

# Tailor-Made Protectivity™ Solutions for the Cement Industry

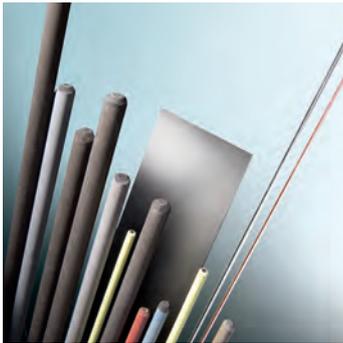


# UTP Maintenance

## Tailor-Made Protectivity™

High-quality industrial-use welding filler metals for maintenance, repair, and overlay welding. By adding the UTP and Soudokay brands to the voestalpine Böhler Welding brand network, the UTP Maintenance can look back on a proud history spanning 60 years as an innovative supplier of welding technology products. UTP Maintenance is the global leader in the repair, maintenance, and overlay welding segment.

With roots both in Bad Krozingen (Germany) and Seneffe (Belgium), UTP Maintenance offers the world's most unique product portfolio for filler metals from its own production facilities. The Soudokay brand was established back in 1938, while the UTP brand began operations in 1953. Each of these brands therefore respectively look back on a long history of international dimension.



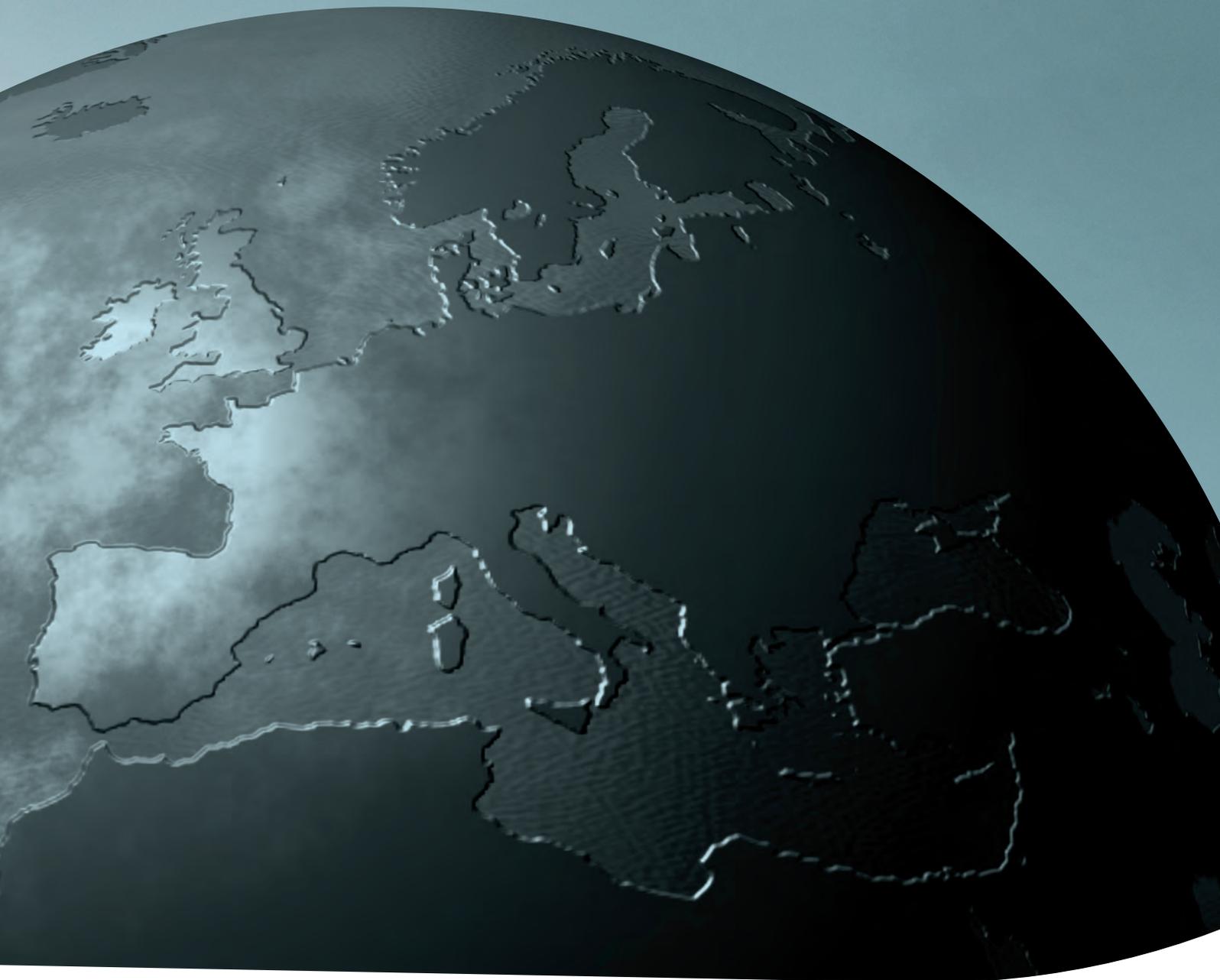
By merging into the UTP Maintenance brand, the collective know-how of both brands – gathered over decades in the fields of metallurgy, service, and applications engineering – is now united under one umbrella. As a result, a truly unique portfolio of solutions for welding applications has been created in the fields of repair, maintenance, and overlay welding.

## Tailor-Made Protectivity™

Industry experience and applications know-how – combined with innovative and custom (tailor-made) products – guarantee that our customers obtain the ideal combination of productivity and protection, within the shortest operating times and up to the maximum performance capacity of their products. This explains UTP Maintenance's guiding principle – "Tailor-Made Protectivity™" – which puts the focus on the customer.

## Research and Development for Customized Solutions

At UTP Maintenance, research and development, conducted in collaboration with customers, plays a crucial role. Because of our strong commitment to research and development, combined with our tremendous innovative capacity, we are constantly engineering new products, and improving existing ones on an ongoing basis. The result is a vast number of innovative products for solving individual problems and complex matters.



### **Customized Products of Superior Quality**

We continuously adapt our product portfolio of about 600 products to customer and industry specifications, while ensuring that we meet the highest quality specifications.

From its in-house production facilities, UTP Maintenance delivers innovative, tailor-made welding filler metals for: unalloyed and fine-grained structural steel, low-grade alloyed steels, rust-proof, acid-proof, and heat-proof steels, nickel-based alloys, cast iron, copper and copper alloys, manganese steels, tool steels, and cobalt steels.

The product portfolio comprises:

- Stick electrodes
- Solid wires and rods
- Flux cored wires
- Submerged arc wires and fluxes
- Submerged arc strips and fluxes
- Spraying- and PTA-powders

### **Solutions at Every Point on the Globe**

UTP Maintenance provides products and services through the global branches of voestalpine Böhler Welding and its dealer network in more than 150 countries throughout the world. A team of welding engineers stand at the customer's side, providing advice and support in all matters related to the challenges of welding technology.



## Cement Industry

We can help optimize the plant productivity by providing high quality maintenance and repair welding consumables, valuable counseling and continuous support.

Parts in the cement industry are subject to high wear caused by impact, abrasion or heat. In mills, the wear rate is influenced by ground materials, the material used for wear components, mill operation and mill design. Wear leads to losses in the efficiency and quality of the ground material, increased energy required, vibrations and the risk of damage to mill integrity. It also leads to increases in maintenance costs.

Hardfacing allows maintaining the original components' profile in order to guarantee optimum production conditions and must be performed before an unacceptable increase in energy consumption or decrease in grinding efficiency. Hardfacing may be performed on site or in a workshop, may be fully automated and can be repeated several times or performed on new components in order to reduce wear.

Hardfacing also increases component wear resistance by providing an austenitic matrix containing carbides in the components surface



that is highly resistant to wear. The martensitic matrix underneath the surface is characterized by lower wear resistance.

#### **Applications**

Vertical mills; Rotary kilns and presses; Crushers; Classifiers; Cones; Hammers; Wear plates

#### **Products**

We provide iron-based, copper-based, cobalt-based and nickel-based hardfacing products allowing preventive or curative overlay welding in a large range of industries and in process with wear challenges.

#### **Service**

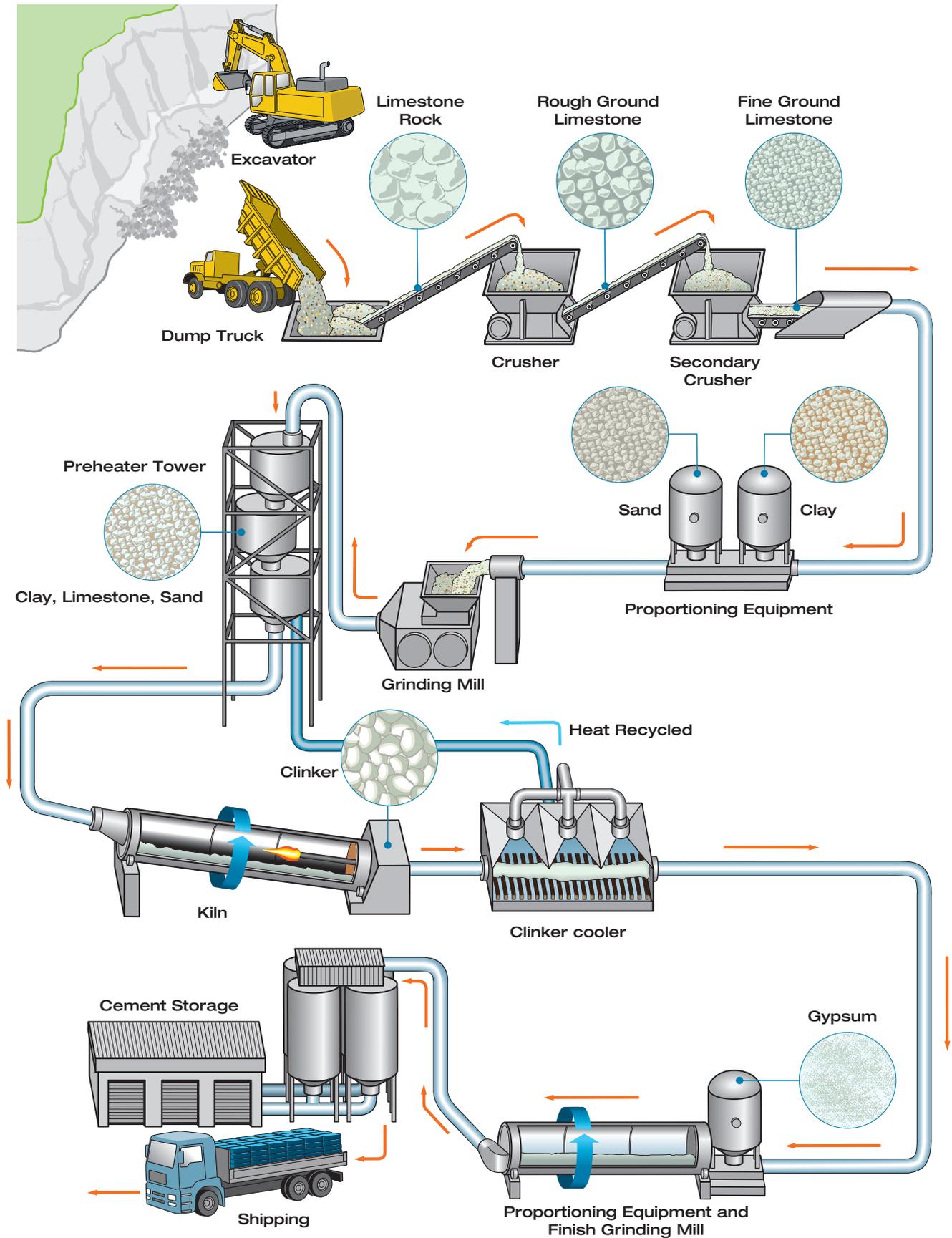
We provide additional value by offering the following:

- Network of service partners able to provide excellence in in-situ or ex-situ hardfacing
- Expertise in overlay welding and hardfacing techniques and applications
- Training of welders, supervisors and engineers

#### **Approvals**

We manufacture welding consumables that comply with quality programs such as ISO 9001 (2008) and ASME QSC580.

# Flowchart cement production





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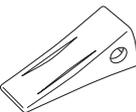
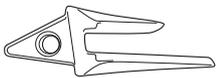
# Limestone Mining

The most important component in cement production is limestone. Limestone is extracted through blasting in opencast mines before being crushed. The crushed limestone is then transported via conveyor belts to a blending bed for temporary storage.

