Wear protection

element®

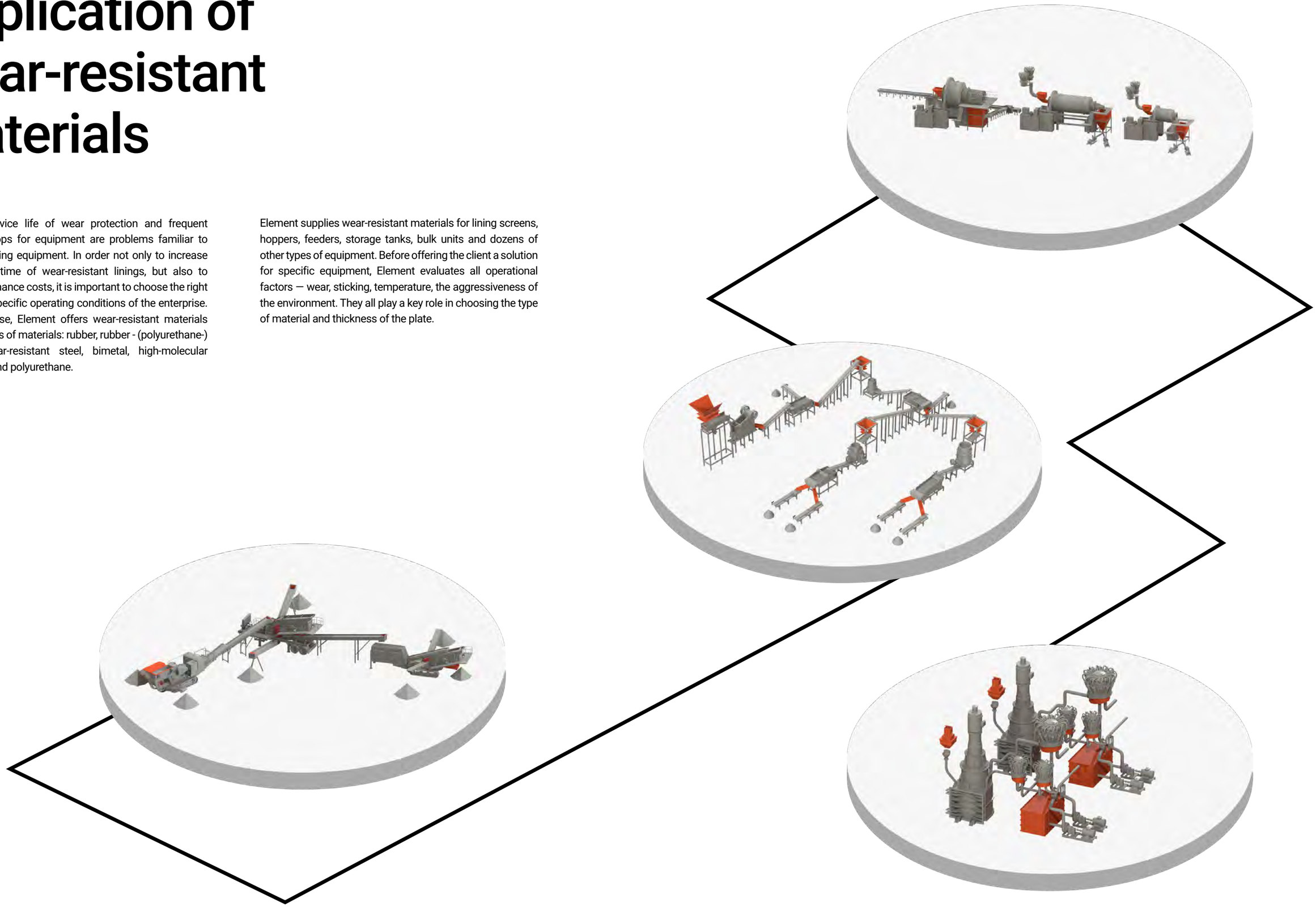
Integrity in details

Contents

Application of wear-resistant materials

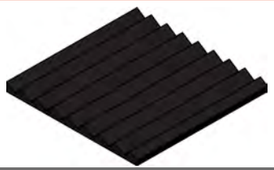
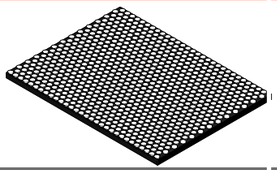
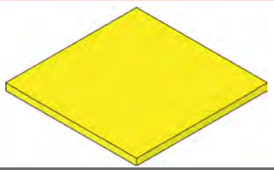
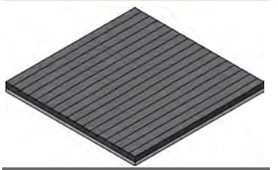
The short service life of wear protection and frequent emergency stops for equipment are problems familiar to owners of mining equipment. In order not only to increase the operating time of wear-resistant linings, but also to reduce maintenance costs, it is important to choose the right lining for the specific operating conditions of the enterprise. For this purpose, Element offers wear-resistant materials made of 6 types of materials: rubber, rubber - (polyurethane-) ceramics, wear-resistant steel, bimetal, high-molecular polyethylene and polyurethane.

