete by means of countersunk screws and impact anchors.



The "closed" solution has all fixing points of the lining closed with KALEN plugs.



To ensure perfect sliding, fixing of the weld studs and the special nuts is flush with the KALEN surface.



A Z-shaped ledge prevents conveyed material depositing behind the KALEN sheets.

>> KALEN Linings

Thermoplastic Synthetic Materials Featuring Slide Promoting Properties

Clogging of outlets of large bunkers, e.g. for cement raw materials, fine coal or other easily sticking materials is a particularly annoying problem.

The desired mass flow will be achieved with the aid of a slide promoting lining. Sticking material accumulations and clogging will be avoided.



KALEN lining installed in a large German coal-fired power station. The material in the bunker is fine coal.



Silo cone with rectangular outlet. Plant components of any shape can be lined with slide promoting KALEN cut to the required size.



When handling sticky materials, KALEN linings have proven successful in front loader shovels.

>> KALINOX Linings

Slide Promotion and Abrasion Protection with Different Types of Stainless Steels

KALINOX linings made from high-grade stainless steel are particularly useful for cases where sliding problems are combined with abrasion. This occurs, for example, in bunkers where coal consisting of sharp edged grain would cause premature wear of a plastic lining.



Apart from the lining itself, structural changes (e.g. angle of slope) mostly result in better flow properties. Kalenborn can offer complete solutions.

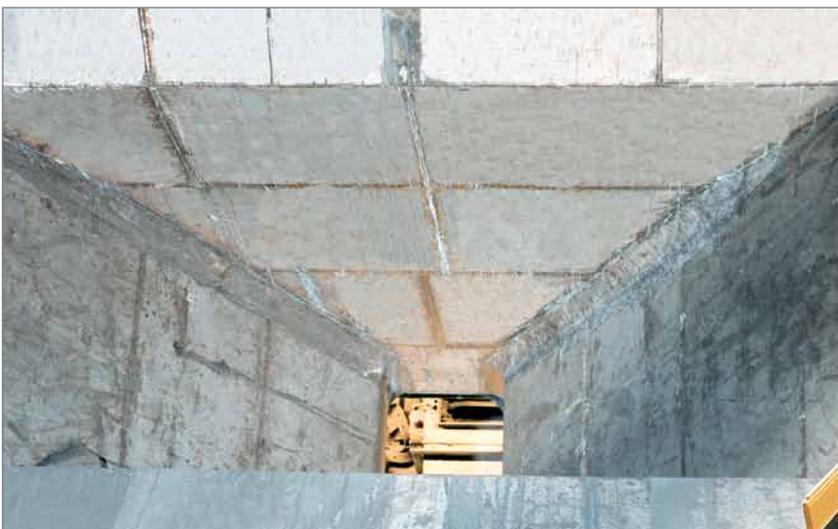
Types supplied

Depending on the requirements, KALINOX will be delivered either as sheets made from different types of high-grade stainless steel or as an integral lining, part of the sub-structure. The standard sheet thickness is 4 mm.

Fixing and installation

- In steel structures the sheet segments are welded to each other and at the same time welded to the sub-surface.
- Bunker systems made from concrete can also be successfully lined with KALINOX.

The individual KALINOX elements are doweled to the concrete surface. The fixing is mounted or welded flush with the lining surface.



KALINOX linings will restore proper functioning even of older bunker systems.

KALINOX has been used to advantage to enhance the slide properties in dump trucks.



>> KALCERAM Linings

Abrasion Resistant Hard Ceramics with Good Sliding Properties

KALCERAM is particularly suitable where apart from sticking problems intense wear occurs and where the wear resistance of higher quality linings cannot be economically justified.

The production of KALCERAM places particular emphasis on abrasion resistance.