## Solutions for Limestone Quarry Applications

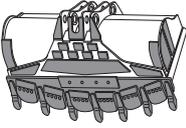


### Crawler excavators

		Product recommendations			
Component	Description of wear	Covered Electrode	Solid wire	Gas shielded cored wire	Open Arc wire
 <p>Excavator shovel</p>	Wear is predominantly caused by abrasion and can be accompanied with a great deal of impact. Most buckets are fabricated from combination of carbon steel & manganese steel & may be lined with a abrasion resistant liners.	UTP 690 UTP Abrasodur 43+ UTP DUR 600 UTP DUR 650 Kb UTP LEDURIT 61	UTP A DUR 600 UTP A DUR 650	SK 600-G SK 650-G	SK 162-O SK 255-O SK 866-O SK A70-O SK ABRA-MAX O/G
 <p>Bucket teeth</p>	Bucket teeth come to use in the excavating of ore, stones or other materials. Wear is predominantly caused by abrasion and can be accompanied with a great deal of impact.	UTP 7200 UTP DUR 600 UTP Abrasodur 43+ UTP DUR 650 Kb UTP LEDURIT 61	UTP A DUR 600 UTP A DUR 650	SK 600-G SK 650-G	SK 162-O SK 258 TIC-O SK A43-O SK ABRA-MAX O/G
 <p>Idler</p>	Undercarriage components typically wear by metal to metal, abrasion and slight impact.	UTP 63 UTP DUR 350	UTP A 63 UTP A DUR 350	SK 307-G SK 402-G	SK 350-O SK BU-O
 <p>Track roller</p>	Undercarriage components typically wear by metal to metal, abrasion and impact.	UTP DUR 350	UTP A DUR 350	SK 250-G	SK 350-O SK BU-O
 <p>Drive sprocket</p>	Undercarriage components typically wear by metal to metal, abrasion and impact.	UTP 63 UTP 65 D UTP 7200 UTP BMC	UTP A 63 UTP A DUR 350	SK 307-G SK 402-G	SK 350-O SK AP-O SK BU-O
 <p>Tooth Adaptor</p>	In addition to abrasive wear, cracks may occur due to overload.	UTP 63 UTP 65 D	UTP A 63	SK 307-G	



### Wheel loader

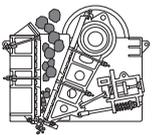
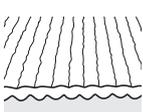
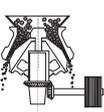
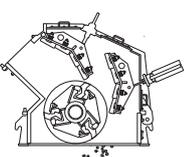
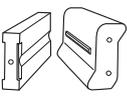
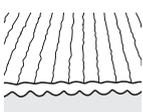
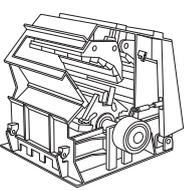
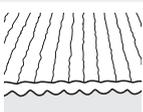
Component	Description of wear	Product recommendations				
		Covered Electrode	Solid wire	Gas shielded cored wire	Open Arc wire	Wear plates
 Payloader Bucket Wear is predominantly caused by abrasion and can be accompanied with a great deal of impact.	UTP 690 UTP Abrasodur 43+ UTP DUR 600 UTP DUR 650 Kb UTP LEDURIT 61	UTP A DUR 600 UTP A DUR 650	SK 600-G SK 650-G	SK 162-O SK 255-O SK 866-O SK A70-O SK ABRA-MAX O/G		
 Payloader Bucket Wear is predominantly caused by abrasion and can be accompanied with a great deal of impact.	UTP 63 UTP 690 UTP Abrasodur 43+ UTP DUR 600 UTP DUR 650 Kb UTP LEDURIT 61	UTP A DUR 600 UTP A DUR 650	SK 600-G SK 650-G	SK 162-O SK 255-O SK 866-O SK A70-O SK ABRA-MAX O/G	SK ABRAGUARD	
 Bucket teeth Bucket teeth come to use in the excavating of ore, stones or other materials. Wear is predominantly caused by abrasion and can be accompanied with a great deal of impact.	UTP DUR 600 UTP 7200 UTP Abrasodur 43+ UTP DUR 650 Kb UTP DUR 650 Kb UTP LEDURIT 61	UTP A DUR 600 UTP A DUR 650	SK 600-G SK 650-G	SK 162-O SK 258 TIC-O SK A43-O SK ABRA-MAX O/G SK ABRA-MAX O/G		

### Dumper

Component	Description of wear	Product recommendations				
		Covered Electrode	Solid wire	Gas shielded cored wire	Open Arc wire	Wear plates
 Load Liner Wear is predominantly caused by abrasion and can be accompanied with a great deal of impact. Liner plates are used for protecting the dump area. These liner plates needs to be joined to base plate of carbon steel.	UTP 63 UTP 65 D UTP DUR 600	UTP A 63 UTP A DUR 600	SK 307-G SK 600-G UTP AF DUR 600 T	SK 258 TIC-O	SK ABRAGUARD	

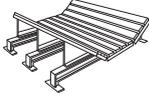
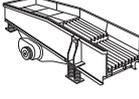
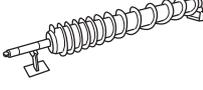


## Crushers

			Product recommendations			
Product	Component	Description of wear	Covered Electrode	Solid wire	Open Arc wire	Wear plates
 <p>Jaw Crusher</p>	 <p>Jaw plates</p>	<p>Jaw plates are subjected to high stress abrasion coupled with moderate impact.</p>	UTP 63	UTP A 63	SK 162-O	SK ABRAGUARD
			UTP Abrasodur 43+	UTP A DUR 600	SK 255-O	
			UTP BMC/ UTP 7200	UTP A DUR 650	SK 258 TiC-O	
			UTP DUR 600		SK 866-O	
			UTP DUR 650 Kb		SK A43-O	
UTP LEDURIT 61		SK AP-O				
 <p>Gyratory Crusher</p>	 <p>Crusher mantle</p>	<p>Crusher Mantle is subjected to high stress abrasion coupled with moderate impact.</p>	UTP Abrasodur 43+	UTP A DUR 350/ UTP A 63	SK 255-O SK 162-O	
			UTP BMC/ UTP 7200/ UTP DUR 350	UTP A DUR 600	SK 258 TiC-O	
			UTP DUR 600	UTP A DUR 650	SK 866-O	
			UTP DUR 650 Kb		SK A43-O	
			UTP LEDURIT 61		SK AP-O	
 <p>Cone Crusher</p>	 <p>Crusher mantle</p>	<p>Crusher Mantle is subjected to high stress abrasion coupled with moderate impact.</p>	UTP Abrasodur 43+	UTP A DUR 350/ UTP A 63	SK 255-O SK 162-O	
			UTP BMC/ UTP 7200/ UTP DUR 350	UTP A DUR 600	SK 258 TiC-O	
			UTP DUR 600	UTP A DUR 650	SK 866-O	
			UTP DUR 650 Kb		SK A43-O	
			UTP LEDURIT 61		SK AP-O	
 <p>Impact crusher</p>	 <p>Impactor Arm</p>	<p>Impactor arm is subjected to high impact &amp; abrasion.</p>	UTP Abrasodur 43+	UTP A DUR 350/ UTP A 63	SK 255-O/ SK 162-O	
			UTP BMC/ UTP 7200/ UTP DUR 350	UTP A DUR 600	SK 258 TiC-O	
			UTP DUR 600	UTP A DUR 650	SK A43-O	
			UTP DUR 650 Kb		SK AP-O	
			UTP LEDURIT 61			
	 <p>Impactor Plates</p>	<p>Impactor plates are subjected to moderate impact &amp; high stress abrasion.</p>	UTP 63	UTP A DUR 350/ UTP A 63	SK 255-O/ SK 162-O	SK ABRAGUARD
			UTP Abrasodur 43+	UTP A DUR 600	SK 258 TiC-O	
			UTP BMC/ UTP 7200/ UTP DUR 350	UTP A DUR 650	SK A43-O	
			UTP DUR 600		SK AP-O	
			UTP DUR 650 Kb			
UTP LEDURIT 61						
 <p>Hammer crusher</p>	 <p>Hammers</p>	<p>Hammers are subjected to high impact &amp; abrasion. Usually the base material is manganese steel.</p>	UTP Abrasodur 43+	UTP A DUR 350/ UTP A 63	SK 255-O/ SK 162-O	
			UTP BMC/ UTP 7200/ UTP DUR 350/ UTP 63	UTP A DUR 600	SK 258 TiC-O	
			UTP DUR 600	UTP A DUR 650	SK A43-O	
			UTP DUR 650 Kb		SK AP-O	
			UTP LEDURIT 61			
	 <p>Side wear liners</p>	<p>Side wear liners are subjected to high stress abrasion with moderate impact. Usually the base material is manganese steel.</p>	UTP Abrasodur 43+	UTP A DUR 350/ UTP A 63	SK 255-O/ SK 162-O	SK ABRAGUARD
			UTP BMC/ UTP 7200/UTP DUR 350/ UTP 63	UTP A DUR 600	SK 258 TiC-O	
			UTP DUR 600	UTP A DUR 650	SK A43-O	
			UTP DUR 650 Kb		SK AP-O	
			UTP LEDURIT 61			



### Conveyor systems

		Product recommendations				
Component	Description of wear	Covered Electrode	Solid wire	Gas shielded cored wire	Open Arc wire	Wear plates
Gear wheel 	These drive gears & pinion are made either from cast iron or steel. Standard problem are of friction wear or breakage of tooth.	UTP 63 UTP 86 FN /UTP DUR 350		SK 300-G SK 307-G SK FNM4-G		
Collection tray 	Wear is predominantly caused by moderate impact and abrasion.	UTP 63 UTP 65 D				SK ABRAGUARD
Vibrating feeder 	Wear is predominantly caused by impact and abrasion.	UTP 63 UTP 65 D				SK ABRAGUARD
Screw-conveyor 	Screw conveyor flights wall & edge wear out due to abrasion.	UTP LEDURIT 61	UTP A 7550 UTP A DUR 600 UTP A DUR 650		SK 162-O SK 255-O SK A43-O	



### Surfacing electrodes for anti-wear

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP 690	DIN 8555 E 4-UM-60-ST EN 14700 E Fe4 AWS A5.13 E Fe 5-B (mod.)	Hardness HRC approx. 62	UTP 690 is used for repair and production of cutting tools, particularly for building-up cutting edges and working surfaces.
UTP 7200	DIN 8555 ~ E 7-UM-250-KP EN 14700 EZ Fe9 AWS A5.13 ~ E FeMn-A	Hardness HB approx. 200 - 250	UTP 7200 is predominantly suited for tough and crack resistant joinings and surfacings on parts of high Mn-steel subject to extreme impact, compression and shock.
UTP Abrasodur 43+	DIN 8555 E10-UM-65-GR EN 14700 EZ Fe15	Hardness 1 layer 62 HRC 2 layers 63 HRC	UTP Abrasodur 43+ is used for hardfacing of parts subject to heavy abrasion with moderate impact.
UTP BMC	DIN 8555 E 7-UM-250-KPR EN 14700 E Fe9	Hardness HB approx. 260	UTP BMC is suitable for claddings on parts subject to highest pressure and shock in combination with abrasion.
UTP DUR 350	DIN 8555 E 1-UM-350 EN 14700 E Fe1	Hardness HB approx. 370	UTP DUR 350 is particularly suited for wear resistant surfacings on Mn-Cr-V alloyed parts.
UTP DUR 600	DIN 8555 E 6-UM-60 EN 14700 E Fe8	Hardness HRC 56 - 58	UTP DUR 600 is universally applicable for cladding on parts of steel, cast steel and high Mn-steel, subject simultaneously to abrasion, impact and compression.
UTP DUR 650 Kb	DIN 8555 E 6-UM-60 EN 14700 E Fe8	Hardness HRC 58 - 60 HRC	UTP DUR 650 Kb is suitable for cladding structural parts subject to abrasion combined with impact.
UTP LEDURIT 61	AWS A5.13 ~ E FeCr-A 1 EN 14700 EZ Fe14	Hardness HRC approx. 60	UTP LEDURIT 61 is suited for highly wear resistant claddings on parts subject to strong grinding abrasion combined with medium impact.
UTP LEDURIT 65	DIN 8555 E 10-UM-65-GRZ EN 14700 E Fe16	Hardness HRC approx. 65	UTP LEDURIT 65 is suited for highly abrasion resistant claddings on parts subject to extreme sliding mineral abrasion, also at elevated temperatures up to 500 °C.