Element supplies wear-resistant materials for lining screens, hoppers, feeders, storage tanks, bulk units and dozens of other types of equipment. Before offering the client a solution for specific equipment, Element evaluates all operational factors — wear, sticking, temperature, the aggressiveness of the environment. They all play a key role in choosing the type of material and thickness of the plate.



Comparison of wear-resistant plates

HYBRID

Synthetic and composite linings						Metal linings	
	Rubber lining (RU)		RU (PU)-CER	PU	UHMWPE	WRSteel	HYBRID
Standard smooth plates	Corrugated plates	Sheet rubber	Rubber (polyurethane)- ceramic plates	Polyurethane plates and sheets	Polyethylene plates	Plates	HYBRID bimetallic plates
							
Production capabilities							
thickness: 15-150 mm width: 500, 600, 750 mm length: 1500, 3000 mm	thickness: 50, 75, 100, 125 mm width: 500, 600, 750 mm length: 1000, 1500 mm	thickness: 4-25 mm width: 1400, 1500 mm length: 3000, 10000 mm	thickness: 10, 20, 35, 50, 64, 95 mm width: 250, 500 mm length: 250, 500 mm	thickness: 5-30 mm width: 1000 mm length: 2000 mm	thickness: 5-80 mm width: 1220 mm length: 3050 mm	thickness: 3-60mm width: 2000 mm length: 6000, 8000 mm	thickness: 6-45mm width: 1400, 2100 mm length: up to 3500 mm
The nature of the load							
Shock	Shock	Sliding friction	Combined	Combined	Combined	Sliding friction	Combined
Features							
1.For light and heavy conditions 2.Shock absorption 3.Vibration reduction 4.Reducing the formation of cracks 5.Noise reduction by 2 times in comparison with steel 6.Not subject to corrosion	1.For medium and hard conditions with an angle of incidence of 10-500 2.Shock absorption 3.Thanks to the grooved profile, it can be used at a material drop angle of 900	1.For light and heavy conditions 2.For wet and dry conditions 3.Protection against abrasion by small particles 4.Protection against sharp crushed material	1.For light/medium/heavy duty applications 2.Low coefficient of friction to prevent sticking 3.For processing large volumes of material with particles of different diameters	1.For dry and wet conditions 2.Protection against sliding friction of small and medium particles 3.Protection against shock loads 4.Noise reduction by 2 times in comparison with steel	1.For fine bulk material 2.Low coefficient of friction to prevent sticking 3.Good impact resistance 4.Good abrasion resistance	1.Wide range of applications 2.Easy to bend and weld 3.Extends the service life of products due to increased wear resistance	1.The wear resistance of HYBRID is 16 times higher than that of low-carbon steel. 2.Excellent weldability thanks to a base made from low-alloy steel
Application							
Hoppers Chutes Feeders Dump truck bodies Skips Overload points Intermediate hoppers Silages Feeders Cement mixers Feed boxes Discharge devices Screen edges	Hoppers Chutes Skips Overload points Intermediate hoppers Silages	Curtains Seals Screens Dust protection Hoppers Chutes Vibrating feeders Overload points Intermediate hoppers Silages Trays General wear protection	Small / Large Feeders Overload points Discharge trays Screens Chutes Bins Trays	Screens (wet screening) Dust protection Hoppers Chutes Vibrating feeders Overload points Intermediate hoppers Silages Trays Cutting blades of a scraper bowl General wear protection	Hoppers Chutes Skips Intermediate hoppers Silages Trays Screens Chutes for fine material Feeders (with easy operation)	Trucks Buckets of loaders Dump truck bodies Crushers Conveyors Sievers Feeding devices Skip lifts Chutes Shredders Hammers Crushers Shredders Lining of the blasting machine	Hoppers Chutes Feeders Dump truck bodies Overload points Intermediate hoppers Feeding boxes Discharge devices Classifier spirals Fan coils Conveyors Fleet of machinery Cyclones
Temperature conditions							
from -40ºC to +60ºC	from -40ºC to +60ºC	from -40ºC to +60ºC	from -40ºC to +60ºC	from -60ºC to +80ºC	from -130ºC to +135ºC	from -60ºC to +200º C	to +900ºC
Pages							
4			6	8	10	10	14

* It is possible to produce linings for individual sizes.

Rubber lining plates

Rubber plates have good wear resistance and tear resistance, which makes them a standard solution for protecting equipment in the mining industry. The steel substrate provides additional protection and securely fixes the plate to the surface of the equipment using bolts or welded studs.

Application: primary and secondary crushing, zones with high sliding friction impact load in feed chutes, hoppers, storage bins, transfer points etc.