Types supplied

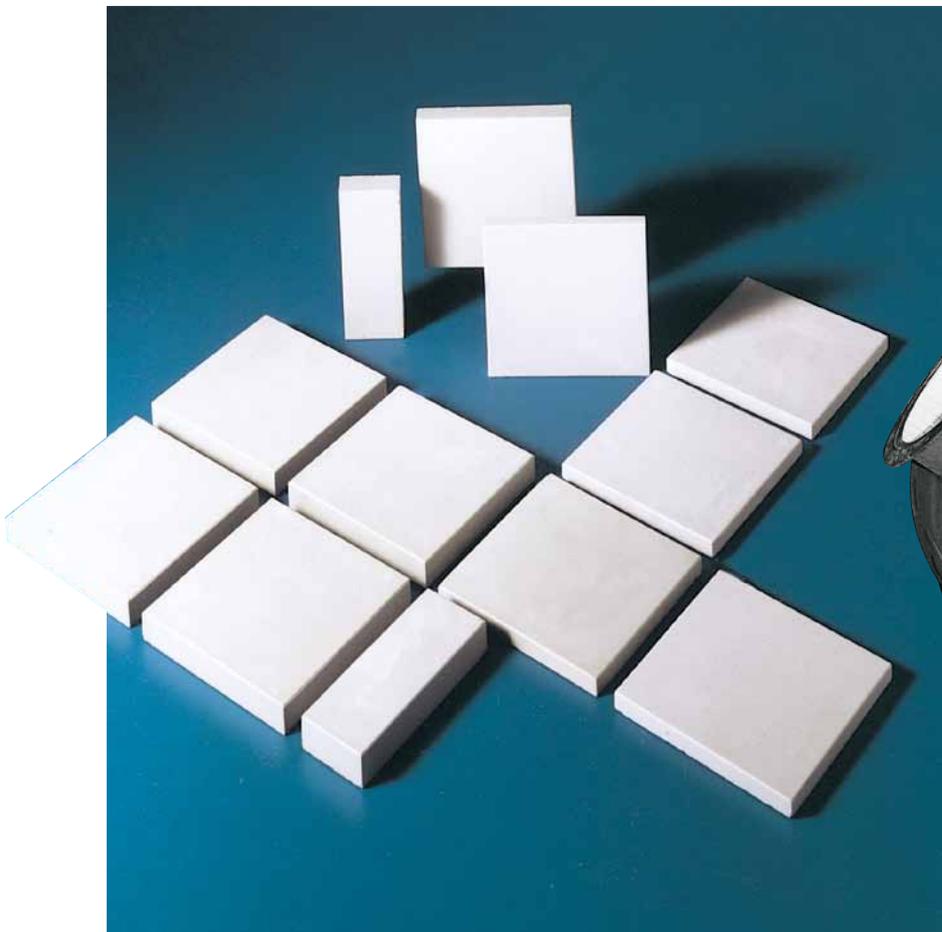
KALCERAM is delivered as standard tiles or, if required, made-to-measure tiles. They are used for plant components for which a smooth surface and medium wear resistance are requested. These include coal bunkers and chutes, fine-coal troughs, thickeners and chain conveyors.

Fixing and installation

KALCERAM tiles are set in cement mortar or KALFIX synthetic mortar.



Chutes lined with KALCERAM are a solution that lasts, e.g. for bag loading systems in cement plants.



Even conical surfaces can be lined as required by cut KALCERAM tiles.

>> Combined Linings

More Economical due to Good Material Flow and Similar Lifetimes for all Plant Components

High conveying speeds and abrasive materials cause wear in the systems. However, wear is often of varying intensity in the different areas. On the other hand good slide promoting properties are also required.

This is where a combination of the different Kalenborn linings proves successful.

Being designed on the basis of the necessary experience, all components reach similar lifetimes without one of them failing prematurely or another one having been excessively protected.



Slide promoting lining combination in the lower part of a high-level storage bin: fitted with KALEN linings on the inclined surfaces and KALINOX within the outlets which are subject to more intense wear.



KALINOX angles protect the saddle of the bin lined with KALEN.



Lining combination in a large fine coal bunker: The surfaces subject to different wear have been protected with due regard to the stress to which they are exposed, here e.g. with KALCERAM and KALEN.

>> Materials at a Glance and Application Examples

Slide Promotion Linings for Various Industries, Materials and Plant Components

Linings	Slide Promotion	Temperature Resistance	Wear Resistance	Remarks
KALEN	+++++	80 °C	+	No corrosion, very smooth surface and light weight
KALINOX	+++	550 °C	++	Slide promotion wherever abrasion and sticking constitute a twofold problem
KALCERAM	+++	350 °C	+++	For slide promotion and severe wear protection

Industries	Materials	Plant Components
Brickyards	Aggregates, clay	Bunkers
Cement industry	Fine coal, marl, limestone, cement, raw materials	Chutes
Clay industry	Clay	Discharge hoods
Coal industry	Lignite, hard coal (fines)	Dump trucks
Coke plants	Fine coal	Front loader shovels
Foundries	Molding sand	Hoppers
Glass industry	China clay	Rotary gate valves
Gypsum plants	Gypsum	Silos
Lime plants	Limestone, marl, sand	Transfer Sections
Pet food plants	Pet food, animal powder, grain	Troughs
Potassium & salt industry	Salt	Vessels
		Vibrating Troughs

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