## Covered electrodes for repair of cracked material

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP 63	EN 14700	Yield strength $R_{p0.2}$	Tensile strength $R_m$	With the fully austenitic UTP 63, non-alloy structural and heat-treatable steels can be welded, also in combination with austenitic CrNi steels.
	E Fe10	> 350 MPa	> 600 MPa	
	EN ISO 3581-A	Elongation A	Impact strength $K_V$	
	E 18 8 Mn R 32	> 40 %	> 60J (RT)	
UTP 65 D	EN 14700	Yield strength $R_{p0.2}$	Tensile strength $R_m$	UTP 65 D has been developed to satisfy the highest requirements for repair and surfacing. It is extremely crack-resistant when joining steels of difficult weldability.
	E Z Fe11	> 640 MPa	> 800 MPa	
	EN ISO 3581-A	Elongation A		
	~ E 29 9 R 12	> 20 %		
UTP 86 FN	EN ISO 1071	Yield strength $R_{p0.2}$		Universally applicable for repair, construction and production welding.
	E C NiFe-13	approx. 340 MPa		
	AWS A5.15	Hardness HB		
	E NIFE-CL	approx. 220		

## Solid wires for anti-wear and anti-corrosion

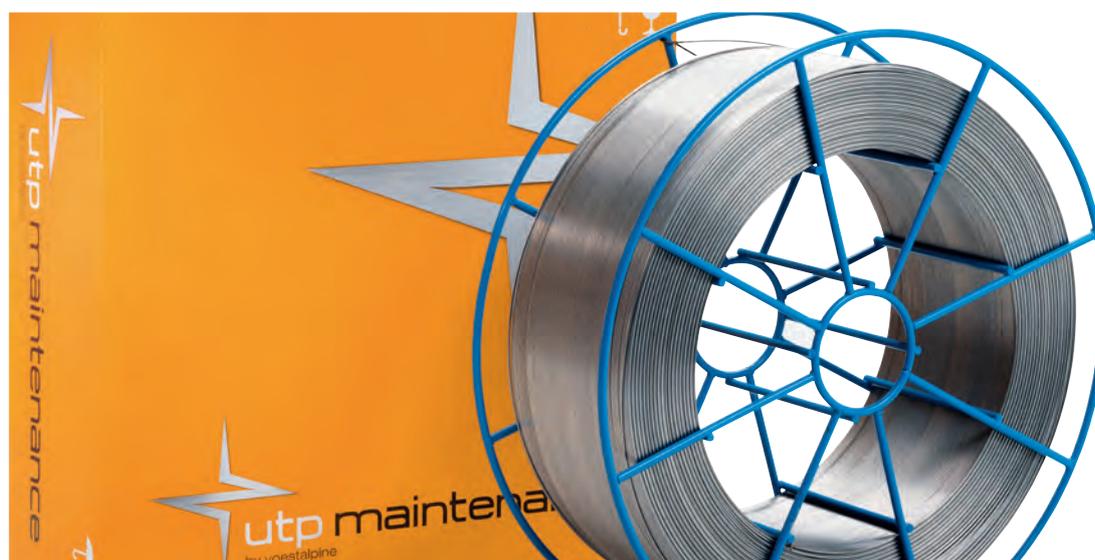
Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP A 63	AWS A5.9	Yield strength $R_{p0.2}$	Tensile strength $R_m$	UTP A 63 is suitable for particularly crack resistant joining, repair and surfacing of high-strength ferritic and austenitic steels, hard manganese steels and cold-tough steels, as cushioning layer under hard alloys, dissimilar metal joints.
	ER 307 (mod.)	> 370 MPa	> 600 MPa	
	EN ISO 14343-A	Elongation A		
	W 18 8 Mn	> 30 %		
UTP A DUR 350	DIN 8555	Hardness HB		UTP A DUR 350 is suited for MAG buildups on structural parts subject to compression, impact and abrasion, such as caterpillar track components, machine and gear parts, stamps.
	MSG 2-GZ-400	approx. 450		
	EN 14700			
	SZ Fe 2			
UTP A DUR 600	DIN 8555	Hardness HRC		UTP A DUR 600 is universally applicable for MAG buildups on structural parts subject to high impact and medium abrasion.
	MSG 6-GZ-60-S	54 - 60		
	EN 14700			
	S Fe 8			
UTP A DUR 650	EN 14700	Hardness HRC		UTP A DUR 650 is universally used for MAG buildups on structural parts subject to high impact and abrasion.
	S Fe 8	55 - 60		
	DIN 8555			
	MSG 3-GZ-60			

## Special alloy - gas rod

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP A 7550	DIN 8555	Hardness		Heavy coated, flexible tungsten-carbide welding rod against extreme mineral friction wear, corrosion resistant.
	WSG 21-UM-55-CG	Carbide: approx. 2500 HV		
	EN 14700	Matrix: approx. 55 HRC		
	C Ni 20			

### Gasshielded cored wires for anti-wear

Name	Classification	Hardness		Composition % (All weld metal)													Characteristics and field of use
		HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	
SK 250-G	DIN 8555 MF 1-GF-225-GP ASME IIC SFA 5.21 ERC Fe-1	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Metal-cored wire designed for building-up by welding in horizontal and vertical-up positions under gas shielding.
		225		0,09	1,2	0,5	0,4										
SK 300-G	DIN 8555 MF 1-GF-300-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Build-up alloy designed for welding in horizontal and vertical-up positions under gas shielding.
		300		0,25	1,5	0,4	1,4										
SK 307-G	DIN 8555 MF 8-GF-150-KP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Flux-cored wire for gas shielded arc welding giving a 18 % Cr – 8 % Ni – 7 % Mn deposit.
		155		0,1	7,1	0,8	17,9	8,5				0,2					
SK 402-G	DIN 8555 MF 8-GF-150-KP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Austenitic alloy type 18Cr8Ni7Mn recommended for build up and buffer layer prior to hardfacing. It can also be used for joining of dissimilar metals.
		170		0,1	6,6	0,6	17,1	7,8									
SK 600-G	DIN 8555 MF 6-GF-60-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and low stress abrasive wear with moderate impact is excellent.
			59	0,52	1,5	1,2	5,9		0,8		0,05						
SK 650-G	DIN 8555 MF 3-GF-60-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and medium stress abrasive wear with moderate impact is excellent.
			58	0,45	0,9	0,6	5,5		1,4				1,6	0,5			
SK FNM4-G	DIN 8573 (ca) MF NiFe-2-S	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	FeNi alloy with 4 % Manganese designed for joining and surfacing of cast iron pieces. Can also be used for dissimilar welding between cast iron and steel.
			140		0,25	3,5	0,7		Rest								
UTPAF DUR600T	DIN 8555 MSG 6-GT-60-GP EN 14700 T Fe 8	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Seamless, Chromium alloyed, metal cored wire for wear resistant surfacing applications with Ar-CO <sub>2</sub> shielding gas.
			38	0,1	1,1	0,4	2,4						3,8	0,6			

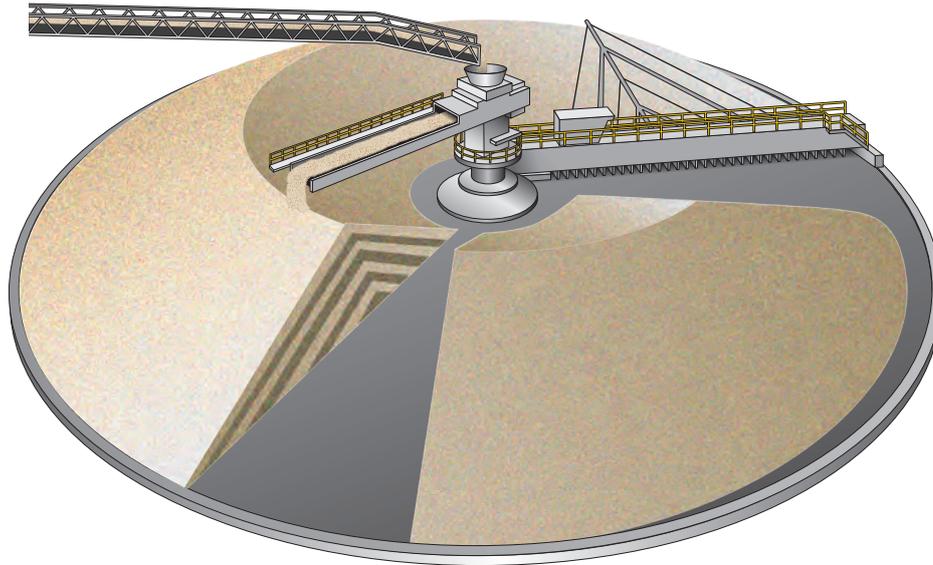


## Open arc cored wires for anti-wear

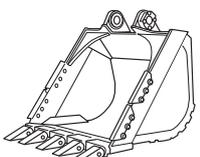
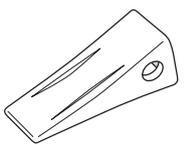
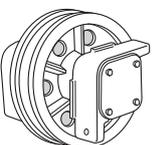
Name	Classification	Hardness		Composition % (All weld metal)													Characteristics and field of use
		HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	
SK 162-O	DIN 8555 MF 10-GF-65-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	High Chromium alloy designed to resist high stress grinding abrasion with low impact. The deposit will show readily stress relief cracks.
			63	5,4	0,2	1,3	27										
SK 255-O	DIN 8555 MF 10-GF-60-G ASME IIC SFA 5.21 FeCr-A9	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Open arc metal cored wire designed to deposit a metal resistant to high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	5	0,6	1	27									0,5	
SK 258 TIC-O	DDIN 8555 MF 6-GF-60-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic Chromium-Titanium alloy designed to resist high stress abrasion with heavy impact. Deposits usually do not relieve cracks.
			58	1,8	0,9	0,2	6,1		1,4		5,5						
SK 350-O	DIN 8555 MF 1-GF-350	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Rebuilding and hardfacing alloy for Carbon steel parts. Suitable for medium hard build-ups.
			360		0,15	1,3	0,1	2,5				0,9					
SK 866-O	DIN 8555 MF 10-GF-60-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Alloy designed to resist high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	4,5	0,7	0,8	27									0,5	
SK A43-O	DIN 8555 MF 10-GF-65-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	CrNb alloy designed to resist high stress grinding abrasion at service temperature not exceeding 450 °C. The deposit will readily show stress relief cracks.
			64	5,6	0,2	1,3	20,2			6,7							
SK A70-O	DIN 8555 MF 10-GF-70-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special Chromium-Niobium-Boron alloy designed to give extreme resistance to high stress grinding abrasion without impact. The deposits will show stress relief cracks.
			64	2,8			15			4,6		0,1				2	
SK ABRA-MAX O/G	DIN 8555 MF 6-GF-70-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special hardfacing cored wire designed to give an extreme resistance against high stress grinding abrasion and erosion without impact. The deposit will readily show stress relief cracks.
			70	C + Cr + Mo + Nb + W + V + B (bal. Fe)													
SK AP-O	DIN 8555 MF 7-GF-200-KP ASME IIC SFA 5.21 FeMn-Cr	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Multi-purpose cored wire, mainly used for rebuilding and joining of Carbon and 14 % Manganese steels. Can also be used as buffer layer prior to hard overlay. Work-hardenable alloy.
			205		0,37	16	0,3	12,8									
SK BU-O	DIN 8555 MF 1-GF-300-P	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Rebuilding alloy for Carbon steel parts. Can also be used as buffer layer prior to hard overlay.
			280		0,1	0,9	0,6	0,5		0,3							

# Blending bed

At the cement plant the crushed stone is stored in blending beds. Homogenization is usually necessary if there are major fluctuations in raw material composition. The stockpiles consists of different layers of various types of raw materials. The stockpiles are subsequently cleared away layer by layer. The calcium carbonate content of the raw material mixture should be at least 76-78%. Attention must also be paid to the ratio of silica, iron oxide and alumina.