Effective operating temperature range: from -40ºC to +60ºC

Basic properties:

1. Protect equipment against wear due to high shock absorbing properties
2. Reduce ore disintegration during transportation
3. Reduce noise and vibration levels compared to steel lining
4. Light-weight solution
5. Resistant to corrosion and temperature gradients
6. Easy to cut and bend for mounting

Standard smooth plates

Rubber hardness	60 Shore A
Steel substrate*	Carbon structural steel
Material drop angle	50º-90º
Standard range, mm	thickness: 15-150 width: 500, 600, 750 length: 1500, 3000

Corrugated rubber plates

Rubber hardness	60 Shore A
Steel substrate*	Carbon structural steel
Material drop angle	10º-50º
Standard range, mm	thickness: 50, 75, 100, 125 width: 500, 600, 750 length: 1000, 1500

Sheet rubber

Rubber hardness	40/60 Shore A
Steel substrate*	Without steel substrate
Material drop angle	0º-90º
Standard range, mm	thickness: 4-25 width: 1400, 1500 length: 3000, 10000

* The thickness of the steel substrate can vary from 3 to 10 mm for a rigid attachment with a mate to prevent bending, delamination and sagging under high load.

Special designation:

RU—Cor—SH60 35x500x500–5W

Material:
RU — rubber

Surface:
Cor — corrugated

Hardness

Overall dimensions, thickness-width-length, mm

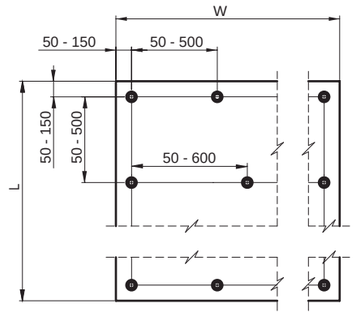
Thickness of steel sheet, mm

Fastening method

Cutting and installation:

Plate thickness, mm	Max. recommended bend radius, mm	Max. recommended bend angle, (°)
up to 25	400	0- 45
25-40	500	0- 45
40-75	600	0- 45
Over 75	Individual recommendations	

Standard mounting hole arrangement:



Standard pattern of fastening holes

Standard plugs

With L and W over 1000 mm an additional holes required

Fastening:

