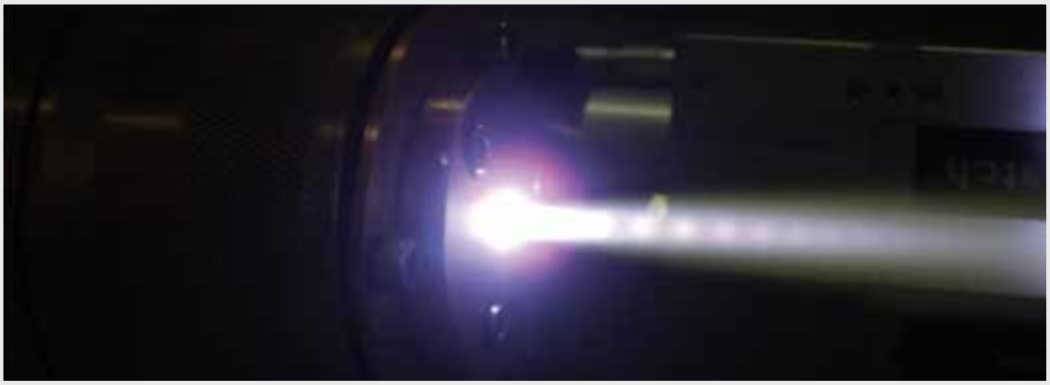
DURUM
VERSCHLEISS-SCHUTZ GMBH

Materials and Services

for Wear Protection



Wear Solution with Creative Ideas for Practical Solutions

DURUM VERSCHLEISS-SCHUTZ GMBH was established in 1984 as a manufacturer of advanced hard-facing products. Today DURUM has production and service centres in Brazil, France and the USA and exports to more than 80 countries all over the world!

DURUM provides high performance welding and surfacing wires and powders and is a global market leader in the supply of specialized overlaying consumables that can be applied by a range of processes including: Flux Cored Wire, Plasma Transferred Arc (PTA) Welding, Oxy-fuel Welding, Thermal Spray Powder and Wire.

Besides Willich (Germany) DURUM Group maintains production and workshop facilities in Brazil (Sao Paolo), France (Saint Victor) and the USA (Houston TX). We also support a network of independent agencies throughout the world. We meet demanding requirements of today's industry with a wide array of Welding and Thermal Spray technologies.

The company employs national and international PhD's; welding engineers and independent experts from well known and respected universities, which ensures that constant material and process development is achieved to the highest standards.

DIN EN ISO 9001:2008
Cert. No.: 01 100 040463

Hard-Facing Products

DURUM focuses on "continuous development" and sets a significant annual budget aside for research and development including new product development, product enhancement and the development of highly specialised solutions to the most challenging applications in the industry.

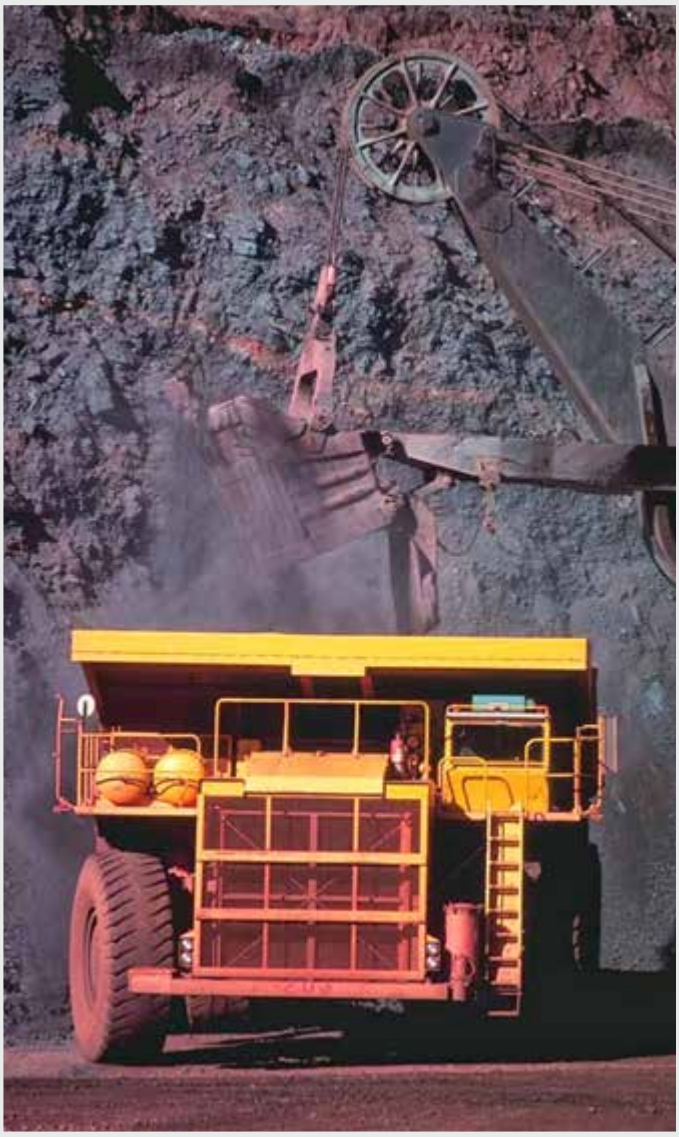
We meet the demanding requirements of today's industry with a wide array of Welding and Thermal Spray products including Flux Cored Wire, PTA (Plasma Transferred Arc) our famous oxy-acetylene products and last but not least our Thermal Spray Powder and Wire.

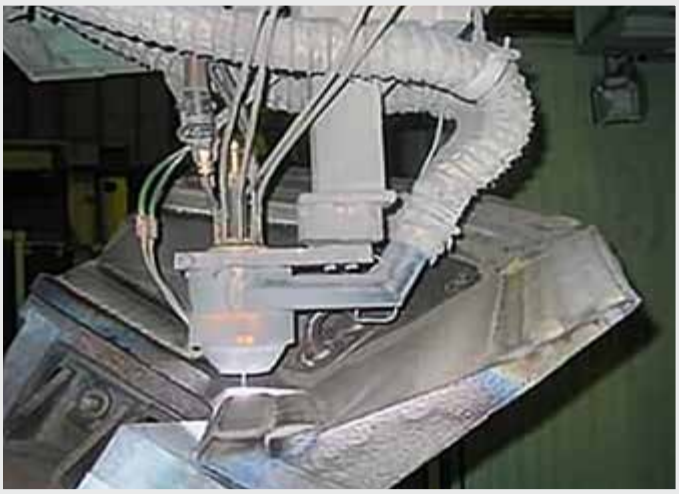
Today we have a world-class solution developed for every aspect of wear, typically encountered throughout the industry that outperforms competitive products in the market.

Our wide range of specialized surface hard-facing materials includes:

- Tungsten carbide rods for oxy-acetylene welding
- Nickel, cobalt and iron based flux cored wire
- FCAW wires with tungsten carbide and complex carbides to provide extremely hard and tough coatings, used principially for extreme wear applications
- Tungsten carbides, complex carbides and chromium carbides for manual arc welding
- PTA welding powders
- PTA machines, torches and powder feeders
- Powders for oxy-acetylene welding and spraying
- Fused crushed and spherical tungsten carbides
- Pre-manufactured replacement wear parts
- Thermal spray powders (conforming to DIN EN 1274)
- Thermal spray wires (conforming to DIN EN 14919)

Typical Applications of DURUM Products





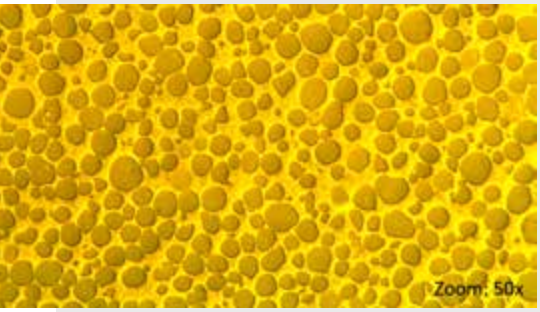
Tungsten Carbide and its Derivatives

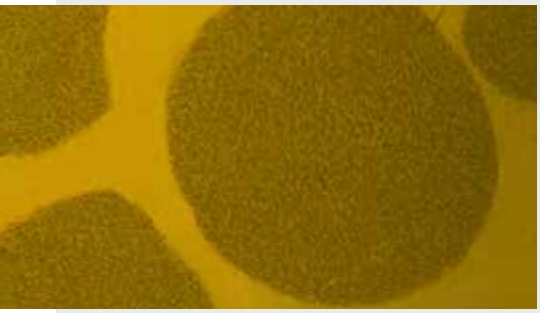
DURMAT®
WC-Co Powders

The development of the thermal spray powders DURMAT® 125 and DURMAT® 135 represented our first steps in this direction. Their characteristic, fine-structured composition with crystallite grain sizes of max. 400 nm is their trademark and a guarantee for high wear resistance. We have also achieved comparable wear resistances in the powder cladding field using PTA or laser methods, by making the WC structure smaller in a similar way.

Thanks to their outstanding strength properties, hardfacing alloys based on tungsten carbide (WC) and cobalt take a central position in wear protection.

Our **DURMAT® DNK 1.3** development using fine-structured WC thus resulted in hardness in the region of 1,750 $HV_{0.5}$. In an effort to establish a uniform parlance for identifying alloy structures, the German-speaking carbide industry has agreed on the following definitions to describe grain size categories. It is generally accepted at present.





1. Abrasive wear

The greater hardness of the nano-scale hardfacing alloy associated with the decreasing WC grain size reduces wear from abrasion considerably. The harder “hardmetal” counters abrasion with a greater resistance.

Wear progresses significantly slower, as the binding metal layer between the fine grain hardfacing crystallites is exceptionally thin, making it harder to wash out. Due to this structural attribute, only very small hardfacing particles are torn out of the structural bond. The spherical shape represents a further form of protection, which is further stabilized by the small grain size; small particles have to expend a great deal more energy to divide and become smaller than coarse ones.