## Solutions for blending bed applications

Component	Description of wear	Product recommendations			
		Covered Electrode	Solid wire	Gas shielded cored wire	Open Arc wire
<p>Bucket</p> 	<p>Wear is predominantly caused by abrasion and can be accompanied with mild impact at lip areas. Most buckets are fabricated from combination of carbon steel &amp; may be lined with a abrasion resistant liners.</p>	<p>UTP 690 UTP Abrasodur 43+ UTP DUR 600 UTP DUR 650 Kb UTP LEDURIT 61</p>	<p>UTP A DUR 600 UTP A DUR 650</p>	<p>SK 600-G SK 650-G</p>	<p>SK 162-O SK 255-O SK 866-O SK A70-O SK ABRA-MAX O/G</p>
<p>Bucket tooth</p> 	<p>Wear is predominantly caused by abrasion and can be accompanied with a moderate impact.</p>	<p>UTP DUR 600 UTP Abrasodur 43+ UTP DUR 650 Kb UTP LEDURIT 61</p>	<p>UTP A DUR 600 UTP A DUR 650</p>	<p>SK 600-G SK 650-G</p>	<p>SK 162-O SK 258 TIC-O SK A43-O SK ABRA-MAX O/G</p>
<p>Stacker wheels</p> 	<p>Wear is predominantly caused due to presence of silica/ raw material dust on tracks &amp; abrasion caused by movement of stacker wheels on these tracks.</p>	<p>UTP DUR 350</p>	<p>UTP A DUR 350</p>	<p>SK 250-G</p>	<p>SK 350-O SK BU-O</p>



## Surfacing electrodes for anti-wear

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP 690	DIN 8555	Hardness HRC	UTP 690 is used for repair and production of cutting tools, particularly for building-up cutting edges and working surfaces.
	E 4-UM-60-ST	approx. 62	
	EN 14700		
	E Fe4		
	AWS A5.13		
UTP Abrasodur 43+	DIN 8555	Hardness	UTP Abrasodur 43+ is used for hardfacing of parts subject to heavy abrasion with moderate impact.
	E10-UM-65-GR	1 layer 62 HRC	
	EN 14700	2 layers 63 HRC	
	EZ Fe15		
UTP DUR 350	DIN 8555	Hardness HB	UTP DUR 350 is particularly suited for wear resistant surfacings on Mn-Cr-V alloyed parts.
	E 1-UM-350	approx. 370	
	EN 14700		
	E Fe1		
UTP DUR 600	DIN 8555	Hardness HRC	UTP DUR 600 is universally applicable for cladding on parts of steel, cast steel and high Mn-steel, subject simultaneously to abrasion, impact and compression.
	E 6-UM-60	56 - 58	
	EN 14700		
	E Fe8		
UTP DUR 650 Kb	DIN 8555	Hardness HRC	UTP DUR 650 Kb is suitable for cladding structural parts subject to abrasion combined with impact.
	E 6-UM-60	58 - 60 HRC	
	EN 14700		
	E Fe8		
UTP LEDURIT 61	AWS A5.13	Hardness HRC	UTP LEDURIT 61 is suited for highly wear resistant claddings on parts subject to strong grinding abrasion combined with medium impact.
	~ E FeCr-A 1	approx. 60	
	EN 14700		
	EZ Fe14		

## Solid wires for anti-wear and anti-corrosion

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP A DUR 350	DIN 8555	Hardness HB	UTP A DUR 350 is suited for MAG buildups on structural parts subject to compression, impact and abrasion, such as caterpillar track components, machine and gear parts, stamps.
	MSG 2-GZ-400	approx. 450	
	EN 14700		
	SZ Fe 2		
UTP A DUR 600	DIN 8555	Hardness HRC	UTP A DUR 600 is universally applicable for MAG buildups on structural parts subject to high impact and medium abrasion.
	MSG 6-GZ-60-S	54 - 60	
	EN 14700		
	S Fe 8		
UTP A DUR 650	EN 14700	Hardness HRC	UTP A DUR 650 is universally used for MAG buildups on structural parts subject to high impact and abrasion.
	S Fe 8	55 - 60	
	DIN 8555		
	MSG 3-GZ-60		

## Gasshielded cored wires for anti-wear

Name	Classification	Hardness		Composition % (All weld metal)													Characteristics and field of use
		HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	
SK 250-G	DIN 8555 MF 1-GF-225-GP ASME IIC SFA 5.21 ERC Fe-1	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Metal-cored wire designed for building-up by welding in horizontal and vertical-up positions under gas shielding.
		225		0,09	1,2	0,5	0,4										
SK 600-G	DIN 8555 MF 6-GF-60-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and low stress abrasive wear with moderate impact is excellent.
			59	0,52	1,5	1,2	5,9		0,8		0,05						
SK 650-G	DIN 8555 MF 3-GF-60-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and medium stress abrasive wear with moderate impact is excellent.
			58	0,45	0,9	0,6	5,5		1,4				1,6	0,5			

## Open arc cored wires for anti-wear

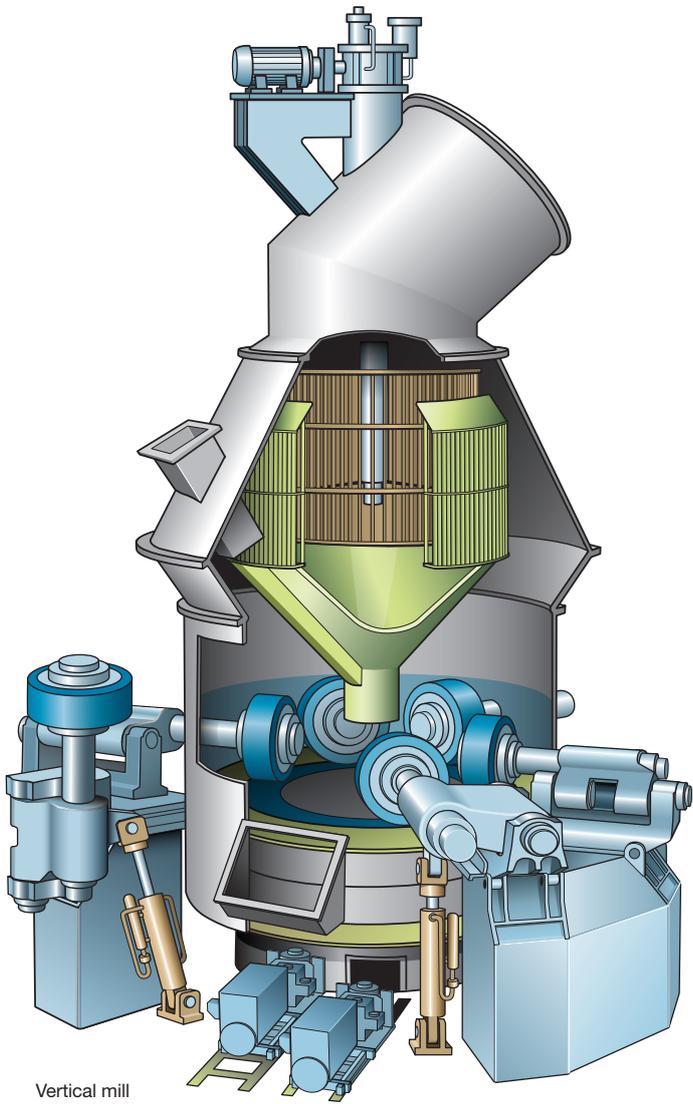
Name	Classification	Hardness		Composition % (All weld metal)													Characteristics and field of use
		HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	
SK 162-O	DIN 8555 MF 10-GF-65-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	High Chromium alloy designed to resist high stress grinding abrasion with low impact. The deposit will show readily stress relief cracks.
			63	5,4	0,2	1,3	27										
SK 255-O	DIN 8555 MF 10-GF-60-G ASME IIC SFA 5.21 FeCr-A9	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Open arc metal cored wire designed to deposit a metal resistant to high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	5	0,6	1	27								0,5		
SK 258 TIC-O	DIN 8555 MF 6-GF-60-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic Chromium-Titanium alloy designed to resist high stress abrasion with heavy impact. Deposits usually do not relieve cracks.
			58	1,8	0,9	0,2	6,1		1,4		5,5						
SK 350-O	DIN 8555 MF 1-GF-350	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Rebuilding and hardfacing alloy for Carbon steel parts. Suitable for medium hard build-ups.
			360	0,15	1,3	0,1	2,5				0,9						
SK 866-O	DIN 8555 MF 10-GF-60-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Alloy designed to resist high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	4,5	0,7	0,8	27									0,5	
SK A43-O	DIN 8555 MF 10-GF-65-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	CrNb alloy designed to resist high stress grinding abrasion at service temperature not exceeding 450 °C. The deposit will readily show stress relief cracks.
			64	5,6	0,2	1,3	20,2			6,7							
SK A70-O	DIN 8555 MF 10-GF-70-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special Chromium-Niobium-Boron alloy designed to give extreme resistance to high stress grinding abrasion without impact. The deposits will show stress relief cracks.
			64	2,8			15			4,6		0,1				2	
SK ABRA-MAX O/G	DIN 8555 MF 6-GF-70-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special hardfacing cored wire designed to give an extreme resistance against high stress grinding abrasion and erosion without impact. The deposit will readily show stress relief cracks.
			70	C + Cr + Mo + Nb + W + V + B (bal. Fe)													
SK BU-O	DIN 8555 MF 1-GF-300-P	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti		W	V	B	Fe	Rebuilding alloy for Carbon steel parts. Can also be used as buffer layer prior to hard overlay.
			280	0,1	0,9	0,6	0,5		0,3								

# Raw material mills

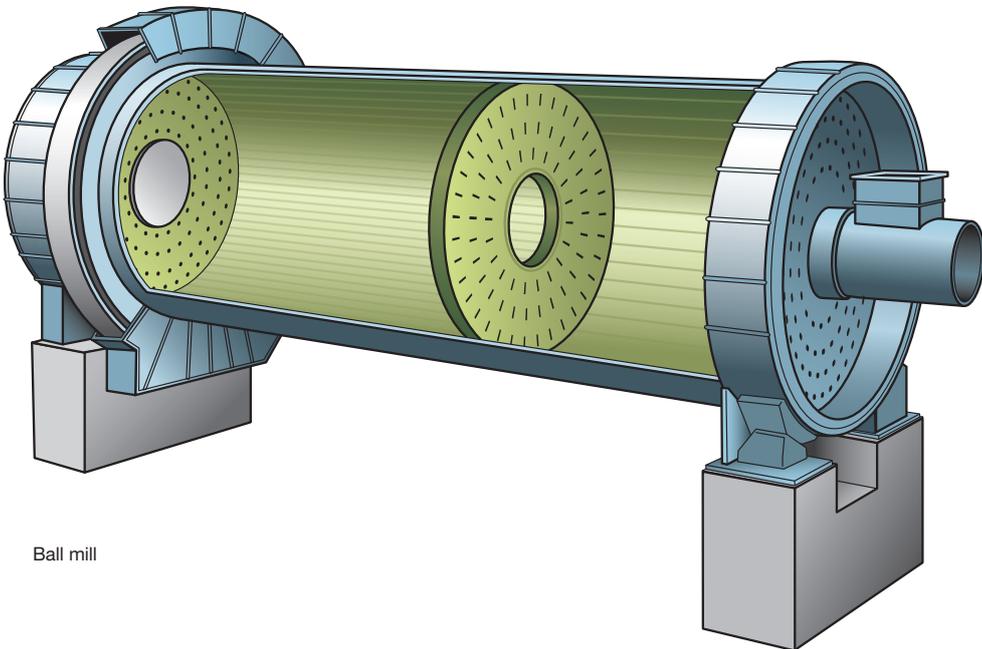
After being stored in the blending bed, the crushed stone (raw material) is transported to the drying plant. Here the crushed stone is dried before being transferred to the raw material mill. A dosage unit feeds in the admixtures sand, iron ore and ash in the required proportions.

Type of mill

<b>Ball mill</b>
A ball mill is a horizontal cylinder filled with with steel balls. They are usually round but sometimes take other shapes. The raw materials are crushed between the balls by the rotating and cascading effect.
<b>Vertical mill</b>
Vertical mills are available with different types of grinder, and vary according to manufacturer. The various components in a vertical mill, such as grinding table, grinding rollers and grinding track, are usually manufactured from chill-casting alloys. The grinding rollers press down onto the rotating grinding table, either through their own weight or with the aid of hydraulic cylinders, to crush the rawmix. The grinding rollers are usually conical, cylindrical or spherical, depending on the form of the grinding table.