No coding

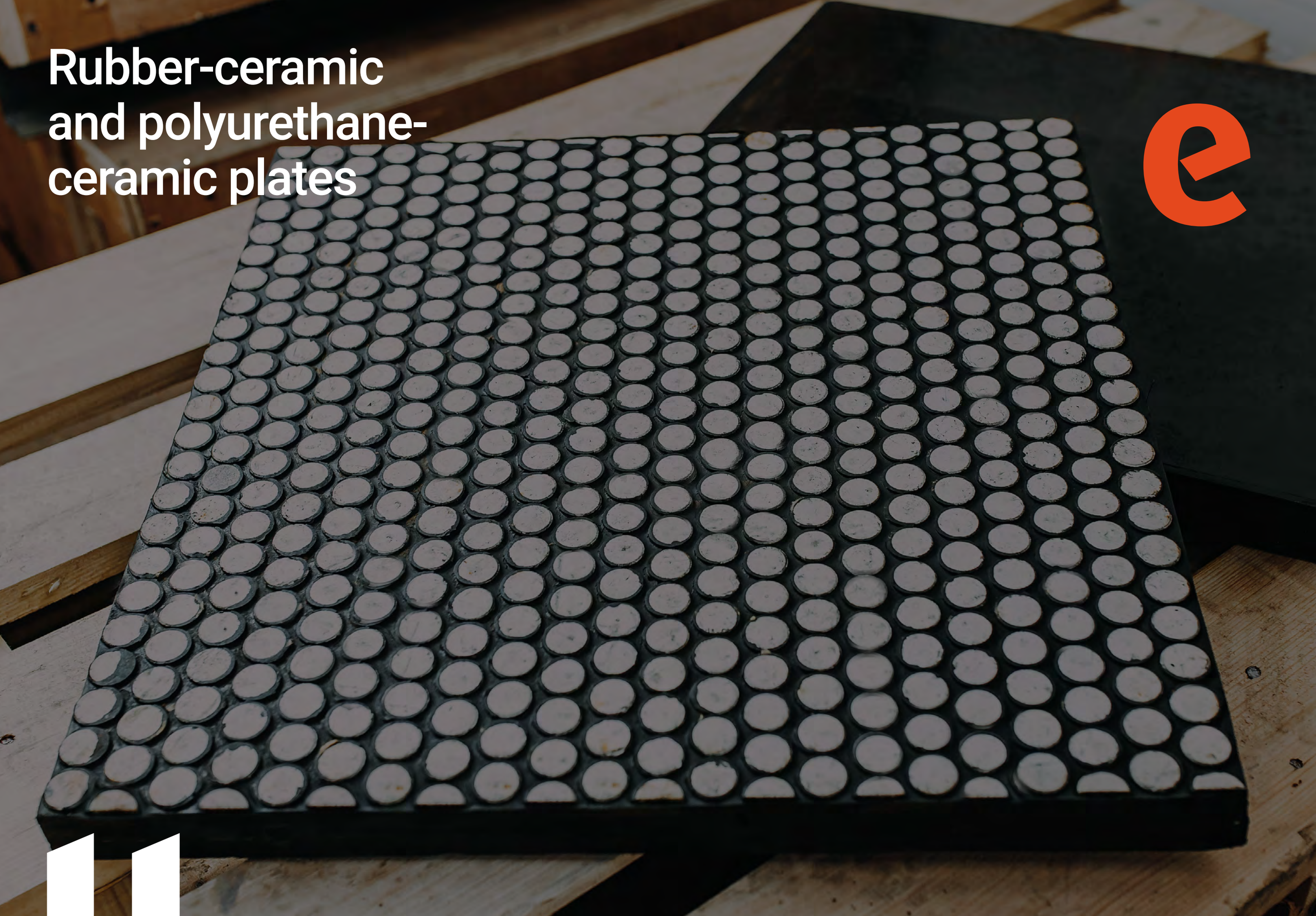
CL — with contact glue layer

VW — through hole with washer

W — welded pin

H — through hole for bolting

Rubber-ceramic and polyurethane-ceramic plates



Composite lining plates have an extremely long service life due to the high cushioning properties of rubber or polyurethane combined with the high hardness and wear resistance of aluminum oxide ceramics. For reliable fixation on the equipment, the plates also feature metal bases.

Application: feeders, chutes, trays, screen discharge chutes, transfer points in conveyor systems, deflector materials and screening chutes.

Rubber-ceramic plates

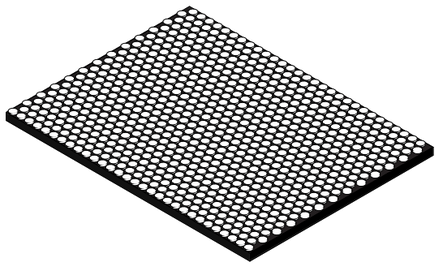
Effective operating temperature range: from -40ºC to +60ºC

Basic properties:

1 Several times longer lifetime than steel lining

2 Noise reduction and occupational safety improvement

3 Good performance in severe conditions (high volume of material with different size)



Material	Ceramic elements: aluminum oxide 92%, hardness 9 Mohs
	Rubber: type SBR, hardness 60-65 Shore
Standard range, mm*	500x500, 250x500

Polyurethane-ceramic plates

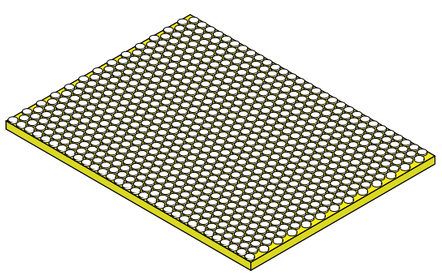
Effective operating temperature range: from -40ºC to +60ºC

Basic properties:

1 Several times longer lifetime than steel lining

2 Resistant to oil and some solvents

3 For wet and dry conditions



Material	Ceramic elements: aluminum oxide 92%, hardness 9 Mohs
	Polyurethane: hardness 60 Shore
Standard range, mm*	500x500, 250x500

* Other sizes of plates on request.

Special designation:

RC35 C20x10 500x500–5W

Material:
RC – rubber-ceramics
UC – polyurethane-ceramics

Thickness, mm

Design of the ceramic element
C — circle
S — square
R — rectangle
H — hexagon

The size of the ceramic element, mm

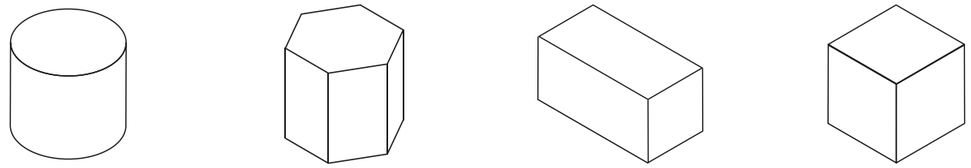
Height of ceramic element, mm

Overall standard dimensions, width-length, mm

Thickness of the steel sheet, mm

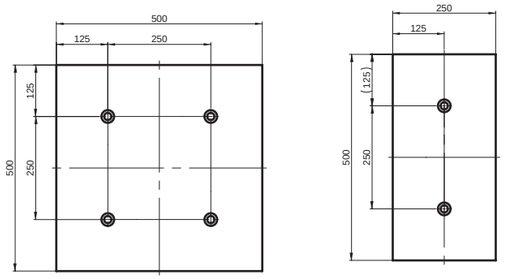
Mounting method

Design of the ceramic element

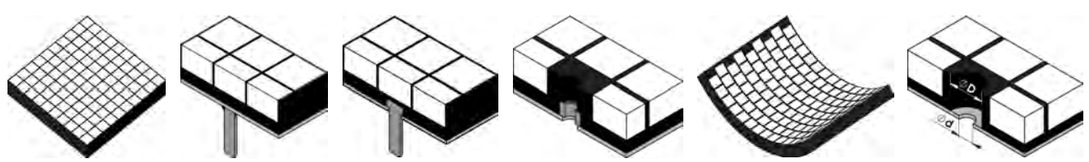


C — circle | H — hexagon | R — rectangle | S — square

Standard mounting hole arrangement:



Fasteners:



No coding | W — welded pin | WB — welded bolt | WN — welded nut | G — plate without steel substrate for gluing | H — through hole for bolting

Polyurethane lining plates

Polyurethane is the only polymer to date that has a wide variety of physical and mechanical characteristics, depending on the formulation and application area. Polyurethane has a number of significant advantages over metal, rubber and some other plastics — it has increased abrasive resistance, tear resistance, it reduces the impact of shock loads, comes in a wide range of hardnesses and features a number of other useful properties.