2. Corrosive wear

A characteristic, higher wear resistance also occurs with regard to corrosive wear. As a result of the nano-structure and in particular the significantly reduced intermediate binding metal layer, the corrosive media can only reach the cobalt with difficulty, leading to considerable delays in wear. In turn, only the smallest hardfacing particles escape, corrosion is slowed down considerably.

As in most applications, abrasive and corrosive wear are barely distinguishable, due to the improvement in properties that can be achieved, a nano-structured carbide like **DURMAT® DN 3.0** is the better choice for both forms of wear.

Grain Size in µm	
<0,2	nano
0,2 - 0,5	ultrafine
0,5 - 0,8	submicron
0,8 - 1,3	fine
1,3 - 2,5	medium
2,5 - 6,0	coarse
> 6,0	extra coarse

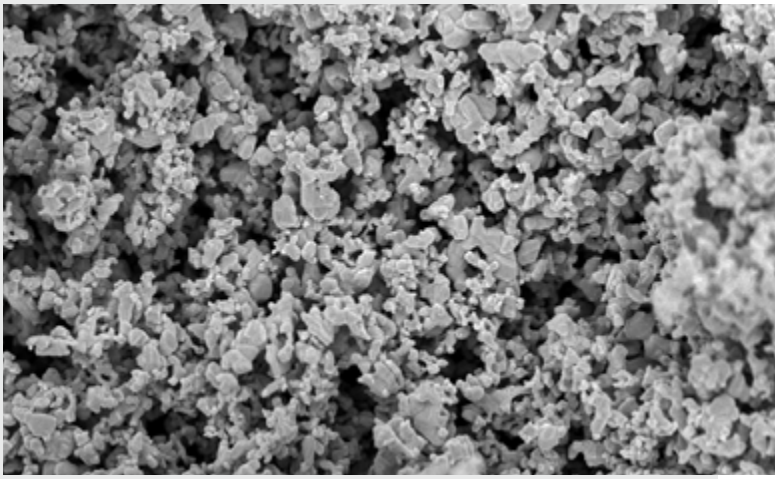
Hardness: In WC-Co alloys of the same chemical composition, the hardness is mostly determined by the grain size of the carbide phase, which in turn depends on the primary grain size of the starting powder. When the grain size drops, the hardness increases considerably, meaning that a significantly high hardness level can be reached with the finest starting powders. The increase in hardness is always accompanied by the rise in coercive field strength.

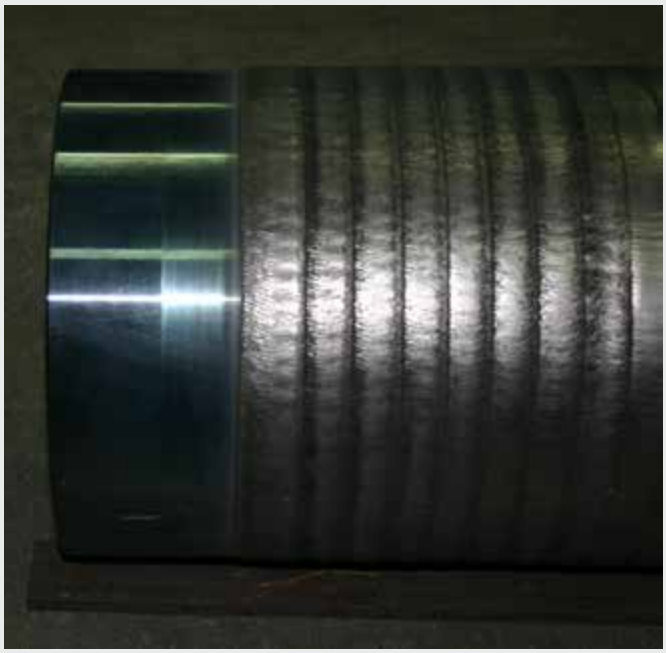
High temperature hardness: With increased grain fineness, these alloys also feature improved hardness properties at high temperatures, so that strength benefits emerge in high-temperature use particularly for wear protection layers made from them. The nano-scale WC raises the strength level a stage higher.

Toughness: A smaller grain size in the carbide phase with the same Co content results in a decrease in the difference between WC grains and hence to a reduction in particle movement.

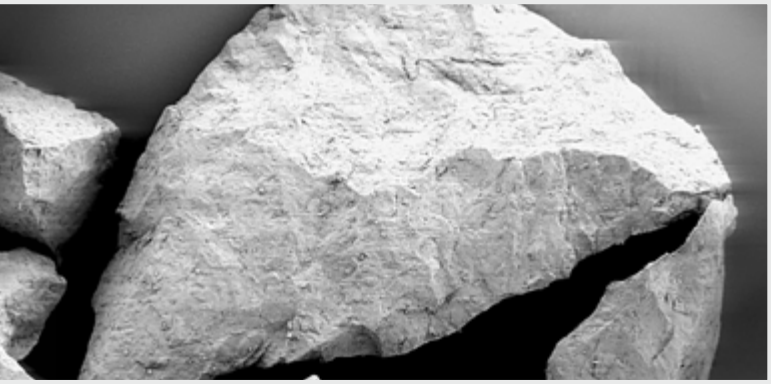
Compressive strength: The high compressive strength of these carbide alloys is one of the most important properties in these materials, as it is significant in practically all technical applications. After diamond, hardmetal (cemented tungsten carbide) is the most pressure resistant material. This property is also of predominant significance in wear protection. The increase in the microstructure leads to a significant rise and as a result these nano tungsten carbides have the highest compressive strength.

Product DURMAT®	-	DN 3.0	DNK 1.3
Alloy type	-	WC-8Co	WC-Co
Parameter	Unit	Typical Data	Typical Data
Co	%	7.5 - 8.5	6 - 7
C_{TOTAL}	%	< 5.7	< 5.65
Fe	%	< 0.25	< 0.25
Ti	%	< 0.04	< 0.04
Mo+Nb+Ta	%	< 0.4	< 0.4
Others	%	bal.	bal.
Hardness	HV	2,400 - 2,550	1,950 - 2,050
Density	g/cm³	14.2 - 14.5	14.7 - 14.9
Apparent density	g/cm³	> 8.5	> 8
η-Phase	%	< 1	< 1
Microporosity	<6%	<A04/B02/C02	<A04/B02/C00
Binder lakes: >25µm	%	<6	<6
Binder lakes: >50µm	%	0	0
Cavities: >25µm	%	<6	<6
Cavities: >75µm	%	0	0
Grain Size	µm	45 - 300	45 - 250
Coercitive field strength	kA/m	> 36	> 18
Magnetic saturation	µTm³/kg	13.7	11
Saturation percentage	%	88 - 98	> 92





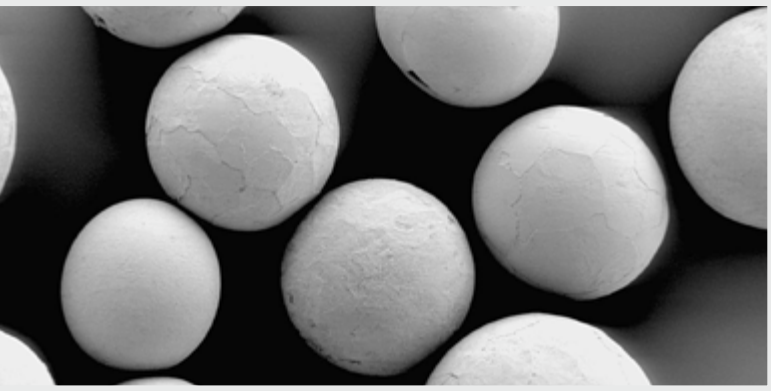
Tungsten Carbide and its Derivatives



Fused Tungsten Carbide (FTC) is one of the hardest and most abrasion resistant materials used in modern wear resistance and tool technology.

Product		DURMAT® FTC	DURMAT® SFTC
Alloy type	-	WC-W_2C	WC-W_2C
Parameter	Unit	Typical data	Typical data
C_{TOTAL}	%	3.8 - 4.1	3.8 - 4.1
C_{FREE}	%	0.1 max.	0.1 max.
O_2 SIEVE RANGE	%	0.05 max.	0.05 max.
O_2 SUB SIEVE RANGE	%	0.2 max.	0.2 max.
Fe	%	0.3 max.	0.3 max.
Co	%	0.3 max.	0.3 max.
Hardness	HV	2,360	3,000
Structure	-	mainly feather	fine
Density	g/cm³	16 - 17	16 - 17
Melting point	°C/°F	2,860/5,176	2,860/5,176

DURMAT® Spherical Tungsten Carbide (SFTC) is the most wear resistant Fused Tungsten Carbide we can offer.



DURMAT® FTC Powders

FTC is the eutectic composition of WC and W_2C. The average carbon content of our FTC is 3.8 – 4.1 wt. % and the phases can be estimated to be approximately 78 – 80% W_2C and 20 – 22% WC.

Application: hardfacing metallic surfaces exposed to extreme mechanical load. In this case FTC should be used as a fine or coarser powder, which is embedded in the metallic matrix or is precipitated into hard alloys (surface coating by thermal spraying or welding). Using powder metallurgical processes, it is possible to produce parts of nearly any shape, which can contain hard materials or diamonds together with a metal binder and FTC (reinforcing the hardness of diamond tools). FTC equalizes the matrices between the different hardnesses of diamonds and binder in diamond drilling, grinding and honing tools. Excellent for deep well drilling tools and rods, crusher jaws, mixers, concrete and stone saws, hot-pressed tools, screens & conveyors, extrusion housings, hard additives to diamond bits and saws.

DURMAT® SFTC Powders

These SFTC spherical fused tungsten carbide particles show a fine non-acicular structure with a higher hardness than conventional FTC (>3,000 $HV_{0.1}$). The increased apparent density combined with a better flowability enable an increase of hard particles in wear resistant coatings and components produced by infiltration.