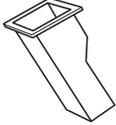
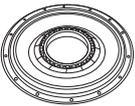
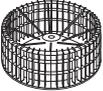
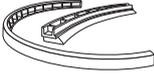
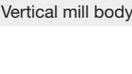
Vertical mill



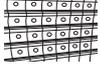
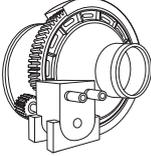
Ball mill

# Solutions for Vertical- and Ball mills

## Vertical mill

Component	Description of wear	Product recommendations				
		Covered Electrode	Solid wire	Gas shielded cored wire	Open Arc wire	Wear plates
 <p>Inlet chute</p>	Feeding the vertical mill with crushed stone. Wear is primarily the result of abrasion.	UTP 63	UTP A DUR 600	SK 600-G	SK A43-O	SK ABRAGUARD
		UTP 690	UTP A DUR 650	SK 650-G	SK 255-O	
		UTP Abrasodur 43+			SK 866-O	
		UTP DUR 600			SK ABRA-MAX O/G	
		UTP DUR 650 Kb			SK AP-O	
 <p>Outlet duct</p>	The light and finely crushed material is extracted from the mill via the outlet duct . Wear is primarily the result of abrasion.	UTP 63	UTP A DUR 600	SK 600-G	SK A43-O	SK ABRAGUARD
		UTP 690	UTP A DUR 650	SK 650-G	SK 255-O	
		UTP Abrasodur 43+			SK 866-O	
		UTP DUR 600			SK ABRA-MAX O/G	
		UTP DUR 650 Kb				
 <p>Grinding roller</p>	The grinding rollers press down onto the rotating grinding table, either through their own weight or with the aid of hydraulic cylinders, to crush the feed material. The grinding rollers are usually conical, cylindrical or spherical, depending on the form of the grinding table. Wear is primarily the result of abrasion.	UTP 63			SK 255-O	
		UTP Abrasodur 43+			SK 256-O/ SK 162-O	
		UTP LEDURIT 61			SK 258 TIC-O	
					SK 866-O	
 <p>Reject cone</p>	Wear is primarily the result of abrasion.	UTP 63	UTP A DUR 600	SK 600-G	SK 255-O	SK ABRAGUARD
		UTP 690	UTP A DUR 650	SK 650-G	SK 866-O	
		UTP Abrasodur 43+			SK A43-O	
		UTP DUR 600			SK ABRA-MAX O/G	
		UTP DUR 650 Kb				
 <p>Grinding table</p>	The rawmix is crushed finely as it passes between the grinding table and grinding rollers. Wear is primarily the result of abrasion.	UTP 63			SK 255-O	
		UTP Abrasodur 43+			SK 256-O/ SK 162-O	
		UTP LEDURIT 61			SK 258 TIC-O	
					SK 866-O	
 <p>Classifier Guide vanes</p>	Wear is primarily the result of abrasion.	UTP 63	UTP A DUR 600		SK 255-O/ SK 162-O	SK ABRAGUARD
		UTP A 7550	UTP A DUR 650		SK A43-O	
		UTP Abrasodur 43+			SK ABRA-MAX O/G	
		UTP LEDURIT 61				
		UTP LEDURIT 65				
 <p>Dam ring</p>	Wear due to abrasion caused by limestone spill overs while crushing on table.	UTP 63			SK 255-O	
		UTP Abrasodur 43+			SK 256-O/ SK 162-O	
		UTP LEDURIT 61			SK 866-O	
 <p>Crushing roll shaft guards</p>	Wear due to erosion.	UTP 63			SK 255-O	SK ABRAGUARD
		UTP Abrasodur 43+			SK 256-O/ SK 162-O	
		UTP LEDURIT 61			SK 866-O	
					SK A43-O	
 <p>Roller Hub</p>	Wear due to friction / abrasion caused by loosening of tyre.	UTP 63 + UTP 65 D		SK 307-G		
		UTP 86 FN		SK FNM4-G		
 <p>Vertical mill body</p>	Repair of cracked sections.	UTP 068 HH				

## Ball mill

		Product recommendations			
Component	Description of wear	Covered Electrode	Solid wire	Gas shielded cored wire	Wear plates
Wear plates 	Wear is primarily the result of abrasion as well as impact.	UTP 63	UTP A 63		SK ABRAGUARD
Trunnion Magnet 	Cracks	UTP 068 HH UTP 7015			
Gear Ring 	Cracks	UTP 068 HH UTP 7015			
	These drive gears & pinion are made either from cast iron or steel. Standard problem are of friction wear or breakage of tooth.	UTP 63/UTP DUR 350 UTP 86 FN /UTP DUR 350		SK 307 G/SK 300-G SK FNM4-G/SK 300-G	

## Surfacing electrodes for anti-wear

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP 690	DIN 8555 E 4-UM-60-ST EN 14700 E Fe4 AWS A5.13 E Fe 5-B (mod.)	Hardness HRC approx. 62	UTP 690 is used for repair and production of cutting tools, particularly for building-up cutting edges and working surfaces.
UTP Abrasodur 43+	DIN 8555 E10-UM-65-GR EN 14700 EZ Fe15	Hardness 1 layer 62 HRC 2 layers 63 HRC	UTP Abrasodur 43+ is used for hardfacing of parts subject to heavy abrasion with moderate impact.
UTP DUR 350	DIN 8555 E 1-UM-350 EN 14700 E Fe1	Hardness HB approx. 370	UTP DUR 350 is particularly suited for wear resistant surfacings on Mn-Cr-V alloyed parts.
UTP DUR 600	DIN 8555 E 6-UM-60 EN 14700 E Fe8	Hardness HRC 56 - 58	UTP DUR 600 is universally applicable for cladding on parts of steel, cast steel and high Mn-steel, subject simultaneously to abrasion, impact and compression.
UTP DUR 650 Kb	DIN 8555 E 6-UM-60 EN 14700 E Fe8	Hardness HRC 58 - 60 HRC	UTP DUR 650 Kb is suitable for cladding structural parts subject to abrasion combined with impact.
UTP LEDURIT 61	AWS A5.13 ~ E FeCr-A 1 EN 14700 EZ Fe14	Hardness HRC approx. 60	UTP LEDURIT 61 is suited for highly wear resistant claddings on parts subject to strong grinding abrasion combined with medium impact.
UTP LEDURIT 65	DIN 8555 E 10-UM-65-GRZ EN 14700 E Fe16	Hardness HRC approx. 65	UTP LEDURIT 65 is suited for highly abrasion resistant claddings on parts subject to extreme sliding mineral abrasion, also at elevated temperatures up to 500 °C.

### Covered electrodes for repair of cracked material

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP 068 HH	AWS 5.11	Yield strength R <sub>P0,2</sub>	Tensile strength R <sub>m</sub>	UTP 068 HH is predominantly used for repair identical or similar heat resistant Ni-base alloys, heat resistant austenites, cold tough Ni-steel, and for joining heat resistant austenitic-ferritic materials.
	E NiCrFe-3 (mod.)	420 MPa	680 MPa	
	EN ISO 14172	Elongation A	Impact strength K <sub>V</sub>	
	E Ni 6082	40 %	120 J (RT)	
UTP 63	EN 14700	Yield strength R <sub>P0,2</sub>	Tensile strength R <sub>m</sub>	With the fully austenitic UTP 63, non-alloy structural and heat-treatable steels can be welded, also in combination with austenitic CrNi steels.
	E Fe10	> 350 MPa	> 600 MPa	
	EN ISO 3581-A	Elongation A	Impact strength K <sub>V</sub>	
	E 18 8 Mn R 32	> 40 %	> 60 J (RT)	
UTP 65 D	EN 14700	Yield strength R <sub>P0,2</sub>	Tensile strength R <sub>m</sub>	UTP 65 D has been developed to satisfy the highest requirements for repair and surfacing. It is extremely crack-resistant when joining steels of difficult weldability.
	E Z Fe11	> 640 MPa	> 800 MPa	
	EN ISO 3581-A	Elongation A		
	~ E 29 9 R 12	> 20 %		
UTP 86 FN	EN ISO 1071	Yield strength R <sub>P0,2</sub>		Universally applicable for repair, construction and production welding.
	E C NiFe-13	approx. 340 MPa		
	AWS A5.15	Hardness HB		
	E NiFe-Cl	approx. 220		
UTP 7015	AWS 5.11	Yield strength R <sub>P0,2</sub>	Tensile strength R <sub>m</sub>	UTP 7015 is employed for repair and surfacing of nickel-base materials. UTP 7015 is also recommended for welding different materials, such as austenitic to ferritic steels, as well as for weld claddings on unalloyed and low-alloyed steels, e.g. for reactor construction.
	E Ni 6182	400 MPa	670 MPa	
	EN ISO 14172	Elongation A	Impact strength K <sub>V</sub>	
	E NiCrFe-3	40 %	120 J (RT)	

### Solid wires for anti-wear and anti-corrosion

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP A 63	AWS A5.9	Yield strength R <sub>P0,2</sub>	Tensile strength R <sub>m</sub>	UTP A 63 is suitable for particularly crack resistant joining, repair and surfacing of high-strength ferritic and austenitic steels, hard manganese steels and cold-tough steels, as cushioning layer under hard alloys, dissimilar metal joints.
	ER 307 (mod.)	> 370 MPa	> 600 MPa	
	EN ISO 14343-A	Elongation A		
	W 18 8 Mn	> 30 %		
UTP A DUR 600	DIN 8555	Hardness HRC		UTP A DUR 600 is universally applicable for MAG buildups on structural parts subject to high impact and medium abrasion.
	MSG 6-GZ-60-S	54 - 60		
	EN 14700			
	S Fe 8			
UTP A DUR 650	EN 14700	Hardness HRC		UTP A DUR 650 is universally used for MAG buildups on structural parts subject to high impact and abrasion.
	S Fe 8	55 - 60		
	DIN 8555			
	MSG 3-GZ-60			

### Special alloy - gas rod

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP A 7550	DIN 8555	Hardness		Heavy coated, flexible tungsten-carbide welding rod against extreme mineral friction wear, corrosion resistant.
	WSG 21-UM-55-CG	Carbide: approx. 2500 HV		
	EN 14700	Matrix: approx. 55 HRC		
	C Ni 20			

## Gasshielded cored wires for anti-wear

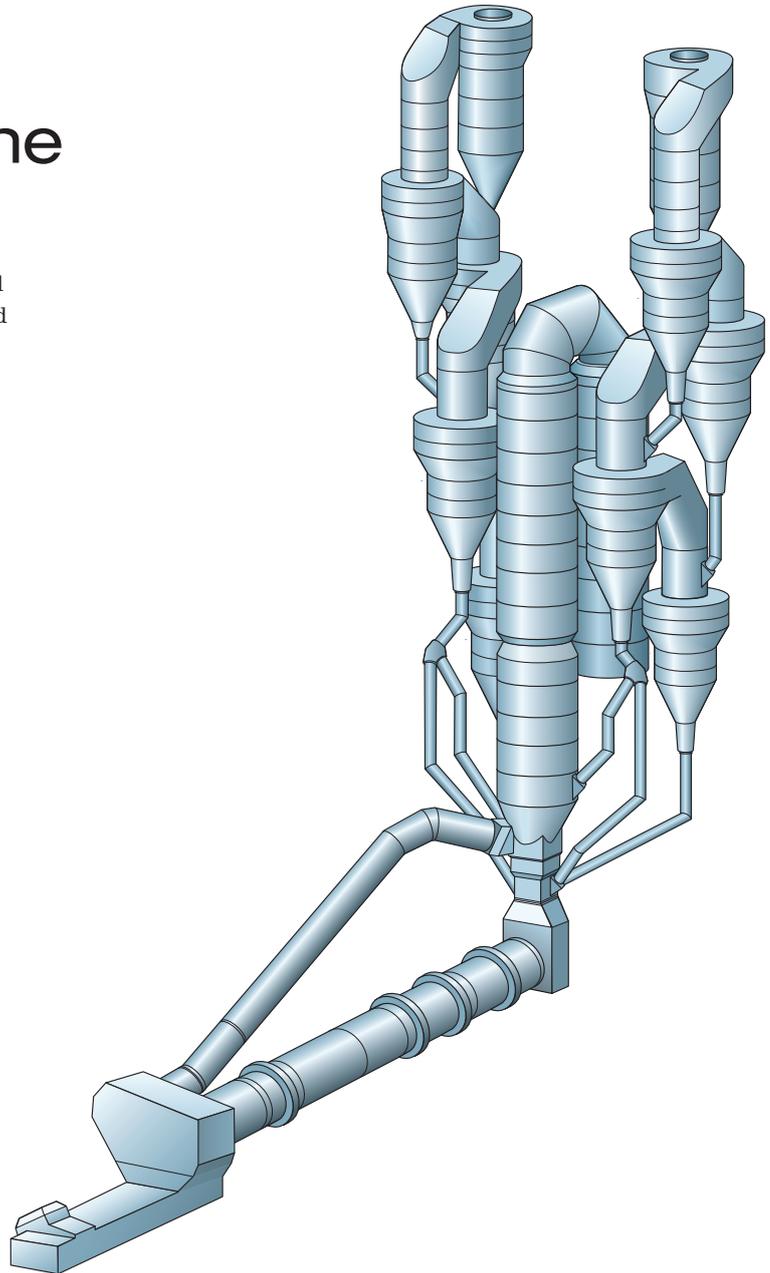
Name	Classification	Hardness		Composition % (All weld metal)													Characteristics and field of use
		HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	
SK 300-G	DIN 8555 MF 1-GF-300-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Build-up alloy designed for welding in horizontal and vertical-up positions under gas shielding.
		300		0,25	1,5	0,4	1,4										
SK 307-G	DIN 8555 MF 8-GF-150-KP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Flux-cored wire for gas shielded arc welding giving a 18 % Cr – 8 % Ni – 7 % Mn deposit.
		155		0,1	7,1	0,8	17,9	8,5				0,2					
SK 600-G	DIN 8555 MF 6-GF-60-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and low stress abrasive wear with moderate impact is excellent.
			59	0,52	1,5	1,2	5,9		0,8		0,05						
SK 650-G	DIN 8555 MF 3-GF-60-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and medium stress abrasive wear with moderate impact is excellent.
			58	0,45	0,9	0,6	5,5		1,4				1,6	0,5			
SK FNM4-G	DIN 8573 (ca) MF NiFe-2-S	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	FeNi alloy with 4 % Manganese designed for joining and surfacing of cast iron pieces. Can also be used for dissimilar welding between cast iron and steel.
		140		0,25	3,5	0,7		bal.									