Due to its properties, polyurethane is one of the most promising and advanced modern synthetic materials used in the mining industry.

Application: loading chutes, bins, storage tanks for sticky, hygroscopic and abrasive materials, especially for those of small fraction. It is also suitable for curved and concave surfaces.

Effective operating temperature range: from -60ºC to +80ºC

Basic properties:

1 Better wear resistance than rubber lining

2 High tear and tensile strength

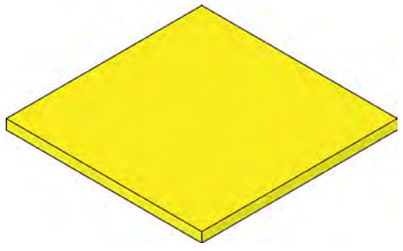
3 Wide hardness range

4 Prevent sticking and improve material flow

5 Good resistance to low temperatures

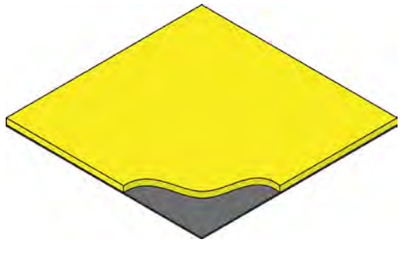
6 Allow to line curved surfaces

Polyurethane plates



Material	70 Shore A — blue color 80 Shore A — yellow color 90 Shore A — green color
Standard range, mm	Thickness: 5-30 Width x Length:1000x2000

Polyurethane plates with steel reinforcement



Material	70/80/90 Shore A Steel substrate* - carbon structural steel Ст3
Standard range, mm	Thickness: 5-30 Width x Length: 1000x2000

* The thickness of the steel substrate can vary from 3 to 10 mm for a rigid attachment with a mate to prevent bending, delamination and sagging under high load.

Special designation:

PU—Cor—SH70 50x1000x1200—5W—Blue

Material:
PU — polyurethane

Surface:
Cor — corrugated

Hardness

Overall dimensions, thickness-width-length, mm

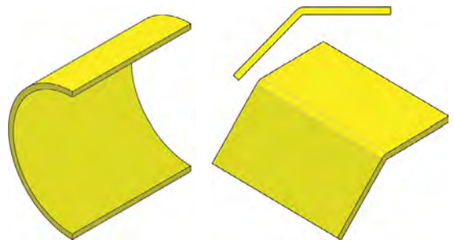
Thickness of steel sheet

Fastening method

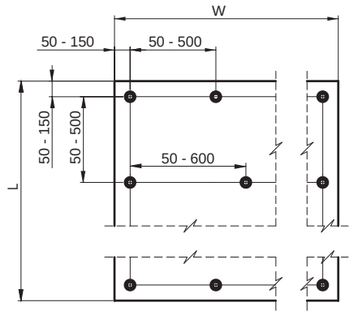
Color coding according to hardness

Cutting and installation:

Plate thickness, mm	Max. recommended bend radius, mm	Max. recommended bend angle, (°)
up to 25	400	0- 45
25-40	500	0- 45
40-75	600	0- 45
Over 75	Individual recommendations	

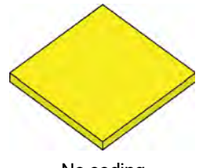


Standard mounting hole arrangement:



With L and W over 1000 mm additional intermediate holes required

Fastening:



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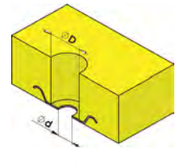
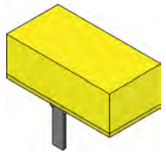


VW — through hole with washer



W — welded pin

Polyethylene lining plates

Ultra-high-molecular-weight polyethylene (UHMPWE) plates have an extremely low friction factor combined with a high impact strength. The material is used to protect against wear caused by sliding friction and shock loads at a small angle of incidence of particles, as well as to prevent sticking.

Application: loading chutes, storage bins for dry substances, storage tanks, trays for the transportation of small fraction materials.