Using powder metallurgical processes, it is possible to produce parts of nearly any shape, which can contain hard materials or diamonds together with a metal binder and SFTC, reinforcing the hardness of diamond tools. FTC equalizes the matrices between the different hardnesses of diamonds and binder in diamond drilling, grinding and honing tools. Excellent for deep well drilling tools and rods, crusher jaws, mixers, concrete & stone saws, hot-pressed tools, screens & conveyors, extrusion housings and hard additives to diamond bits and saws.

The constant testing of our raw materials, production and preshipment procedures ensure the homogeneity of the compliance with the specifications of all powder grades that we deliver.

DURMAT® CP - Wear Plates

The fabrication of the **DURMAT® CP** *– plate is carried out by use of a core- wire welding process. The extreme wear resistance is achieved by use of high quality DURMAT® Flux Cored Wires consumables with high Chromium and Carbon content. The addition of complex carbides enables the formation of a high content of Chromium-carbides and special carbides, so that the required properties are achievable in the first layer in accordance to the DIN EN 14700 (group 10 former DIN 8555)*

The characteristic, hyper-eutectic weld metal of the FeCrC hardfacing alloy consists of large, primary deposited carbides of the type M7C3, embedded in the eutectic matrix. The content of the primary carbides mainly affect the wear resistance and can be determined according to the Maratray formula, as follows:

$$\% K = 12{,}33\ (\% C) + 0{,}55\ (\% Cr) - 15{,}2\ \%$$

The increasing carbide content is related to steady rise of the Cr and C content.

By application of flux cored wires **DURMAT® FD 56** and **62** the primary carbide content can be increased significantly. The addition of complex carbides e.g. NbC subsequently increases the wear resistance performance of the plates..

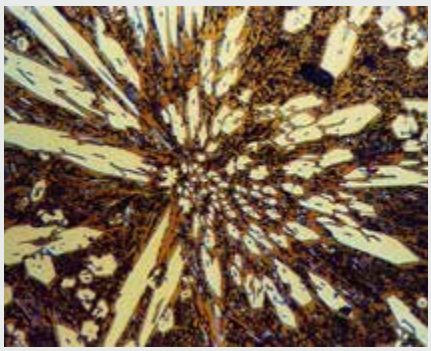
Base material (mm)	Coating (mm)	Total (mm)	Weight (kg/m²)
5	3	8	62
6	4	10	78
6	5	11	85
8	5	13	100
8	8	16	125
10	8	18	140
Further dimensions on request			

Delivery forms:

DURMAT® CP – plates can be delivered as pre-finished blanks with fixation elements, sink-hole bores or others. Re-coating is carried out with similar alloy electrodes (**DURMAT® NISE**) or cored wires **(DURMAT® NIFD**).

DURMAT® CP 960

For parts exposed to moderate abrasive wear combined with moderate impact and corrosion. Maximum working temperature: 350°C. Typical applications are the steel and cement industries, power stations, mining, concrete, glass and recycling as well as chemical and petrochemical industries.

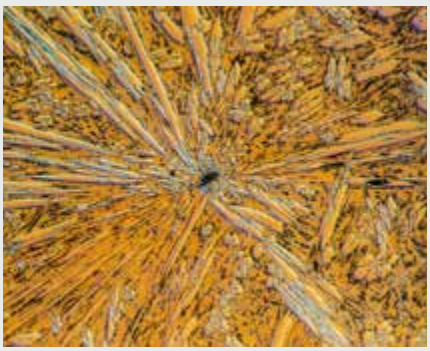


DURMAT® CP 1000

Similar to CP 960 but for parts exposed to a high abrasive wear in combination with corrosion and low impact. Maximum working temperature: 350°C. Typical applications are the mining, steel, cement, power stations, glass and recycling industries.

DURMAT® CP 1100

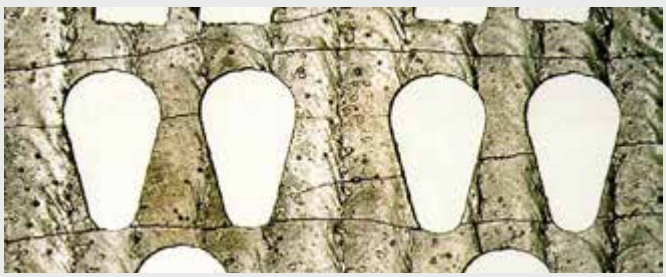
For parts subject to high abrasive wear in combination with temperatures up to 650°C together with moderate corrosion and impact. Typical applications are the mining, steel, cement, chemical and petrochemical industries.



Benefits:

- **High protection for many wear mechanisms**
- **High deformability, the plates can be cut via plasma**
- **Easy weldable based material**

DURMAT®	Typical Chemical Composition of Weld Metal (Wt.-%)									Carbide Content	Working Temperature	Hardness
	C	Si	Mn	Mo	Cr	Nb	V	W	Fe			
CP 960	5.4	1	0.4	-	32	-	-	-	bal.	60 %	350 °C	≈ 58-60 HRC
CP 1000	5.2	1.1	0.4	-	22	7	-	-	bal.	58 %	350 °C	≈ 61-63 HRC
CP 1100	4.8	-	-	4.8	22	4.7	V+W: 2.5		bal.	60 %	650 °C	≈ 64 HRC



Afore mentioned analysis and hardness values are typical for a 1-layer deposit with even hardness from the top to the base material. These figures are typical for our Flux Cored Plus process.

DURMAT® PLATINUM Wear Plates

DURUM's family of Tungsten Carbide - Nickel base alloys exhibit superior resistance to abrasion and wear, retaining their hardness up to 600°C (approx. 1,000°F) in combination with excellent corrosion resistant properties.

PTA - Plasma Transferred Arc is suitable for almost all cobalt and nickel based alloys as well as specially designed iron based alloys. Primary carbides in combination with those nickel, cobalt and iron based alloys improve the wear resistance remarkably compared to chromium carbide plates.

PTA is a true welding process, with deposits forming a metallurgical bond with the base metal. The dilution level is very close to those obtained by using the oxy-acetylene process.

A further advantage of using the PTA process is the capability of producing thin edge surfaces. Together with the very low dilution (approx. 5%) and the minimal distortion risk, the process is ideal for applications on parts such as Fan Blades.

Typical / Standard Sizes of Wear Plates		
Base Material (mm)	Overlay (mm)	Total ± 1mm
3	2	5
5	3	8
6	4	10
6	5	11
8	5	13
8	8	16
10	8	18
Standard base plate type: NF A36-201 E390 / DIN 17102 StE36 / ASTM A 572gr50		
Other types according to customers specifications e.g. stainless, heat resisting, high strength, etc.		

DURMAT® PTA Plates can be cut, bent, rolled, welded, bolted or incorporated into structures to build anti - abrasion assemblies.

DURMAT® 1061 WP and DURMAT® 1062 WP

Characteristics:

DURMAT® 1061 WP is a composite Wear Plate consisting of a mild steel base plate and a high wear resistant overlay.

The hardfacing deposit consists of a Ni-B-Si matrix with very evenly dispersed Fused Tungsten Carbide (FTC) particles. The chromium free Ni-B-Si alloy shows much harder phases than the well known M7C3 carbides. The inserted fine dispersed FTC shows a hardness of >2,340 HV. Alternative is **DURMAT® 1062** WP with Spherical Fused Tungsten Carbide (SFTC) particles available (≈3,000 HV). Due to the low melting point of the Ni alloy in combination with our unique PTA system for application, the material shows a very low and uniform dilution with the base material.

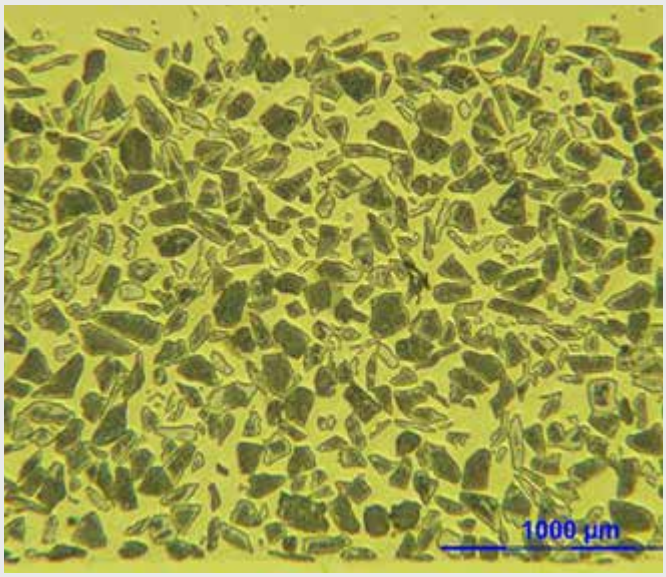
Applications:

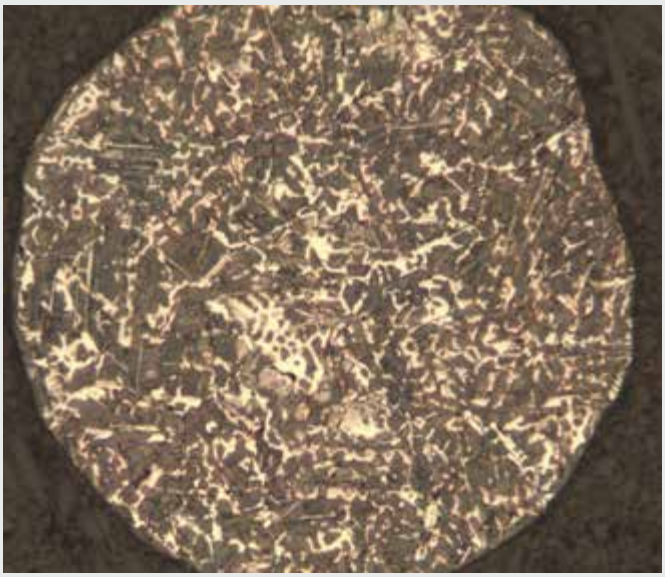
DURMAT® WP 1061 and **DURMAT® 1062 WP** are rust and acid durable, resistant to heavy abrasion and heat up to 500°C. Because of the high FTC content, the overlay is highly wear resistant. **DURMAT® WP Plates** protect components that encounter heavy mechanical and mineral wear. In particular the 3+2 mm wear plates offer extremely economical solutions for parts such as high speed fan blades, or in the cement industry where components are subject to substantial erosion by abrasive particles such as quartz or feldspar dust.