## Open arc cored wires for anti-wear

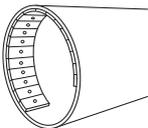
Name	Classification	Hardness		Composition % (All weld metal)													Characteristics and field of use
		HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	
SK 162-O	DIN 8555 MF 10-GF-65-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	High Chromium alloy designed to resist high stress grinding abrasion with low impact. The deposit will show readily stress relief cracks.
			63	5,4	0,2	1,3	27										
SK 255-O	DIN 8555 MF 10-GF-60-GP EN 14700 T Z Fe14	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Open arc metal cored wire designed to deposit a metal resistant to high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	5	0,6	1	27								0,5	bal.	
SK 256-O	DIN 8555 MF 10-GF-65-G EN 14700 T Fe16	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	High Chromium carbide alloy designed to resist high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			63	5,5	1,1	1,2	25,7										
SK 258 TIC-O	DIN 8555 MF 6-GF-60-GP EN 14700 T Fe8	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic Chromium-Titanium alloy designed to resist high stress abrasion with heavy impact. Deposits usually do not relieve cracks.
			58	1,8	0,9	0,2	6,1		1,4		5,5						
SK 866-O	DIN 8555 MF 10-GF-60-G EN 14700 T Z Fe15	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Alloy designed to resist high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	4,5	0,7	0,8	27									0,5	
SK A43-O	DIN 8555 MF 10-GF-65-G EN 14700 T Z Fe15	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	CrNb alloy designed to resist high stress grinding abrasion at service temperature not exceeding 450 °C. The deposit will readily show stress relief cracks.
			64	5,6	0,2	1,3	20,2				6,7						
SK ABRA-MAX O/G	DIN 8555 MF 6-GF-70-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special hardfacing cored wire designed to give an extreme resistance against high stress grinding abrasion and erosion without impact. The deposit will readily show stress relief cracks.
			70	C + Cr + Mo + Nb + W + V + B (bal. Fe)													
SK AP-O	DIN 8555 MF 7-GF-200-KP EN 14700 T Z Fe9	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Multi-purpose cored wire, mainly used for rebuilding and joining of Carbon and 14 % Manganese steels. Can also be used as buffer layer prior to hard overlay. Work-hardenable alloy.
		205		0,37	16	0,3	12,8										

# Preheater cyclone

The ground limestone is fed into the preheater cyclone where it is heated together with silica and additives including iron and aluminium oxide, and neutralized. Before leaving the preheater the rawmix will have been warmed to a temperature of approx. 1000 °C.



## Solutions for Preheater cyclone

		Product recommendations				
Component	Description of wear	Covered Electrode	Solid wire	Gas shielded cored wire	Open Arc wire	Wear plates
Cast Pipes 	Wear due to abrasion.	UTP 63	UTP A 63			SK ABRAGUARD
Preheater Fan 	Wear Due to erosion.	UTP 63 UTP A 7550 UTP Abrasodur 43+ UTP LEDURIT 61 UTP LEDURIT 65	UTP A DUR 600 UTP A DUR 650	SK 600 G SK 650 G SK A68-G	SK 255-O SK 866-O SK A45-O SK ABRA-MAX O/G	SK ABRAGUARD



## Covered electrodes for repair of cracked material

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP 63	EN 14700	Yield strength $R_{p0.2}$	Tensile strength $R_m$	With the fully austenitic UTP 63, non-alloy structural and heat-treatable steels can be welded, also in combination with austenitic CrNi steels.
	E Fe10	> 350 MPa	> 600 MPa	
	EN ISO 3581-A	Elongation A	Impact strength $K_V$	
	E 18 8 Mn R 32	> 40 %	> 60 J (RT)	

## Surfacing electrodes for anti-wear

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP Abrasodur 43+	DIN 8555	Hardness	UTP Abrasodur 43+ is used for hardfacing of parts subject to heavy abrasion with moderate impact.
	E10-UM-65-GR	1 layer 62 HRC	
	EN 14700	2 layers 63 HRC	
	EZ Fe15		
UTP LEDURIT 61	AWS A5.13	Hardness HRC	UTP LEDURIT 61 is suited for highly wear resistant claddings on parts subject to strong grinding abrasion combined with medium impact.
	~ E FeCr-A 1	approx. 60	
	EN 14700		
	EZ Fe14		
UTP LEDURIT 65	DIN 8555	Hardness HRC	UTP LEDURIT 65 is suited for highly abrasion resistant claddings on parts subject to extreme sliding mineral abrasion, also at elevated temperatures up to 500 °C.
	E 10-UM-65-GRZ	approx. 65	
	EN 14700		
	E Fe16		

## Solid wires for anti-wear and anti-corrosion

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use	
UTP A 63	AWS A5.9	Yield strength $R_{p0.2}$	Tensile strength $R_m$	UTP A 63 is suitable for particularly crack resistant joining, repair and surfacing of high-strength ferritic and austenitic steels, hard manganese steels and cold-tough steels, as cushioning layer under hard alloys, dissimilar metal joints.
	ER 307 (mod.)	> 370 MPa	> 600 MPa	
	EN ISO 14343-A	Elongation A		
	W 18 8 Mn	> 30 %		
UTP A DUR 600	DIN 8555	Hardness HRC	UTP A DUR 600 is universally applicable for MAG buildups on structural parts subject to high impact and medium abrasion.	
	MSG 6-GZ-60-S	54 - 60		
	EN 14700			
	S Fe 8			
UTP A DUR 650	EN 14700	Hardness HRC	UTP A DUR 650 is universally used for MAG buildups on structural parts subject to high impact and abrasion.	
	S Fe 8	55 - 60		
	DIN 8555			
	MSG 3-GZ-60			

## Special alloy - gas rod

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP A 7550	DIN 8555	Hardness	Heavy coated, flexible tungsten-carbide welding rod against extreme mineral friction wear, corrosion resistant.
	WSG 21-UM-55-CG	Carbide: approx. 2500 HV	
	EN 14700	Matrix: approx. 55 HRC	
	C Ni 20		

## Gasshielded cored wires for anti-wear

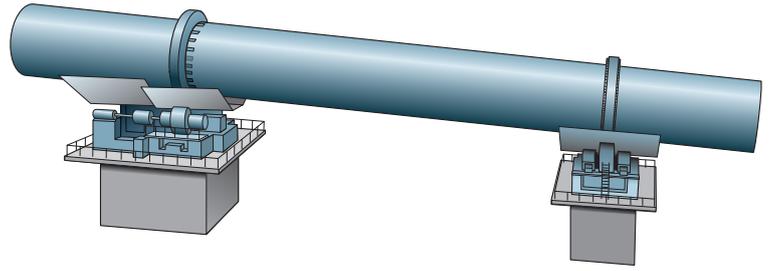
Name	Classification	Hardness	Composition % (All weld metal)													Characteristics and field of use	
SK 600-G	DIN 8555 MF 6-GF-60-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and low stress abrasive wear with moderate impact is excellent.
			59	0,52	1,5	1,2	5,9		0,8		0,05					bal.	
SK 650-G	DIN 8555 MF 3-GF-60-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and medium stress abrasive wear with moderate impact is excellent.
			58	0,45	0,9	0,6	5,5		1,4				1,6	0,5		bal.	
SK A68-G	DIN 8555 MF 2-GF-65-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Hardfacing alloy giving an excellent resistance to medium stress abrasive wear with moderate impact. A very high hardness is already achieved in the first layer.
			62	0,5	1,3	1		1,6							3,7	bal.	

## Open arc cored wires for anti-wear

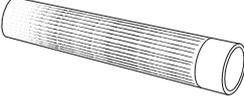
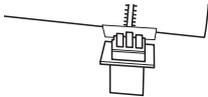
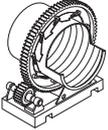
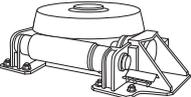
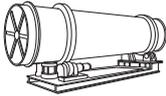
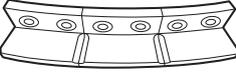
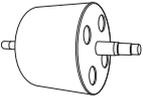
Name	Classification	Hardness	Composition % (All weld metal)													Characteristics and field of use	
SK 255-O	DIN 8555 MF 10-GF-60-GP EN 14700 T Z Fe14	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Open arc metal cored wire designed to deposit a metal resistant to high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	5	0,6	1	27									0,5	
SK 866-O	DIN 8555 MF 10-GF-60-G EN 14700 T Z Fe15	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Alloy designed to resist high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	4,5	0,7	0,8	27									0,5	
SK A45-O	DIN 8555 MF 10-GF-65-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Chromium-Niobium-Molybdenum alloy with addition of Tungsten and Vanadium designed to resist high stress grinding abrasion with low impact and solid erosion at service temperatures up to 650 °C. The deposits will readily show stress relief cracks.
			63	5,3	0,2	0,7	21,2		6,3	6,1			1,9	1		bal.	
SK ABRA- MAX O/G	DIN 8555 MF 6-GF-70-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special hardfacing cored wire designed to give an extreme resistance against high stress grinding abrasion and erosion without impact. The deposit will readily show stress relief cracks.
			70	C + Cr + Mo + Nb + W + V + B (bal. Fe)													

# Rotary Kiln

In the rotary kiln the preheated rawmix is converted into cement clinker at a temperature of approx. 1400°C. The slight inclination and constant rotation of the rotary kiln transports the heated raw materials from the feed in side through to the exit.



## Solutions for Rotary Kiln

Product recommendations					
Component	Description of wear	Covered Electrode	Solid wire	Gas shielded cored wire	Open Arc wire
 <p>Thermo bar</p>	Wear caused by high temperatur oxidation.	UTP 6225 AL			
 <p>Kiln Tyre</p>	Repair of cracked sections.	UTP 068 HH UTP 7015	UTP A 068 HH	UTP AF 068 HH	
 <p>Girth Gear &amp; Pinion</p>	The gear develops cracks in service.	UTP 068 HH UTP 86 FN UTP 7015	UTP A 068 HH	UTP AF 068 HH	
	The teeth profile wears out in service due to friction.	UTP 068 HH + UTP 63/UTP 65 D UTP 86 FN UTP 7015+ UTP 63/UTP 65 D	UTP A 068 HH	UTP AF 068 HH	
 <p>Thrust Rollers</p>	Wear due to friction.	UTP 63 UTP 65 D	UTP A 63 UTP A DUR 350	SK 307-G SK 402-G	SK 350-O SK BU-O
 <p>Weld-on anchor</p>	Welding of stainless steel anchors to carbon steel Kiln shell.	UTP 068 H UTP 6824 LC	UTP A 6824 LC		
 <p>Steel shell</p>	Cracks/wear due to erosion.	UTP 068 HH UTP A 7550 Abrasodur 43+ UTP LEDURIT 61 UTP LEDURIT 65	UTP A DUR 600 UTP A DUR 650	SK 600-G SK 650-G SK A68-G	SK 255-O SK 866-O SK A 45-O SK A70-O SK ABRA-MAX O/G
 <p>Tip casting segments</p>	Wear due to abrasion at elevated temperature.	UTP 068H + UTP LEDURIT 65			SK A 45-O SK ABRA-MAX O/G
 <p>Kiln support rollers</p>	Wear due to friction / abrasion	UTP 63 + UTP DUR 250 UTP DUR 350	UTP A 63 + UTP A DUR 350	SK 307-G SK 402-G	Sk 402-O + SK BU-O