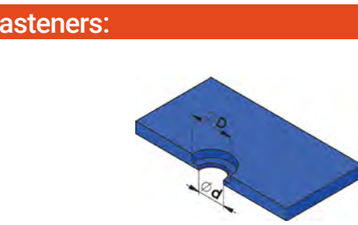
Effective operating temperature range: from -130ºC to +135ºC

Basic properties:

1 High abrasion resistance due to low coefficient of friction

2 Prevention of material stucking on the surface

3 Lightweight construction compared to steel and easy relining



Material	1. Molecular mass - 9 mln g/mol 2. Molecular mass - 4-6 mln g/mol 3. Regenerated
Standard range, mm	thickness: 5-80 width: 1220 length: 3015, 3050

Special designation:

UHMPWE—9000 40x1000x3000—H—Black—A/S

Material:
UHMWPE — polyethylene

Grade:
UHMWPE-9000 (Mw 9 mln g/mol)
UHMWPE-1000 (Mw 4-6 mln. mln g/mol)

Overall dimensions, thickness-width-length, mm

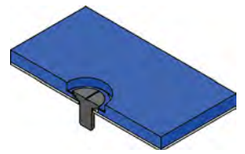
Fastening method

Color*

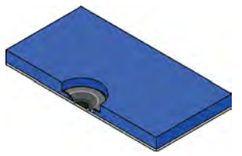
Electrical properties:
A/S — antistatic

Fasteners:

H — through hole for bolting



Bolted joint



Weld through washer

Steel wear-resistant plates

Linings made of wear-resistant steel are characterized by high hardness, strength and good impact resistance. In production, we use a method of metallurgical steel purification and a unique quenching technology. As a result, the linings acquire uniform hardness and strength.

Application: casings of drums, cement mixers, buckets, knives of feeders, trolleys, screw conveyors of mining machines and aggregate transportation vehicles.

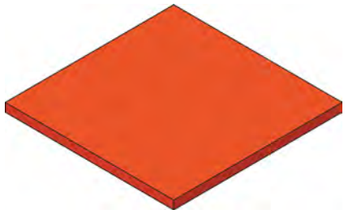
Effective operating temperature range: from -60ºC to +200ºC

Basic properties:

1 General purpose plates, resistant to wear, abrasion and cracking

2 Combine high strength with good bendability and weldability

3 Increase useful load on products and structures



Material	Wear-resistant steel with hardness of 400, 450, 500 and 550 HB Brinell
Standard range, mm	Thickness: 4-75 Dimensions of sheets: 2000X6000, 2000x8000

Special designation:

WRSteel 450HB 16x2000x6000—H

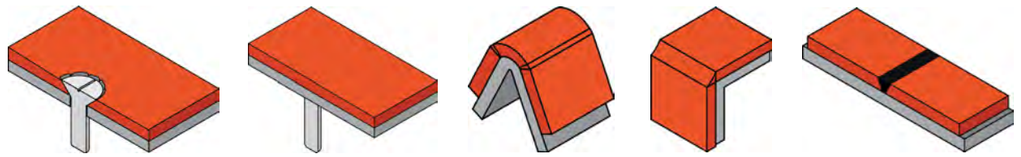
Material:
WRSteel — wear-resistant steel

Hardness

Overall dimensions, thickness-width-length, mm

Fastening method

Fasteners:



H — through hole for bolting

W — welded pin

Weld connections

* We may change the plate color on request

Bimetallic plates

The high wear-resistant properties of HYBRID plates ensure a long service life while reducing maintenance costs. We use ordinary low-carbon or heat-resistant steel as the basis for HYBRID plates. With the help of automated surfacing, a special wear-resistant coating is applied to the base. We produce HYBRID plates with uniform chemical composition and hardness thanks to an automated production method and quality control.

Application: linings of dump truck bodies, excavator buckets, crushers, loading funnels, bunkers, gutters, mixers.

ffective operating temperature range: up to +900ºC

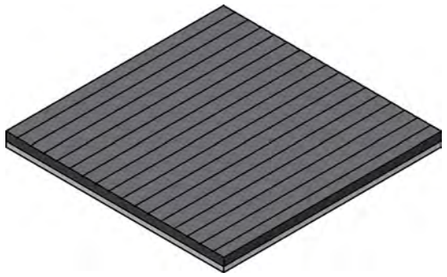
Advantages:

1 Uniformity of built-up layer in terms of hardness and chemical composition

2 Perfect welding ability thanks to low-alloy steel base

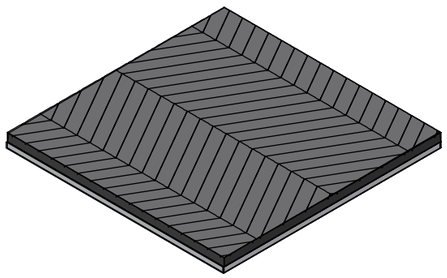
3 Possibility of cold-state deformation. Min. deformation diameter 250 mm

Properties of HYBRID plates:



Chemical composition:

Plates are produced by build-up welding of one or more wear-resistant layers on a base plate of low-carbon steel with medium or low carbon content. Alloy contains a large amount of solid particles of the chromium carbide.

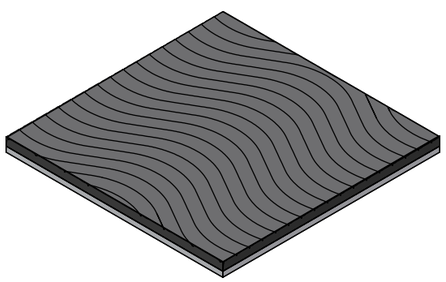


Microstructure:

Volume fraction of chromium carbide (Sg7sz) exceeds 50%.