Technical data:	
Base material size:	2000 x 1000 mm
Coated surface:	1850 x 850 mm
Base material size:	2500 x 1250 mm
Coated surface:	2350 x 1100 mm
Base material size:	3000 x 1500 mm
Coated surface:	2850 x 1350 mm
Smallest thickness of hardfacing:	>2 mm ± 0,5 mm
Thickness of base material:	between 4 and 20 mm on customers specification
Further dimensions on request	

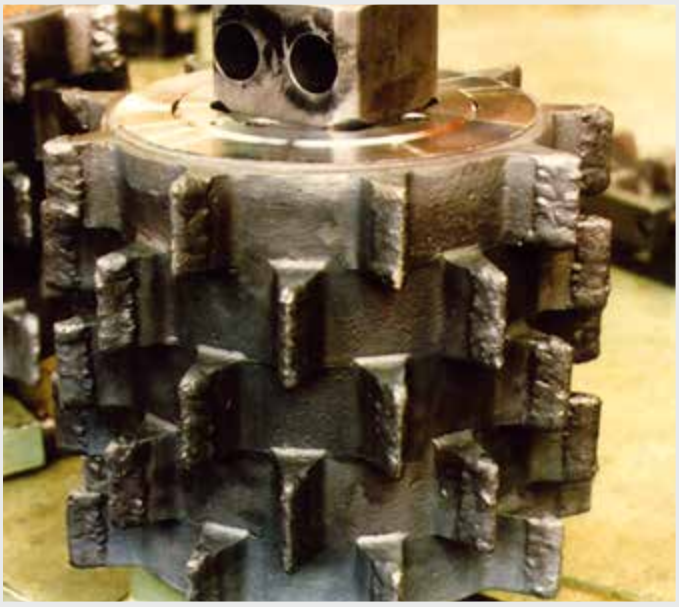
Benefits:

- Very low dilution with the base material (<5%)
- Dense surface with low coefficient of friction
- Extremely economical solutions due to its light weight
- Good formability and can be cut with plasma
- Base material easy to weld

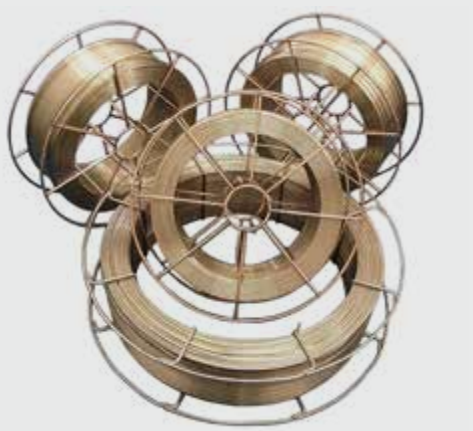




Typical Applications of DURUM Products



Tungsten Carbide and its Derivatives

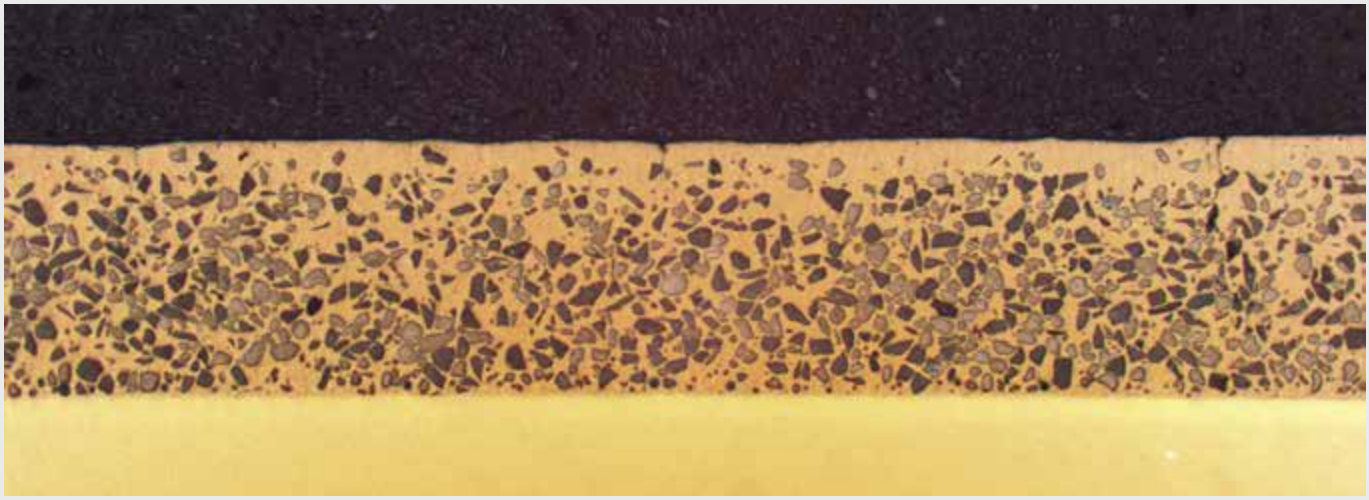


	DURMAT® DIN EN 14700 DIN 8555	Chemical Composition & Typical Applications	Hardness	Typical Properties
Fe-based	**A** T Fe20 G21-GF-55-CG	Fe-based with FTC Tools and machine parts exposed to wear in mining, road construction, ceramic, petroleum, excavation and dredging applications	**FTC:** >2,360 $HV_{0.1}$ **Mixed hardness weld metal:** ≈ 55 HRC	• Special pre-alloyed tube filled with coarsely grained Fused Tungsten Carbide (FTC) for oxy-acetylene welding
	A - PLUS T Fe20 G21-GF-55-CG	Fe-based with SFTC Tools and machine parts exposed to wear in mining, road construction, ceramic, petroleum, excavation and dredging applications	**SFTC:** ≈3,000 $HV_{0.1}$ **Mixed hardness weld metal:** ≈ 55 HRC	• Similar to DURMAT® A, but filled with Spherical Fused Tungsten Carbide
	E E Fe20 E21-GF-UM-60-CG	Fe-based with FTC Hard facing unalloyed and low alloyed steels (cast steels) with a maximum carbon content of 0.5% (tools and machine parts that are exposed to wear in mining, excavation, digging, road construction and deep drilling applications)	**Mixed hardness weld metal:** 55-58 HRC	• Tube metal filled with medium size Fused Tungsten Carbide for manual welding
	E - PLUS E Fe20 E21-GF-UM-60-CG	Fe-based with SFTC Hard facing unalloyed and low alloyed steels (cast steels) with a maximum carbon content of 0.5% (tools and machine parts that are exposed to wear in mining, excavation, digging, road construction and deep drilling applications)	**Mixed hardness weld metal:** >58 HRC	• Nickel core flexible rod coated with both Fused Tungsten Carbide and Ni-Cr-B-Si developed for oxy-acetylene welding
Ni-based	**B** T Ni20 G21-UM-55-CG	NiCrBSi-based with FTC Hard facing of ferritic and austenitic steels (steel castings), applied for overlaying mixer blades, screws and conveyors in chemical, dye and food industry. Specially recommended for stabilizer blades in the petroleum industry	**FTC:** >2,360 $HV_{0.1}$ **NiCrBSi-alloy:** ≈ 420 - 450 $HV_{0.1}$	• Nickel core flexible rod coated with both Fused Tungsten Carbide and Ni-Cr-B-Si developed for oxy-acetylene welding
	BK T Ni20 G21-UM-55-CG	NiCrBSi-based with SFTC Hard facing of ferritic and austenitic steels (steel castings), applied for overlaying mixer blades, screws and conveyors in chemical, dye and food industry. Specially recommended for stabilizer blades in the petroleum industry	**SFTC:** ≈3,000 $HV_{0.1}$	• Similar to DURMAT® B , but filled with Spherical Fused Tungsten Carbide
	NIA T Ni20 G21-GF-55-CG	NiCrBSi-based with FTC Hard facing on ferritic and austenitic steels (steel casings), overlaying mixer blades, conveyors and screws in chemical, dye and food industry. Recommended for hard facing rock bits and stabilizers in the petroleum industry.	**FTC:** ≈2,360 $HV_{0.1}$	• Rod for oxy-acetylene welding • Very high resistance to abrasion • The matrix is highly resistant to acids, alkalis and other corrosive media
	NIA - PLUS T Ni20 G21-GF-55-CG	NiCrBSi-based with SFTC Hard facing on ferritic and austenitic steels (steel casings), overlaying mixer blades, conveyors and screws in chemical, dye and food industry. Recommended for hard facing rock bits and stabilizers in the petroleum industry.	**SFTC:** ≈3,000 $HV_{0.1}$	• Similar to DURMAT® NIA , but filled with Spherical Fused Tungsten Carbide
	NI3 T Ni20 MF21-55-CGZ	Ni-based with FTC and Special Carbide Repairing and hard facing ferritic and austenitic steels, stabilizer blades, conveyor screws, milling plates, deep drilling tools, and mixer blades	**FTC:** >2,360 $HV_{0.1}$ **Matrix:** 480-520 $HV_{0.1}$ **Other Carbides:** ≈2,900 $HV_{0.1}$	• Tubular electrode filled with a mixture of FTC and special carbides in combination with a special Ni-alloy • Highly resistant to extreme abrasion in combination with corrosion
	NI3 - PLUS T Ni20 MF21-55-CGZ	Ni-based with FTC and Special Carbide Repairing and hard facing ferritic and austenitic steels, stabilizer blades, conveyor screws, milling plates, deep drilling tools, and mixer blades	**SFTC:** ≈ 3,000 $HV_{0.1}$ **Matrix:** 450-480 $HV_{0.1}$ **Other Carbides:** ≈2,900 $HV_{0.1}$	• Similar to DURMAT® NI3 , but filled with Spherical Fused Tungsten Carbide