## Covered electrodes for repair

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP 068 HH	AWS 5.11	Yield strength $R_{p0.2}$	Tensile strength $R_m$	UTP 068 HH is predominantly used for repair identical or similar heat resistant Ni-base alloys, heat resistant austenites, cold tough Ni-steel, and for joining heat resistant austenitic-ferritic materials.
	E NiCrFe-3 (mod.)	420 MPa	680 MPa	
	EN ISO 14172	Elongation A	Impact strength $K_v$	
	E Ni 6082	40 %	120 J (RT)	
UTP 63	EN 14700	Yield strength $R_{p0.2}$	Tensile strength $R_m$	With the fully austenitic UTP 63, non-alloy structural and heat-treatable steels can be welded, also in combination with austenitic CrNi steels.
	E Fe10	> 350 MPa	> 600 MPa	
	EN ISO 3581-A	Elongation A	Impact strength $K_v$	
	E 18 8 Mn R 32	> 40 %	> 60 J (RT)	
UTP 65 D	EN 14700	Yield strength $R_{p0.2}$	Tensile strength $R_m$	UTP 65 D has been developed to satisfy the highest requirements for repair and surfacing. It is extremely crack-resistant when joining steels of difficult weldability.
	E Z Fe11	> 640 MPa	> 800 MPa	
	EN ISO 3581-A	Elongation A		
	~ E 29 9 R 12	> 20 %		
UTP 86 FN	EN ISO 1071	Yield strength $R_{p0.2}$		Universally applicable for repair, construction and production welding.
	E C NiFe-13	approx. 340 MPa		
	AWS A5.15	Hardness HB		
	E NiFe-Cl	approx. 220		
UTP 6225 AI	AWS A5.11	Yield strength $R_{p0.2}$	Tensile strength $R_m$	UTP 6225 AI is suitable for high-temperature and heat resistant nickel base alloys. The special features of the weld metal include an excellent resistance against oxidation and carburization and a good creep rupture strength. For service temperature up to 1200° C.
	E NiCrFe-12	> 500 MPa	> 700 MPa	
	EN ISO 14172	Elongation A	Impact strength $K_v$	
	E Ni 6025	> 15 %	> 30 J (RT)	
UTP 6824 LC	EN ISO 3581-A	Yield strength $R_{p0.2}$	Tensile strength $R_m$	The rutile coated stick electrode UTP 6824 LC is used for joining and surfacing of stainless and heat resistant steels / cast steels as well as for dissimilar metal joints (heterogeneous joints) and for buffer layers on corrosion - or wear resistant claddings on C-steels. The weld deposit is scale resistant up to 1000 °C.
	E 23 12 L R 32	> 390 MPa	> 550 MPa	
	AWS A5.4	Elongation A	Impact strength $K_v$	
	E 309 L-17	> 30 %	> 47 J (RT)	
UTP 7015	AWS 5.11	Yield strength $R_{p0.2}$	Tensile strength $R_m$	UTP 7015 is employed for repair and surfacing of nickel-base materials. UTP 7015 is also recommended for welding different materials, such as austenitic to ferritic steels, as well as for weld claddings on unalloyed and low-alloyed steels, e.g. for reactor construction.
	E Ni 6182	400 MPa	670 MPa	
	EN ISO 14172	Elongation A	Impact strength $K_v$	
	E NiCrFe-3	40 %	120 J (RT)	

## Surfacing electrodes for anti-wear

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP Abrasodur 43+	DIN 8555	Hardness		UTP Abrasodur 43+ is used for hardfacing of parts subject to heavy abrasion with moderate impact.
	E10-UM-65-GR	1 layer 62 HRC		
	EN 14700	2 layers 63 HRC		
	EZ Fe15			
UTP DUR 250	DIN 8555	Hardness HB		UTP DUR 250 is used for surfacing on parts, where a tough and easily machinable deposit is required.
	E 1-UM-250	approx. 270		
	EN 14700			
	E Fe1			
UTP DUR 350	DIN 8555	Hardness HB		UTP DUR 350 is particularly suited for wear resistant surfacings on Mn-Cr-V alloyed parts.
	E 1-UM-350	approx. 370		
	EN 14700			
	E Fe1			
UTP LEDURIT 61	AWS A5.13	Hardness HRC		UTP LEDURIT 61 is suited for highly wear resistant claddings on parts subject to strong grinding abrasion combined with medium impact.
	~ E FeCr-A 1	approx. 60		
	EN 14700			
	EZ Fe14			
UTP LEDURIT 65	DIN 8555	Hardness HRC		UTP LEDURIT 65 is suited for highly abrasion resistant claddings on parts subject to extreme sliding mineral abrasion, also at elevated temperatures up to 500 °C.
	E 10-UM-65-GRZ	approx. 65		
	EN 14700			
	E Fe16			

### Solid wires for anti-wear and anti-corrosion

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP A 068 HH	EN ISO 18274	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	UTP A 068 HH is predominantly used for joining identical or similar high heat resistant Ni-base alloys, heat resistant austenites, and for joining heat resistant austenitic-ferritic materials.
	S Ni 6082	> 380 MPa	> 640 MPa	
	AWS A5.14	Elongation A	Impact strength K <sub>v</sub>	
	ER NiCr-3	> 35 %	160 J (RT)	
UTP A 63	AWS A5.9	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	UTP A 63 is suitable for particularly crack resistant joining, repair and surfacing of high-strength ferritic and austenitic steels, hard manganese steels and cold-tough steels, as cushioning layer under hard alloys, dissimilar metal joints.
	ER 307 (mod.)	> 370 MPa	> 600 MPa	
	EN ISO 14343-A	Elongation A		
	W 18 8 Mn	> 30 %		
UTP A 6824 LC	EN ISO 14343-A	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	UTP A 6824 LC ist used for joining and surfacing for working temperatures up to + 300 °C. Weld cladding of non- and low-alloyed base materials. Dissimilar joints.
	G 23 12 L (Si)	400 MPa	590 MPa	
	AWS A5.9	Elongation A	Impact strength K <sub>v</sub>	
	ER 309 L (Si)	30 %	140 J (RT)	
UTP A DUR 350	DIN 8555	Hardness HB		UTP A DUR 350 is suited for MAG buildups on structural parts subject to compression, impact and abrasion, such as caterpillar track components, machine and gear parts, stamps.
	MSG 2-GZ-400	approx. 450		
	EN 14700			
	SZ Fe 2			
UTP A DUR 600	DIN 8555	Hardness HRC		UTP A DUR 600 is universally applicable for MAG buildups on structural parts subject to high impact and medium abrasion.
	MSG 6-GZ-60-S	54 - 60		
	EN 14700			
	S Fe 8			
UTP A DUR 650	EN 14700	Hardness HRC		UTP A DUR 650 is universally used for MAG buildups on structural parts subject to high impact and abrasion.
	S Fe 8	55 - 60		
	DIN 8555			
	MSG 3-GZ-60			

### Special alloy - gas rod

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP A 7550	DIN 8555	Hardness	Heavy coated, flexible tungsten-carbide welding rod against extreme mineral friction wear, corrosion resistant.
	WSG 21-UM-55-CG	Carbide: approx. 2500 HV	
	EN 14700	Matrix: approx. 55 HRC	
	C Ni 20		



## Gasshielded cored wires for anti-wear

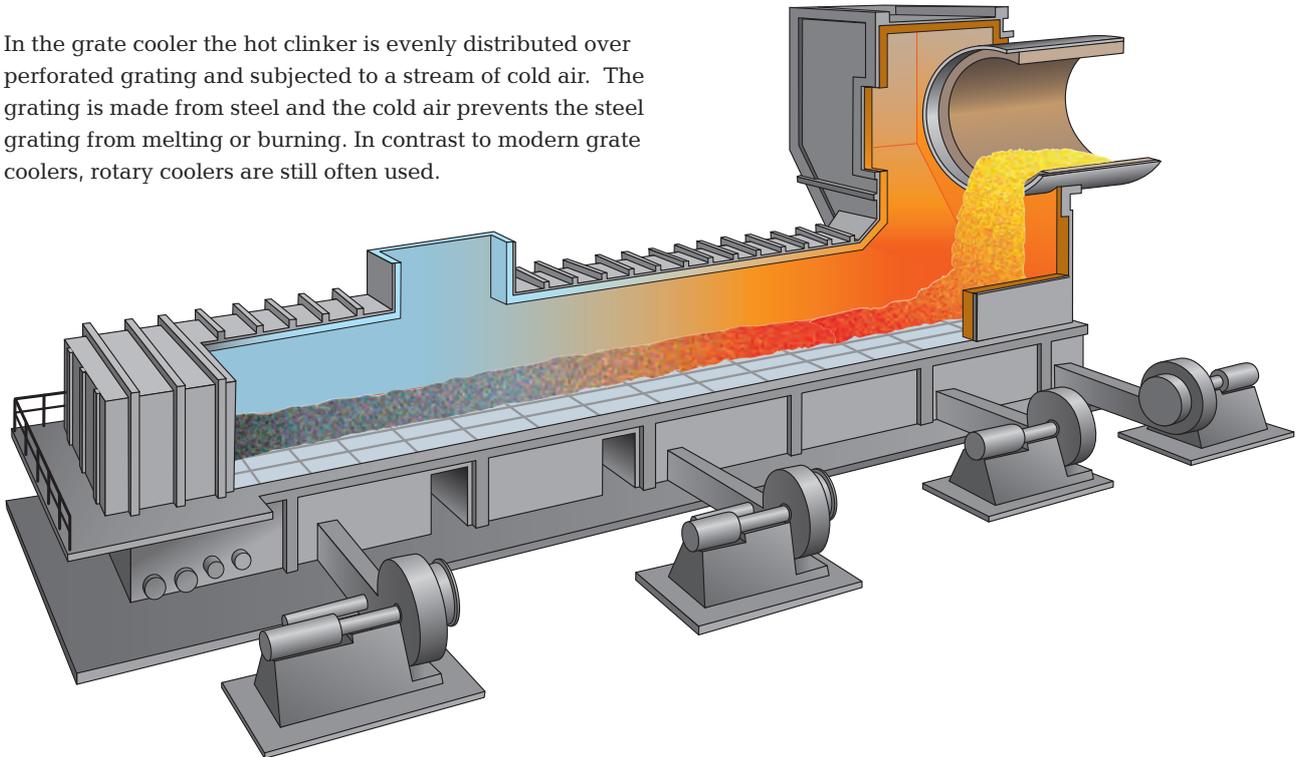
Name	Classification	Hardness		Composition % (All weld metal)													Characteristics and field of use
		HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	
SK 307-G	DIN 8555 MF 8-GF-150-KP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Flux-cored wire for gas shielded arc welding giving a 18 % Cr – 8 % Ni – 7 % Mn deposit.
		155		0,1	7,1	0,8	17,9	8,5				0,2				bal.	
SK 402-G	DIN 8555 MF 8-GF-150-KP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Austenitic alloy type 18Cr8Ni7Mn recommended for build up and buffer layer prior to hardfacing. It can also be used for joining of dissimilar metals.
		170		0,1	6,6	0,6	17,1	7,8								bal.	
SK 600-G	DIN 8555 MF 6-GF-60-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and low stress abrasive wear with moderate impact is excellent.
		59		0,52	1,5	1,2	5,9		0,8		0,05					bal.	
SK 650-G	DIN 8555 MF 3-GF-60-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and medium stress abrasive wear with moderate impact is excellent.
		58		0,45	0,9	0,6	5,5		1,4				1,6	0,5		bal.	
SK A68-G	DIN 8555 MF 2-GF-65-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Hardfacing alloy giving an excellent resistance to medium stress abrasive wear with moderate impact. A very high hardness is already achieved in the first layer.
		62		0,5	1,3	1		1,6							3,7	bal.	
UTP AF 068 HH	EN ISO 12153 T Ni 6082 RM 3 AWS A5.34 E NiCr 3 T0-4	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	UTP AF 068 HH is a Ni-base flux cored wire (NiCr) for repair and surfacing of nickel alloys of the same or of similar nature, heterogeneous joints with C- and CrNi-steels, claddings on C-steels.
				0,03	3	0,4	20	Rest		2,4		0,007	0,005			1,4	

## Open arc cored wires for anti-wear

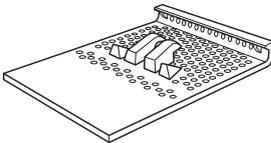
Name	Classification	Hardness		Composition % (All weld metal)													Characteristics and field of use
		HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	
SK 255-O	DIN 8555 MF 10-GF-60-GP EN 14700 T Z Fe14	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Open arc metal cored wire designed to deposit a metal resistant to high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
		60		5	0,6	1	27								0,5	Bal.	
SK 350-O	DIN 8555 MF 1-GF-350	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Rebuilding and hardfacing alloy for Carbon steel parts. Suitable for medium hard build-ups.
		360		0,15	1,3	0,1	2,5				0,9					bal.	
SK 402-O	DIN 8555 MF 8-GF-150/400-KPZ	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Austenitic alloy type 18Cr8Ni7Mn recommended for build up and buffer layer prior to hardfacing. It can also be used for joining of dissimilar metals.
		160		0,09	6	0,9	18	7,8								bal.	
SK 866-O	DIN 8555 MF 10-GF-60-G EN 14700 T Z Fe15	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Alloy designed to resist high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
		60		4,5	0,7	0,8	27								0,5	Bal.	
SK A45-O	DIN 8555 MF 10-GF-65-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Chromium-Niobium-Molybdenum alloy with addition of Tungsten and Vanadium designed to resist high stress grinding abrasion with low impact and solid erosion at service temperatures up to 650 °C. The deposits will readily show stress relief cracks.
		63		5,3	0,2	0,7	21,2		6,3	6,1			1,9	1		bal.	
SK A70-O	DIN 8555 MF 10-GF-70-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special Chromium-Niobium-Boron alloy designed to give extreme resistance to high stress grinding abrasion without impact. The deposits will show stress relief cracks.
		64		2,8			15			4,6	0,1				2	bal.	
SK ABRA-MAX O/G	DIN 8555 MF 6-GF-70-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special hardfacing cored wire designed to give an extreme resistance against high stress grinding abrasion and erosion without impact. The deposit will readily show stress relief cracks.
		70		C + Cr + Mo + Nb + W + V + B (bal. Fe)													
SK BU-O	DIN 8555 MF 1-GF-300-P	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Rebuilding alloy for Carbon steel parts. Can also be used as buffer layer prior to hard overlay.
		280		0,1	0,9	0,6	0,5		0,3							bal.	