Hardness:

Solid particles of chromium carbide are uniformly distributed throughout the layer. This creates a robust microstructure. Hardness is HRC58-65 depending on layer thickness.



Wear resistance:

Wear resistance of HYBRID is 16 times higher than that of low-carbon steel and 5 times higher than that of heat-treated steel.

Flatness tolerance:

Flatness tolerance is ± 3 mm / m

Thickness tolerance:

Uniform built-up thickness with a tolerance within 0-0.5 mm.

Special designation:

HYBRID—CR 6+3 9x1300x2800—H

Material:
HYBRID — bimetal

Surface:
CR — abrasion-resistant
HCR — high-strength and abrasion-resistant
IR — high-strength and impact-resistant
HR — heat-resistant, up to 900 °C
SP — special plates

Thickness of main layer

Thickness of built-up layer

Overall dimensions, thickness-width-length, mm

Fastening method

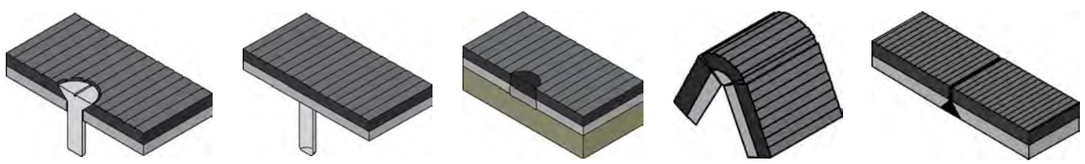
Classification:

Surface	Functions and possibilities
CR	C: 3.0-4.5%, Cr: 15-27%, 58-65HRC
HCR	C : 3.5-5.5%, Cr: 27%-40%, surface wear-resistant layer up to 25 mm thick
IR	High-strength and impact-resistant plate
HR	Heat-resistant plate, up to 900 °C
SP	Special plates with addition of Mo, Nb, Ni, W, V

Variants of thicknesses (base layer + built-up layer)*

3+3 / 4+4 / 5+5
6+4 / 6+5 / 6+6 / 6+8
8+4 / 8+5 / 8+6 / 8+7 / 8+8
10+4 / 10+5 / 10+6 / 10+7 / 10+8 / 10+9 / 10+10 / 10+20
12+4 / 12+5 / 12+6 / 12+7 / 12+8 / 12+10 / 12+11 / 12+12 / 12+18 / 12+20
14+6 / 14+8 / 14+10
16+6 / 16+8 / 16+10
18+6 / 18+8 / 18+10
20+5 / 20+6 / 20+8 / 20+10 / 30+10 / 40+10 / 20+20 / 20+25

Fasteners:



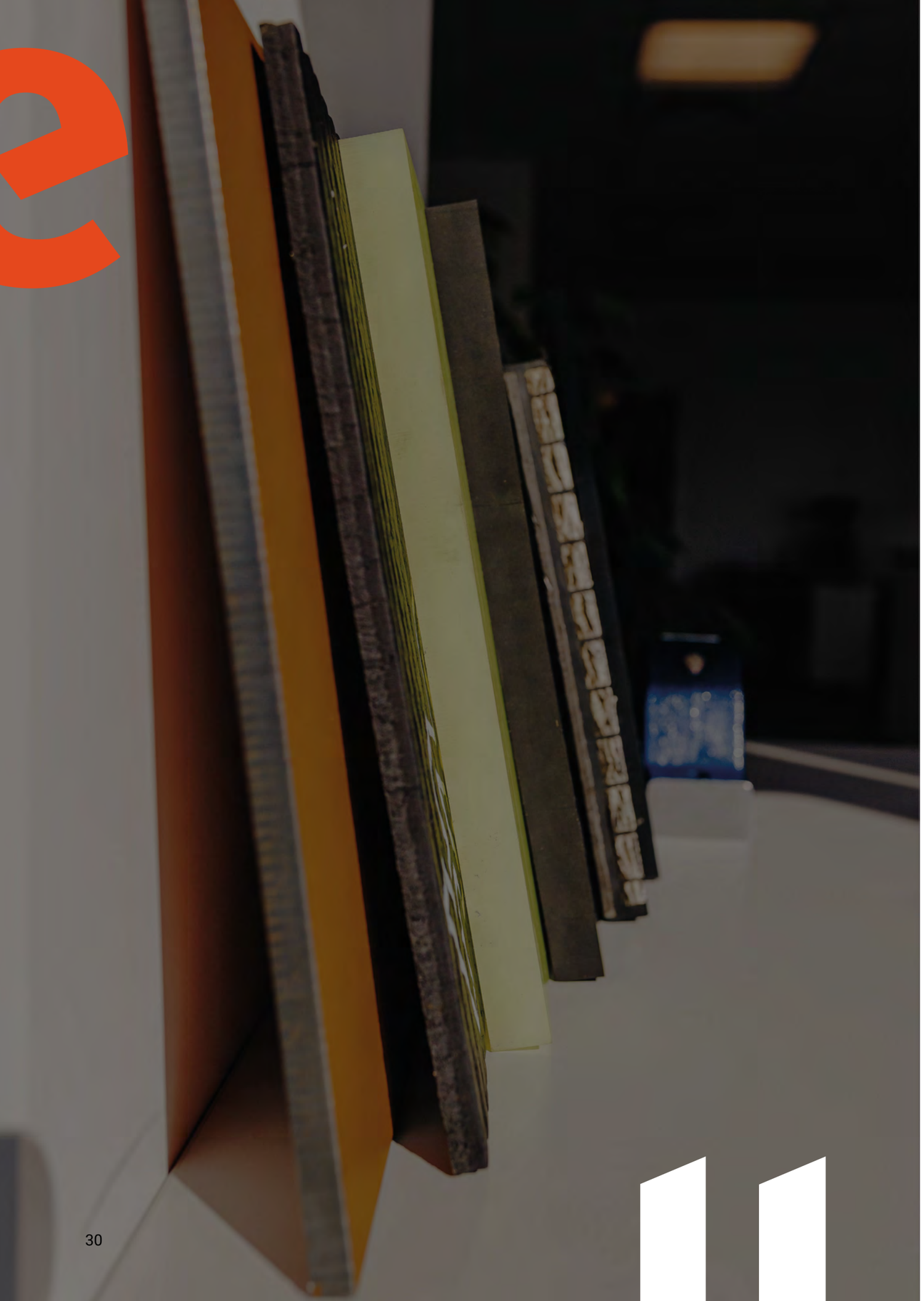
H — through hole for bolting

W — welded pin

Electric rivet

Weld connections

* We can produce plates of various sizes and thicknesses, cut and bend wear plates into specific shapes and details depending on the customer's drawings.



Advantages of Element

A wide range of materials

Element offers an individual selection of lining material based on the specific operating conditions of the equipment. For lining hoppers, loading and bulk devices and other containers for storing and transporting ore and crushed stone, our company produces plates made of bimetal, rubber, polyurethane, high-molecular polyethylene, rubber-ceramics and wear-resistant steel.

Individual engineering

Element is able to calculate, design and manufacture custom plates in accordance with specific operating conditions. After the customer fills out our questionnaire, our technical department will select the necessary types of plates, and design engineers will prepare both drawings and mounting schemes.

Warehouse program

Thanks to the analysis of the database of installed equipment at mining enterprises in Russia, Element regularly replenishes its own warehouses with standard sizes of wear-resistant plates in order to minimize delivery times.

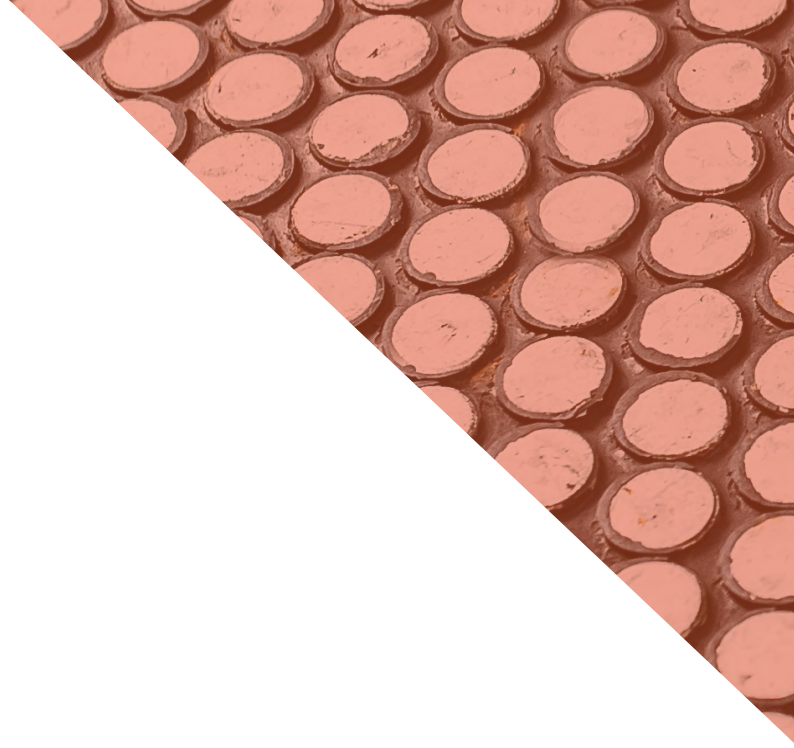
Guarantee of efficiency

Element guarantees high quality wear-resistant plates and provides a guarantee of operating time in hours or tons of processed ore. Our engineers can provide a justification for the payback period and will show the company's past projects that demonstrate the economic efficiency of the Element branded plates.

Technical and service support

During the entire service life of the plates, Element's technical specialists provide consulting and service support for customers. An important part of our technical support is our ability to optimize elements based on operational experience and recommendations from the customer.

Element Group



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Element. Integrity in details

Brochure v 1.1.-08.2021