DURMAT® DIN EN 14700 DIN 8555		Chemical Composition & Typical Applications	Hardness	Typical Properties
Ni-based	**NISE** E Ni20 E21-GF-UM-60-CGZ	Ni-based with FTC Repairing and hard facing ferritic and austenitic steels (steel castings), stabilizer blades, conveyor screws, milling plates, deep drilling tools, and mixer blades	**FTC:** ≈2,360 $HV_{0.1}$ **Ni-Matrix:** ≈ 480-520 $HV_{0.1}$	• Tubular electrode filled with Fused Tungsten Carbide and pecial nickel alloy for manual welding • Highly reststant to extreme abrasion in combination with corrosion
	NISE - PLUS E Ni20 E21-UM-60-CGZ	Ni-based with SFTC Repairing and hard facing ferritic and austenitic steels (steel castings), stabilizer blades, conveyor screws, milling plates, deep drilling tools, and mixer blades	**SFTC:** ≈3,000 $HV_{0.1}$	• Similar to DURMAT® NISE, but filled with Spherical Fused Tungsten Carbide
Spec. Alloy	**CS**	Sintered tungsten carbide fragments in a ductile Cu-Ni-Zn matrix Downhole reamers, openers, fishing tools (spears), coring tools, reamers, milling tools and stabilizers.	-	• Tensile strength of 100,000 psi • Homogeneous distribution of the sintered tungsten carbide particles
	TINNING-RODS	Nickel bronze rods Binder for the sintered tungsten carbide particles with DURMAT® CS	-	• Fume reduced nickel bronze rods containing 10% nickel developed for oxyacetylene welding • High mechanical properties
Tungsten Carbides	**FTC** Fused Tungsten Carbide	$WC-W_2C$ Deep well drilling tools and rods, crusher jaws, mixers, concrete and stone saws, hot-pressed tools, screens & conveyors, extrusion housings, hard additives to diamond bits and saws	≈2,360 $HV_{0.1}$	• For hardfacing of metallic surfaces exposed to extreme mechanical load and reinforcing the hardness of diamond tools
	SFTC Spherical Fused Tungsten Carbide	$WC-W_2C$ Deep well drilling tools and rods, crusher jaws, mixers, concrete and stone saws, hot-pressed tools, screens & conveyors, extrusion housings, hard additives to diamond bits and saws	≈3,000 $HV_{0.1}$	• For hardfacing of metallic surfaces exposed to extreme mechanical load and reinforcing the hardness of diamond tools • Increased apparent density combined with a better flowability
	DN 3.0	WC-Co 92/8 Rock-bits, special tools for deep drilling	2,400-2,550 $HV_{0.1}$	• Highly wear resistant WC/Co alloy based on „Nano“ FTC
	DNK 1.3	WC-Co 94/6 Rock-bits, special tools for deep drilling	1,950 – 2,050 HV	• WC-Co-Alloy with fine FTC • Very good abrasive and corrosive properties associated with high hardness
	MCTC	Monocrystalline Tungsten Carbide with 6.12% C-content PTA-overlay for parts subject to wear	1,600 HV	• Good wear protection properties • Good thermal stability, but lower hardness as compared to FTC/SFTC
	WC IV	Crushed Tungsten Carbide with 6-10% Co - content Mining, deep drilling–ason tool joints in the petroleum industry	1,500-1,800 HV	• Concentrated wear protection for the area exposed to maximum wear • Easy application of an extremely hard and abrasion resistant protective surface for highly stressed areas

Spray & Fuse

DURMAT® DIN EN 14700 DIN 8555	TYPICAL CHEMICAL COMPOSITION (Wt.-%) & TYPICAL APPLICATIONS MIX	C	Si	B	Cr	Ni	W	HARDNESS	TYPICAL PROPERTIES
40 - A	-	0.35	3.8	1.6	9 - 10	bal.	-	35-39 HRC	• Resistant to corrosion, abrasion and heat • Excellent gliding on high tensile strength steels and plastics • High wear and heat resistant up to 550 ° C
-106/+22	On small areas or die edges, mold castings in the glass industry, fittings, pistons and guides, buffer layers in addition to DURMAT® B hardfacings								
60 - A	-	0.8 - 1	3.8	3.3	16 - 17	bal.	-	56 HRC	• Resistant to corrosion, abrasion and heat • Excellent gliding on high tensile strength steels and plastics • Rust and acid resistant, cavitation and corrosion resistant • High wear and heat resistant up to 550 ° C
-106/+22	On small areas or die edges, mold castings in the glass industry, fittings, pistons and guides, buffer layers in addition to DURMAT® B hardfacings								
40 - FTC	Matrix 60	0.8 - 1	3.8	3.3	16-17	-	0.8-1	FTC: >2360 $HV_{0,1}$ DURMAT® 60-A: ≈ 56 HRC	• Resistant to corrosion, abrasion and heat • High wear and heat resistant up to 550 ° C • Rust and acid resistant
-106/+22	FTC 40	3.8 - 4.1	-	-	-	-	bal.		
	Mechanical engineering, pump and mill construction, the manufacturing of petrochemical apparatus, deep drilling tools, wear plates in agriculture								
50 - FTC	Matrix 50	0.8 - 1	3.8	3.3	16-17	-	0.8 - 1	DURMAT® 60 - A: ≈ 56 HRC DURMAT® FTC: > 2360 $HV_{0,1}$	• Resistant to corrosion, abrasion and heat • High wear and heat resistant up to 550 ° C • Rust and acid resistant
-106/+22	FTC 50	3.8 - 4.1	-	-	-	-	bal.		
	Mechanical engineering, pump and mill construction, the manufacturing of petrochemical apparatus, deep drilling tools, wear plates in agriculture								
60 - FTC	Matrix 40	0.8 - 1	3.8	3.3	16 - 17	-	0.8 - 1	DURMAT® 60 - A: ≈ 56 HRC DURMAT® FTC: ≈ 2360 $HV_{0,1}$	• Resistant to corrosion, abrasion and heat • High wear and heat resistant up to 550 ° C • Rust and acid resistant
-106/+22	FTC 60	3.8 - 4.1	-	-	-	-	bal.		
	Mechanical engineering, pump and mill construction, the manufacturing of petrochemical apparatus, deep drilling tools, wear plates in agriculture								
75 - FTC	Matrix 25	0.8 - 1	3.8	3.3	16 - 17	-	0.8 - 1	DURMAT® 60 - A: ≈ 56 HRC DURMAT® FTC: ≈ 2,360 $HV_{0,1}$	• Resistant to corrosion, abrasion and heat • High wear and heat resistant up to 550 ° C • Rust and acid resistant
-106/+22	FTC 75	3.8 - 4.1	-	-	-	-	bal.		
	Mechanical engineering, pump and mill construction, the manufacturing of petrochemical apparatus, deep drilling tools, wear plates in agriculture								
80 - FTC	Matrix 20	0.8 - 1	3.8	3.3	16 - 17	-	0.8 - 1	DURMAT® 60 - A: ≈ 56 HRC DURMAT® FTC: > 2360 $HV_{0,1}$	• Resistant to corrosion, abrasion and heat • High wear and heat resistant up to 550 ° C • Rust and acid resistant
-106/+22	FTC 80	3.8 - 4.1	-	-	-	-	bal.		
	Mechanical engineering, pump and mill construction, the manufacturing of petrochemical apparatus, deep drilling tools, wear plates in agriculture								



* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

Metal- and Flux Cored Tungsten Carbide Wire

DURMAT® DIN EN 14700 DIN 8555	TYPICAL APPLICATIONS AND CHEMICAL COMPOSITION	HARDNESS	TYPICAL PROPERTIES
OA **T Fe20** **MF 21-65GZ**	Fe-Matrixwith 50 - 62% FTC Tools and machine parts that are exposed to wear in mining, excavation, earth moving, tunneling shields, road construction, well drilling and deep drilling applications)	**FTC:** ≈2360 $HV_{0.1}$ **Weld metal:** 64-66 $HRC_{1st\ layer}$ 66-68 $HRC_{2nd\ layer}$	• Open arc tubular wire filled with Fused Tungsten Carbide for semi-automatic applications, where extreme abrasive wear is anticipated • For hard facing low alloyed steels that have a maximum of 0.45% carbon
NICRW **T Fe20** **MF 21-65GZ**	NiCr-Matrix with 50 - 62% FTC Protects surfaces against a combination of extreme abrasive and corrosive attacks	**FTC:** ≈2360 $HV_{0.1}$ **Matrix:** 490-540 $HV_{0.1}$	• Similar to DURMAT® NIFD, but containing a higher chrome content • Low melting range (900 - 1050°C) • Highly resistant to acids, bases and other corrosive media
NIFD **T Ni20** **MF 21-55-CGTZ**	Ni-Matrix with 50 - 62% FTC Repairing and hard facing ferritic and austenitic steel tools and machine parts (steel casting). Welding on tool joints and stabilizers in the petroleum industry	**FTC:** ≈2360 $HV_{0.1}$	• Flux cored wire with Fused Tungsten Carbide and NiCrBSi- matrix for semi-automatic welding application • Protects surfaces against a combination of extreme abrasive and corrosive attacks
NIFD - PLUS **T Ni20** **MF21-55-CGZ**	Ni-Matrix with 50 - 63% SFTC Repairing and hard facing ferritic and austenitic steel tools and machine parts (steel casting). Specially developed for semi and fully automatic welding on tool joints and stabilizers in the petroleum industry	**SFTC:** ≈3000 $HV_{0.1}$	• Similar to DURMAT® NIFD, but filled with Spherical Fused Tungsten Carbide
NI2 **T Ni20** **MF21-55-CGZ**	Ni-Matrix with 50 - 62% FTC and Special Carbides Protects surfaces against a combination of extreme abrasive and corrosive attacks	**FTC:** ≈2360 $HV_{0.1}$ **Matrix:** ≈ 450-480 $HV_{0.1}$ **Other Carbides:** ≈2900 $HV_{0.1}$	• Cored metal wire filled with a combination of very hard special carbides together with fused tungsten carbides and Ni-Cr-B-Si for semi-automatic welding
NI2 - PLUS **T Ni20** **MF21-55-CGZ**	Ni-Matrix with 50 - 62% SFTC and Special Carbides Protects surfaces against a combination of extreme abrasive and corrosive attacks	**SFTC:** ≈3,000 $HV_{0.1}$ **Matrix:** ≈ 450-480 $HV_{0.1}$ **Other Carbides:** ≈2900 $HV_{0.1}$	• Similar to DURMAT® NI2, but filled with Spherical Fused Tungsten Carbide
FD 773 **T Ni20** **MF 21-55-CGZ**	NiCr-Matrix with 50 - 62% DNK 1.3 Protection of surfaces against a combination of extreme abrasive and corrosive attacks	**DNK 1,3:** >1950 $HV_{0.1}$ **Matrix:** 490-540 $HV_{0.1}$	• Good corrosion protection against chloride media
FD 774 **T Ni20** **MF 21-55-CGZ**	Co-Matrix with 50 - 62% DNK 1.3 Protection of surfaces against a combination of extreme abrasive and corrosive attacks	**DNK 1,3:** >1950 $HV_{0.1}$ **Matrix:** 450-480 $HV_{0.1}$	• Good corrosion protection against chloride media
FD 778 **T Ni20** **MF 21-55-CGZ**	NiFe-Matrix with 50 - 62% FTC Protection of surfaces against a combination of extreme abrasion and corrosion	**FTC:** ≈2360 $HV_{0.1}$ **Matrix:** 490-540 $HV_{0.1}$	• Lower melting point than commonly used iron based Flux Cored Wires with FTC filling • Smooth and clean surface • Good resistance to corrosive media
FD 779 **T Ni20** **MF21-55-CGZ**	Ni-Matrix with 50 - 62% MCWC Protection of surfaces against a combination of extreme abrasion and corrosion	**MCWC:** >1630 $HV_{0.1}$ **Matrix:** 490-540 $HV_{0.1}$	• Resistant against extreme abrasive wear in combination with corrosion • Low melting range, self fluxing characteristic producing a smooth and clean surface
FD 780 **T Ni20** **MF 21-55-CGZ**	NiFe-Matrix with 50 - 62% MCWC Protection of surfaces against a combination of extreme abrasion and corrosion	**MCWC:** >2000 $HV_{0.1}$ **Matrix:** 490-540 $HV_{0.1}$	• Resistant against a combination of extreme abrasive and corrosive wear • Low melting point, self fluxing characteristic producing a smooth and clean surface • Good resistance to corrosive media
FD 789 **T Ni20** **MF 21-55-CGZ**	Ni-Matrix with 50 - 62% DNK 1.3 Protection of surfaces against a combination of extreme abrasive and corrosive attack	**DNK 1,3:** >1950 $HV_{0.1}$ **Matrix:** 450-480 $HV_{0.1}$	• Good corrosion protection against chloride media

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

Flux Cored Wires

Workhardening Austenitic Surfacing

DURMAT®	CLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	B		
FD 200 K	DIN EN 14700: T Fe-10-200-CKNPZ / DIN 8555: MF 8-200-CKNPZ												180-200 HB When hardened: 400-450 HB	• Stainless, antimagnetic and workhardening. • Heat resistant up to 850 °C. • Can be applied as a buffer layer.
	Repair of manganese steel buckets and shovels, high tensile tools & dies, clutches, crane wheels, earthmoving undercarriage parts, gear wheels, etc.													
	0.1	0.5	6	19	8.5	-	-	-	-	-	bal.	-		
FD 240 K	DIN EN 14700: T Fe9-250-KNP / DIN 8555: MF 7-250-KNP												200-230 HB When hardened: 400-450 HB	• Austenitic flux cored wire. • Designed for repairing worn parts of similar to base materials as well as for hard facing carbon steels parts against severe impact loads.
	Hardfacing of crushers, swing hammers, railway crossings, dredge buckets, etc.													
	1.1	0.3	14	4	0.6	-	-	-	-	-	bal.	-		
FD 250 K	DIN EN 14700: T Fe9 / DIN 8555: MF 7-250-KNP												230-260 HB When hardened: 450-500 HB	• Austenitic flux cored wire of the Mn-Cr-type. • High plasticity: can be applied as a buffer layer. • Corrosion resistant, antimagnetic, impact-resistant.
	Repair of manganese steel buckets and shovels, high tensile tools & dies, clutches, crane wheels, earthmoving undercarriage parts, gear wheels, etc.													
	0.5	0.5	16	14	1.2	0.6	-	-	0.2	-	bal.	-		
FD 270 K	DIN EN 14700: T Fe9 / DIN 8555: MF 7-250-KNP												250 HB When hardened: 500 HB	• Ductile austenitic matrix alloy bearing Cr and Nb (Cb) - Carbides. • High wear resistance.
	Hardfacings of blast furnace seilings													
	1.1	-	19	8	-	-	-	3	-	-	bal.	-		
FD 295 HY	DIN EN 14700: Fe Z9-300-CKP												280-300 HB When hardened: 450 HB	• Austenitic matrix. • Resistant to corrosion, erosion and cavitation. • Hot cracking resistant.
	Water turbines, valves and components in the field of hydraulic or gas plants													
	0.15-0.25	<3	9-11	18-20	-	-	9-11	-	-	-	-	N+		

Impact Resistant Coatings

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 300	DIN EN 14700: T Fe1-300-P / DIN 8555: MF 1-300-P												280-325 HB	• Tough and not sensitive to impact loads. The number of layers is not limited. • Forgeable and can be additionally worked with cutting tools.
	Cable rolls, rails, couplings, back up rolls of caterpillars crane wheel rims, shafts, tool – joints, etc.													
	0.1	0,5	2	0.5	-	0.3	-	-	-	-	bal.	Ti		
FD 310	DIN EN 14700: T Fe7-45-CPT / DIN 8555: MF 9-45-CPT												40-44 HRC	• Corrosion and impact resistant, has an excellent resistance to thermal fatigue. • Heat treatment is possible. • Tough and can be treated with cutting tools.
	Continuous casting rolls, new cladding and rewelding of all types of hot rolling mills and caster.													
	0.2	1	1	13.5	3.5	1	-	0.2	0.15	-	bal.	-		

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 356	DIN EN 14700: T Fe7-40-CPT / DIN 8555: MF 9-40-CPT												40-42 HRC	• Corrosion and impact resistant, has an excellent resistance to thermal fatigue. • Multiple layers decrease hardness.
	Continuous casting rolls, new cladding and rewelding of all types of hot rolling mills and caster.													
	0.1	0.3	0.8	17	4.6	1.1	-	0.2	0.15	-	bal.	-		
FD 400	DIN EN 14700: T Fe1-40-P / DIN 8555: MF 1-40-P												38-42 HRC	• Low alloyed deposit for hard facing of about 400 HB. Tough and not sensitive to impact. • Forgeable, can be additionally worked with cutting tools.
	Cable rolls, rails, couplings, back up rolls of caterpillar crane wheel rims.													
	0.2	-	-	3	-	0.3	-	-	-	-	bal.	-		
FD 450	DIN EN 14700: T Fe1-45-P / DIN 8555: MF 1-45-P												43-45 HRC	• Low alloyed deposit for hard facing of about 450 HB. Tough and not sensitive to impact. • Forgeable, can be additionally worked with cutting tools.
	Cable rolls, rails, couplings, back up rolls of caterpillar crane wheel rims and shafts, etc.													
	0.2	-	-	4.5	-	0.6	-	-	0.3	-	bal.	-		
FD 476	DIN EN 14700: T Z Fe7-50-CPT / DIN 8555: MF 9-50-CPT												48 - 50 HRC	• High Cr- Ni- Mo- Co- V- W- alloyed flux cored wire. Specially developed for the hardfacing of rolls for hot rolling. Corrosion and wear resistant. • Resistant to impact loads and continuous rating through heat fatigue and high pressure.
	Casting rolls.													
	0.3	0.3	0.8	16	4	1.5	1.5	-	1	1	bal.	-		
FD 495	DIN EN 14700: T Z Fe8-50-CKTZW / DIN 8555: MF 3-50-CKTZ												48 - 50 HRC After work hardening: 53 HRC	• Stainless weld deposit on Fe, Cr, Co, Mo-basis. • High wear resistance at elevated temperatures, high tensile strength, resistance against sliding wear of metallic objects, thermal shock resistance.
	Hardfacing of forging presses, hot piercing dies, stretching rolls, pinch rolls, hot strip mill table rolls and back-up rolls.													
	0.2	0.7	0.4	15	-	3.2	14	-	-	-	bal.	-		
FD 580	DIN EN 14700: T Fe3-50-PT / DIN 8555: MF 6-50-PT												48 - 52 HRC	• Durable and abrasion resistant. • Excellent thermal fatigue properties.
	Guiding rolls, scale-breaker rolls, blooming- and slabbing-mill rolls hot working tool steels.													
	0.35	0.6	2	6.5	-	1.5	-	-	0.5	1.2	bal.	-		
FD 600	DIN EN 14700: T Fe3-60-PS / DIN 8555: MF 6-60-P												55 - 58 HRC	• Flux core wire which enables a CrMoV alloyed deposit for semi automatic and automatic surfacing. Good resistance to tempering and good crack resistance.
	Parts subjected to abrasion, impact and compressive loads, sand pumps, dredge pump arms, dredge ladder rolls, etc.													
	0.5	1	3	6.5	-	0.8	-	-	0.2	-	bal.	-		
FD 600 TIC	DIN EN 14700: T Fe8-60-GP / DIN 8555: MF 6-60-GP												56 - 58 HRC	• Tough and not sensitive to impact loads. • Excellent resistance a combination of impact and abrasion.
	Roller press, bucket teeth and lips, sand pumps, impellers, screws.													
	1.8	1.6	1.4	7	-	1.4	-	-	-	-	bal.	Ti: 5		
FD 601	DIN EN 14700: T Fe3-60-PST / DIN 8555: MF 6-60-PST												56 - 60 HRC	• Excellent properties of resistance to abrasion and impact • High heat resistance up to 550°C
	Hammer and blooming table rolls, blowbars and bucket teeth.													
	0.5	1	3	6	-	1.6	-	-	1.5	1	bal.	-		
FD 605	DIN EN 14700: T Fe20-60-GPS												55 - 60 HRC	• Resistant against heavy abrasion and impact. • High tenacity. • Precipitation of fine special carbides (SC).
	Mining equipment, scraper blades for brick and clay, agriculture, fans.													
	0.5	-	-	6	-	1.3	-	-	-	-	bal.	SC: 12		