# Clinker Cooler

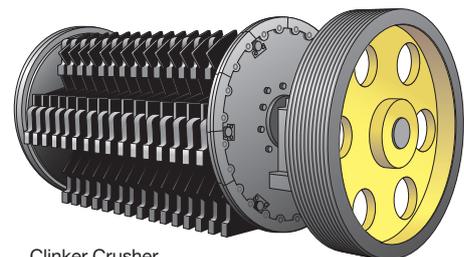
In the grate cooler the hot clinker is evenly distributed over perforated grating and subjected to a stream of cold air. The grating is made from steel and the cold air prevents the steel grating from melting or burning. In contrast to modern grate coolers, rotary coolers are still often used.



## Solutions for Clinker Cooler

Component	Description of wear	Product recommendations		
		Covered Electrode	Solid wire	Open Arc wire
Cooler grate plates 	Cracks	UTP 068 HH UTP 6824 LC	UTP A 6824 LC	
	Wear due to abrasion at elevated temperature.	UTP LEDURIT 65		SK A45-O SK ABRA-MAX O/G
Cooler grate side guard				

Component	Description of wear	Product recommendations	
		Covered Electrode	Open Arc wire
Hammers 	Wear due to impact and abrasion.	UTP 63 UTP LEDURIT 65	SK A45-O SK ABRA-MAX O/G



Clinker Crusher

## Covered electrodes for repair of cracked material

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP 068 HH	AWS 5.11	Yield strength $R_{p0,2}$	Tensile strength $R_m$	UTP 068 HH is predominantly used for repair identical or similar heat resistant Ni-base alloys, heat resistant austenites, cold tough Ni-steel, and for joining heat resistant austenitic-ferritic materials.
	E NiCrFe-3 (mod.)	420 MPa	680 MPa	
	EN ISO 14172	Elongation A	Impact strength $K_V$	
	E Ni 6082	40 %	120 J (RT)	
UTP 63	EN 14700	Yield strength $R_{p0,2}$	Tensile strength $R_m$	With the fully austenitic UTP 63, non-alloy structural and heat-treatable steels can be welded, also in combination with austenitic CrNi steels.
	E Fe10	> 350 MPa	> 600 MPa	
	EN ISO 3581-A	Elongation A	Impact strength $K_V$	
	E 18 8 Mn R 32	> 40 %	> 60 J (RT)	
UTP 6824 LC	EN ISO 3581-A	Yield strength $R_{p0,2}$	Tensile strength $R_m$	The rutile coated stick electrode UTP 6824 LC is used for joining and surfacing of stainless and heat resistant steels / cast steels as well as for dissimilar metal joints (heterogeneous joints) and for buffer layers on corrosion - or wear resistant claddings on C-steels. The weld deposit is scale resistant up to 1000 °C.
	E 23 12 L R 32	> 390 MPa	> 550 MPa	
	AWS A5.4	Elongation A	Impact strength $K_V$	
	E 309 L-17	> 30 %	> 47 J (RT)	

## Surfacing electrodes for anti-wear

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP LEDURIT 65	DIN 8555	Hardness HRC	UTP LEDURIT 65 is suited for highly abrasion resistant claddings on parts subject to extreme sliding mineral abrasion, also at elevated temperatures up to 500 °C.
	E 10-UM-65-GRZ	approx. 65	
	EN 14700		
	E Fe16		

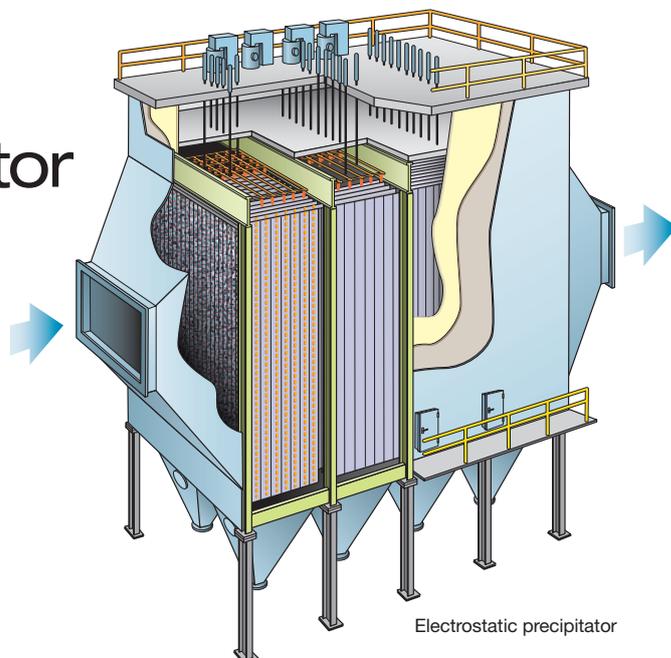
## Solid wires for anti-wear and anti-corrosion

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP A 6824 LC	EN ISO 14343-A	Yield strength $R_{p0,2}$	Tensile strength $R_m$	UTP A 6824 LC is used for joining and surfacing for working temperatures up to + 300 °C. Weld cladding of non- and low-alloyed base materials. Dissimilar joints.
	G 23 12 L (Si)	400 MPa	590 MPa	
	AWS A5.9	Elongation A	Impact strength $K_V$	
	ER 309 L (Si)	30 %	140 J (RT)	

## Open arc cored wires for anti-wear

Name	Classification	Hardness	Composition % (All weld metal)													Characteristics and field of use	
SK A45-O	DIN 8555 MF 10-GF-65-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Chromium-Niobium-Molybdenum alloy with addition of Tungsten and Vanadium designed to resist high stress grinding abrasion with low impact and solid erosion at service temperatures up to 650 °C. The deposits will readily show stress relief cracks.
			63	5,3	0,2	0,7	21,2		6,3	6,1			1,9	1		Bal.	
SK ABRA-MAX O/G	DIN 8555 MF 6-GF-70-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special hardfacing cored wire designed to give an extreme resistance against high stress grinding abrasion and erosion without impact. The deposit will readily show stress relief cracks.
			70	C + Cr + Mo + Nb + W + V + B (bal. Fe)													

# Electrostatic precipitator



## Solutions for Electrostatic precipitator

Component	Description of wear	Product recommendations				Wear plates
		Covered Electrode	Solid wire	Gas shielded cored wire	Open Arc wire	
 I D Fan	Wear Due to erosion.	UTP 63	UTP A DUR 600	SK 600-G	SK 255-O	SK ABRAGUARD
		UTP A 7550	UTP A DUR 650	SK 650-G	SK 866-O	
		UTP Abrasodur 43+		SK A68-G	SK A45-O	
		UTP LEDURIT 61			SK A70-O	
		UTP LEDURIT 65			SK ABRA-MAX O/G	

### Covered electrodes for repair of cracked material

Name	Classification	Mechanical properties of the weld metal		Characteristics and field of use
UTP 63	EN 14700	Yield strength $R_{p0.2}$	Tensile strength $R_m$	With the fully austenitic UTP 63, non-alloy structural and heat-treatable steels can be welded, also in combination with austenitic CrNi steels.
	E Fe10	> 350 MPa	> 600 MPa	
	EN ISO 3581-A	Elongation A	Impact strength $K_v$	
	E 18 8 Mn R 32	> 40 %	> 60 J (RT)	

### Surfacing electrodes for anti-wear

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP Abrasodur 43+	DIN 8555	Hardness	UTP Abrasodur 43+ is used for hardfacing of parts subject to heavy abrasion with moderate impact.
	E10-UM-65-GR	1 layer 62 HRC	
	EN 14700	2 layers 63 HRC	
	EZ Fe15		
UTP LEDURIT 61	AWS A5.13	Hardness HRC	UTP LEDURIT 61 is suited for highly wear resistant claddings on parts subject to strong grinding abrasion combined with medium impact.
	~ E FeCr-A 1	approx. 60	
	EN 14700		
UTP LEDURIT 65	EZ Fe14		UTP LEDURIT 65 is suited for highly abrasion resistant claddings on parts subject to extreme sliding mineral abrasion, also at elevated temperatures up to 500 °C.
	DIN 8555	Hardness HRC	
	E 10-UM-65-GRZ	approx. 65	
	EN 14700		
	E Fe16		

## Solid wires for anti-wear and anti-corrosion

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP A DUR 600	DIN 8555	Hardness HRC	UTP A DUR 600 is universally applicable for MAG buildups on structural parts subject to high impact and medium abrasion.
	MSG 6-GZ-60-S	54 - 60	
	EN 14700		
	S Fe 8		
UTP A DUR 650	EN 14700	Hardness HRC	UTP A DUR 650 is universally used for MAG buildups on structural parts subject to high impact and abrasion.
	S Fe 8	55 - 60	
	DIN 8555		
	MSG 3-GZ-60		

## Special alloy - gas rod

Name	Classification	Mechanical properties of the weld metal	Characteristics and field of use
UTP A 7550	DIN 8555	Hardness	Heavy coated, flexible tungsten-carbide welding rod against extreme mineral friction wear, corrosion resistant.
	WSG 21-UM-55-CG	Carbide: approx. 2500 HV	
	EN 14700	Matrix: approx. 55 HRC	
	C Ni 20		

## Gasshielded cored wires for anti-wear

Name	Classification	Hardness	Composition % (All weld metal)														Characteristics and field of use
SK 600-G	DIN 8555 MF 6-GF-60-GP	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and low stress abrasive wear with moderate impact is excellent.
			59	0,52	1,5	1,2	5,9		0,8		0,05						
SK 650-G	DIN 8555 MF 3-GF-60-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Martensitic steel alloy designed for welding in horizontal and vertical-up positions under gas shielding. Its resistance to friction and medium stress abrasive wear with moderate impact is excellent.
			58	0,45	0,9	0,6	5,5		1,4				1,6	0,5			
SK A68-G	DIN 8555 MF 2-GF-65-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Hardfacing alloy giving an excellent resistance to medium stress abrasive wear with moderate impact. A very high hardness is already achieved in the first layer.
			62	0,5	1,3	1		1,6								3,7	

## Open arc cored wires for anti-wear

Name	Classification	Hardness	Composition % (All weld metal)														Characteristics and field of use
SK 255-O	DIN 8555 MF 10-GF-60-GP EN 14700 T Z Fe14	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Open arc metal cored wire designed to deposit a metal resistant to high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	5	0,6	1	27									0,5	
SK 866-O	DIN 8555 MF 10-GF-60-G EN 14700 T Z Fe15	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Alloy designed to resist high stress grinding abrasion with low impact. The deposits will readily show stress relief cracks.
			60	4,5	0,7	0,8	27									0,5	
SK A45-O	DIN 8555 MF 10-GF-65-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Chromium-Niobium-Molybdenum alloy with addition of Tungsten and Vanadium designed to resist high stress grinding abrasion with low impact and solid erosion at service temperatures up to 650 °C. The deposits will readily show stress relief cracks.
			63	5,3	0,2	0,7	21,2		6,3	6,1			1,9	1			
SK A70-O	DIN 8555 MF 10-GF-70-G	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special Chromium-Niobium-Boron alloy designed to give extreme resistance to high stress grinding abrasion without impact. The deposits will show stress relief cracks.
			64	2,8			15			4,6		0,1				2	
SK ABRA-MAX O/G	DIN 8555 MF 6-GF-70-GT	HB	HRC	C	Mn	Si	Cr	Ni	Mo	Nb	Ti	Cu	W	V	B	Fe	Special hardfacing cored wire designed to give an extreme resistance against high stress grinding abrasion and erosion without impact. The deposit will readily show stress relief cracks.
			70	C + Cr + Mo + Nb + W + V + B (bal. Fe)													

# voestalpine Böhler Welding

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