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Flux Cored Wires

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 609	DIN EN 14700: T Z Fe6-55-CGPT / DIN 8555: MF 6-55-GPT												55 - 57 HRC	• Ferritic-martensitic micro structure. • High resistance against impact stress and medium abrasion. Crack free in multiple layers. • Can be used up to 700 ° C.
	Crusher wheels and hammers, rock processing shredders, cutting-tools, fluid valves and protection welding on Mn-Hadfield-steel.													
	0.5	2.8	0.8	9.5	0.3	-	-	-	-	-	bal.	-		
FD 615	DIN EN 14700: T Z Fe8-50-CGP/ DIN 8555: MF 6-50-RPS												48-52 HRC	• High chromium alloyed flux-cored wire for high wear and corrosion resistance. Rust and corrosion resistance equivalent to a 17% Cr steel.
	Screw oil press, screw conveyors, clay industry, plastics industry.													
	0.5	-	-	17-18	0.6	1.3	-	-	-	-	bal.	SC: 16		
FD 629	DIN EN 14700: T Z Fe6 / DIN 8555: MF 6-60-GPS												58 - 63 HRC	• Resistant against heavy abrasion and impact • Precipitation of fine special carbides (SC) • Extreme hardness and high tenacity
	Mining equipment, scraper blades for brick and clay, technical knifes, agriculture, fans.													
	0.6	-	-	7	-	3	-	-	-	-	bal.	SC: 20		
FD 710	DIN EN 14700: T Z Fe13-60-GPT / DIN 8555: MF 6-65-GPT												62 - 65 HRC	• Martensitic weld material with embedded Cr- V- Mo-carbides. • High hardness and is crack resistant, further resistant to abrasive wear at medium impact, creep resistant up to 500 °C.
	Parts for crushing of minerals, dredger teeth, briquetting press tools, moulds for the ceramic/brick industry, mixing wings, feed screws, shredders, hammer mills.													
	1.4	1	1	8	-	1	-	-	1	-	bal.	B: 1		
FD 760	DIN EN 14700: T Fe8-55-GP / DIN 8555: MF 6-55-GP												55 - 57 HRC	• Martensitic with embedded Nb- carbides. • High resistance to pressure, crack resistant. Additional resistance to abrasion wear.
	Cement and crusher rolls / hammers, briquetting plants, ceramic industry.													
	1.4	0.7	1.3	7	-	0.8	-	8	1	1.2	bal.	-		

Abrasion Resistant Hardfacing

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 42	DIN EN 14700: T Fe14-45-CGT / DIN 8555: MF 10-45-CGT												41 - 44 HRC	• Resistant to wear and corrosion. • Used at any place, where corrosive and abrasive wear is expected. • Hardfacing of welding material is possible without cracking. • Can be additionally worked with metalloid cutting tools.
	Normally used in the meat processing and food industry for vegetable oil extrusion presses and in the chemical industry.													
	1.8	0.9	1.2	28	3	0.8	-	-	-	-	bal.	-		
FD 50	DIN EN 14700: T Z Fe14-50-GP / DIN 8555: MF 10-50-GP												50 - 54 HRC	• Resistant to abrasion and medium impact. • Best results by welding in two layers. • Cannot be heat treated, machined or forged.
	Excavater teeth, mixer blades, conveying screws and others.													
	3.2	1.8	1.8	15	-	-	-	-	-	-	bal.	-		
FD 51	DIN EN 14700: T Z Fe14-60-G / DIN 8555: MF 10-60-G												58 - 59 HRC	• Excellent resistance to abrasion and medium impact up to 450°C. • Best results by welding in two layers. Cannot be heat treated, machined or forged.
	Waste crushing, shredder equipments , conveyer screws, pumps, mixer parts, shovel-buckets, scrapers, fan-blades, etc.													
	4.5	0.8	0.8	25	-	-	-	-	-	-	bal.	B: 0.8		
FD 53 ES	DIN EN 14700: T Fe14-60-CG / DIN 8555: MF 10-60-CGT												58 - 62 HRC	• High-alloyed flux-cored wire with high matrix hardness. • High abrasion and corrosion resistance.
	Oil press screw, screw conveyors, extruder screws.													
	3.8	1.2	-	32	0.5	0.4	-	-	1	-	bal.	-		
FD 55	DIN EN 14700: T Z Fe14-60-G / DIN 8555: MF 10-60-GR												55 - 59 HRC	• Stainless weld metal with excellent resistance to abrasion and medium impact. • Best results by welding in two layers. • Cannot be heat treated, machined or forged.
	Piping, impellers and screws, etc.													
	4.8	1.2	0.6	29	-	-	-	-	-	-	bal.	-		
FD 55 Mo	DIN EN 14700: T Z Fe14-60-GT / DIN 8555: MF 10-60-GT												57 - 60 HRC	• Stainless weld metal with excellent resistance to abrasion and medium impact. • Higher warm strength of the deposit in comparison to DURMAT® FD 55. • Cannot be heat treated, machined or forged.
	Bucket teeth and lips, sand pumps (wet sand possible), catalyst piping, impellers and screws.													
	5	1.2	0.4	28	-	1.3	-	-	-	-	bal.	-		

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 56	**DIN EN 14700: T Z Fe14-60-G / DIN 8555: MF 10-60-G**												58 - 60 HRC	• Self shielding flux cored wire. • Specifically made for overlaying parts which are exposed to very extreme abrasive mineral wear related to the high amount of hard phasing. • Corrosion resistant.
	Wear plates, fans, etc.													
	5.4	1	0.4	32	-	-	-	-	-	-	bal.	-		
FD 56 Mo	**DIN EN 14700: T Z Fe14-60-G / DIN 8555: MF 10-65-GR**												60 - 64 HRC	• High C, Cr + Mo alloyed self shielding flux core wire. • Resistant to strong abrasive wear by mineral substances, rust resistant. • Impact and shock sensitive.
	Wear plates, fans, etc.													
	5.3	1	-	31	-	0.7	-	-	-	-	bal.	-		
FD 59	**DIN EN 14700: T Fe14-60-G / DIN 8555: MF 10-60-GR**												59 – 61 HRC	• Highly C- Cr - alloyed flux- cored wire for applications in high mineral wear. • Suitable for hard facing of parts that are exposed to high abrasion in wet areas.
	Farming, gravel digger, pumps, mixer paddles, concrete pumps, conveyor screws, impeller screws, track hoppers.													
	5.0	1.2	0.4	33	-	0.5	-	-	-	-	bal.	-		
FD 59 L	**DIN EN 14700: T Fe14-60-CG / DIN 8555: MF 10-60-CGT**												57 - 59 HRC	• Highly C- Cr- Mo alloyed flux- cored wire for applications in high mineral wear with a corrosion resistant matrix. • Hardfacing of parts that are exposed to high abrasion and minor corrosion. • Crack free welding is possible.
	Kneading machines, liners, pumps, mixer parts, conveyer screws, mixer paddles, oil screws, etc.													
	3.8	1.2	-	33	-	0.5	-	-	-	-	bal.	-		
FD 59 XL	**DIN EN 14700: T Z Fe14-55-CG / DIN 8555: MF 10-55-CGT**												50 - 53 HRC	• Highly C- Cr- Mo- Ni alloyed flux- cored wire for applications in high mineral wear with a corrosion resistant matrix. • Hard facing of parts that are exposed to high abrasion and minor corrosion. • Crack free welding is possible.
	Kneading machines, liners, pumps, mixer parts, conveyer screws, mixer paddles, oil screws, etc.													
	3	1.3	-	32	3	0.5	-	-	-	-	bal.	-		
FD 60	**DIN EN 14700: T Fe14-60-G / DIN 8555: MF 10-60-G**												61 - 63 HRC	• Flux core wire for hardfacing particularly for extreme abrasive wear. • Free of slag, weldability is excellent. • Best results by welding in two layers. Cannot be heat treated, machined or forged.
	Parts for coal mining equipment, cement and mineral industries.													
	5.2	1.1	0.4	22	-	-	-	7	-	-	bal.	-		
FD 61	**DIN EN 14700: T Z Fe15-65-G / DIN 8555: MF 10-65-G**												62 - 65 HRC	• Flux core wire for hardfacing particularly for extreme abrasive wear. • Free of slag, weldability is excellent. • Best results by welding in two layers. • Cannot be heat treated, machined or forged.
	Parts for coal mining equipment, cement and mineral industries.													
	5.2	1.3	-	22	-	-	-	7	-	-	bal.	B:1		
FD 62	**DIN EN 14700: T Z Fe15-60-G / DIN 8555: MF 10-60-G**												60 - 63 HRC	• Specifically made for verlaying parts which are exposed to very extreme abrasive mineral wear related to the high amount of hard phases.
	Wear plates, spiked rollers, cement and concrete pumps, dredging teeth, slag breakers, coke oven slides and Ni-Hard IV.													
	5.4	1.2	-	29	-	-	-	3	-	-	bal.	-		
FD 64	**DIN EN 14700: T Fe16-65-GZ / DIN 8555: MF 10-65-GZ**												63 - 65 HRC 400°C: 58 HRC 600°C: 48 HRC	• Resistant to heavy mineral abrasion at elevated temperature.
	Cement industry, mineral and brick industry, mining industry and parts subject to heavy wear in combination with temperature.													
	4.5	1.2	1.2	24	-	-	-	-	0.8	0.8	bal.	B: 1		
FD 65	**DIN EN 14700: T Fe16-65-GTZ / DIN 8555: MF 10-65-GZ**												63 - 65 HRC 400°C: 62 HRC 600°C: 59 HRC 800°C: 53 HRC	• Resistant to extreme abrasive wear even at elevated temperatures. Free of slag, weldability is excellent • Ledeburitic structure with many different carbide types • Best results by welding in two layers, can't be heat treated, machined or forged
	Blast furnace bells, coke oven screens and doors, sinter wheel breakers, smelter loading chutes, etc.													
	5.2	1	0.4	21	-	7	-	7	1	2	bal.	-		
FD 67	**DIN EN 14700: T Fe16-65-GZ / DIN 8555: MF 10-65-GZ**												64 - 67 HRC	• Designed for extreme abrasive wear and moderate impact. • Free of slag. • Weldability is excellent.
	Hardfacing on parts for coal mining equipment, cement and mineral industries.													
	5.4	1	0.4	21	-	-	-	-	10	-	bal.	-		
FD 68	**DIN EN 14700: T Fe16-70-CGZ / DIN 8555: MF 10-70-CGZ**												66 - 68 HRC 600°C: 60 HRC 800°C: 54 HRC	• Ledeburitic structure with a high amount of different hard phases. Free of slag. • Resistant to extreme abrasive wear at elevated temperatures. • Cannot be heat treated, machined or forged.
	Blast furnace bells, coke oven screens and doors, sinter wheel breakers, smelter loading chutes, etc.													
	5	0.8	0.4	38	-	-	-	-	-	-	bal.	B: 2		
FD 69	**DIN EN 14700: T Fe16-65-GZ / DIN 8555: MF 10-65-GRZ**												64 - 67 HRC	• Resistant to extreme abrasive wear up to 800 °C. • Ledeburitic structure containing a high amount of different hard phases. Free of slag, the weldability is excellent. • Best results welding in two layers. Cannot be heat-treated, machined or forged.
	Concrete industry, mixer parts, scrapers, etc.													
	5.2	0.8	0.4	32	-	-	-	5.8	-	-	bal.	B: 1.8		

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

Flux Cored Wires

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 70	**DIN EN 14700: T Fe16-65-G / DIN 8555: MF 10-65-G**												62 - 64 HRC	• High C-, Cr-, V-alloyed flux core wire against high abrasive wear • Not machinable
	Steel, coal, cement and mineral industry.													
	5.2	1	0.4	27	-	-	-	-	6	-	bal.	-		
FD 75	**DIN EN 14700: T Fe16-65-GZ / DIN 8555: MF 10-65-GZ**												62 - 64 HRC 400°C: 61 HRC 600°C: 58 HRC 700°C: 55 HRC	• High C-, Cr-, Nb-, Mo-, W-, V-alloyed flux-cored wire electrode for mineral wear and use at higher temperatures. • Hardness reduction at a temperature of 400°C is approximately 6% and at 600°C approximately 10%.
	Slag conveyer screws, hot sinter breaker.													
	5.2	1.2	0.6	22	6.4	4.5	-	-	0.8	1.4	bal.	-		
FD 78	**DIN EN 14700:T Fe16-70-G / DIN 8555: MF 10-70-G**												64 - 68 HRC	• C-, Cr-, V-, Nb-alloyed flux core wire against extreme mineral wear. • High scratch hardness. Best results by welding in two layers. • Cannot be heat-treated, machined or forged.
	Sinter plants, lignite mining machines, gravel industry, chains, clinker industry, concrete pumps.													
	5	1.3	0.5	16	-	-	-	6.5	6.5	-	bal.	B: 1.2		
FD 79	**DIN EN 14700: T Fe16-70-G / DIN 8555: MF 10-70-G**												64 - 68 HRC	• Resistant to abrasion by the highest mineral wear. • Slag-free with excellent weldability.
	Sand and concrete pumps, mixer blades, mixers, screw conveyors, mining, cement industry, mineral processing and waste breakers.													
	5	1	-	21	-	-	-	6	2.5	-	bal.	B: 1.3		
FD 164	**DIN EN 14700: T Fe14-60-CG / DIN 8555: MF 10-65-GR**												60 - 64 HRC	• Suitable for application to parts subject to severe abrasive wear with exposed mineral substances. • Resistant corosion.
	Wear plates, fans, machinable, NI-Hard IV, etc.													
	5.3	1.2	-	28	-	-	-	-	-	-	-	Zr: 0.35		
FD 720	**DIN EN 14700: T Fe13-65-G**												64 - 66 HRC	• Low alloyed flux core wire. • Suitable for parts subject to impact, metal to metal friction and severe fine particle abrasion and erosion load.
	Dredges, concrete pumps, driving screws, fine particle wearing parts.													
	0.7	1	2	-	2	-	-	-	-	-	bal.	B: 4.5		
FD 721	**DIN EN 14700: T Z Fe8**												64 - 66 HRC	• Flux cored wire with alloyed Fe-B-Cr-weld metal with a martensitic carbide structure. • Suitable for highly abrasion resistant hardfacings that are exposed to minor impact and high wear at temperatures of up to 450°C.
	Feed screws, sand preparation plants, wear plates, ceramic industry													
	1.5	1	2	16	-	-	-	-	-	-	bal.	B: 3.5		
FD 733	**DIN EN 14700: T Z Fe12-70-G / DIN 8555: MF 10-70-GT**												66 - 68 HRC	• Contains very fine grained extremely hard chrome-carbides and niobium-carbides. • Suitable for hardfacing on parts requiring high abrasion resistance, minor impact resistance and wear resistance up to a working temperature of approx. 450 °C.
	Parts with high abrasive and erosive load superposed by corrosive attack.													
	3.5	1	1	18	-	-	-	4	-	-	bal.	B: 1.4		
FD 739	**DIN EN 14700: T Fe16-70-CG**												67 - 70 HRC	• Iron based flux cored wire containing complex carbide phases which are precipitated more fine than in common used hardfacings. • Better resistance against abrasive and erosive load.
	Parts with high abrasive and erosive load superposed by corrosive attack.													
	1	-	-	20	-	3.3	-	3.4	-	5.7	bal.	B: 4.4		
FD 740	**DIN EN 14700: T Fe16-65-CG**												65 - 68 HRC	• Iron based flux cored wire containing complex carbide phases which are precipitated more fine than in common used hardfacings. • Better resistance against abrasive and erosive load.
	Parts with high abrasive and erosive load superposed by corrosive attack.													
	1	-	-	20	-	3.3	-	-	-	5.7	bal.	B: 4.4		

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

Hot Forging Molds

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSTION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 812	Special alloy Repair of drop-forge dies.												38 - 44 HRC	• Thermal shock resistant. • Highly heat resistant. • Tensile strength: 1200 - 1400 N/mm².
	0.1	0.5	0.6	10	1	2	-	-	-	-	bal.	Ti: 0.2		
FD 813	Special alloy Repair of drop-forge dies.												41 - 47 HRC	• Thermal shock resistant. • Highly heat resistant. • Tensile strength: 1300 - 1500 N/mm².
	0.12	0.6	0.6	10	1.7	3	-	-	-	-	bal.	Ti: 0.2		
FD 814	Special alloy Repair of drop-forge dies.												44 - 48 HRC	• Thermal shock resistant. • Highly heat resistant. • Tensile strength: 1400 - 1600 N/mm².
	0.2	0.6	0.6	10	1.7	3	-	-	-	-	bal.	Ti: 0.2		
FD 816	Special alloy Repair of drop-forge dies.												48 - 53 HRC	• Thermal shock resistant. • Highly heat resistant. • Tensile strength: 1600 - 1800 N/mm².
	0.28	0.7	0.6	10	1.7	3	-	-	-	-	bal.	Ti: 0.2		
FD 818	Special alloy Repair of drop-forge dies.												52 - 55 HRC	• Thermal shock resistant. • Highly heat resistant. • Tensile strength: 1800 - 2000 N/mm².
	0.36	0.7	0.6	10	1.7	3	-	-	0.3	2	bal.	Ti: 0.2		
FD 862	Special alloy Repair of drop-forge dies.												34 - 40 HRC	• Thermal shock resistant. • Highly heat resistant. • Tensile strength: 1100 - 1300 N/mm².
	0.15	0.7	0.6	4.5	-	1	-	-	0.2	1	bal.	-		
FD 864	Special alloy Repair of drop-forge dies.												44 - 48 HRC	• Thermal shock resistant. • Highly heat resistant. • Tensile strength: 1400 - 1600 N/mm².
	0.25	0.7	0.6	5	-	1.5	-	-	0.4	1.4	bal.	Ti: 0.2		
FD 866	Special alloy Repair of drop-forge dies.												48 - 52 HRC	• Thermal shock resistant. • Highly heat resistant. • Tensile strength: 1600 - 1800 N/mm².
	0.3	0.7	0.6	5.5	-	2.5	-	-	0.6	2.4	bal.	Ti: 0.2		
FD 868	Special alloy Repair of drop-forge dies.												52 - 55 HRC	• Thermal shock resistant. • Highly heat resistant. • Tensile strength: 1800 - 2000 N/mm².
	0.4	0.8	0.6	6	-	3	-	-	0.7	3	bal.	Ti: 0.2		

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

Flux Cored Wires

Tool Steel

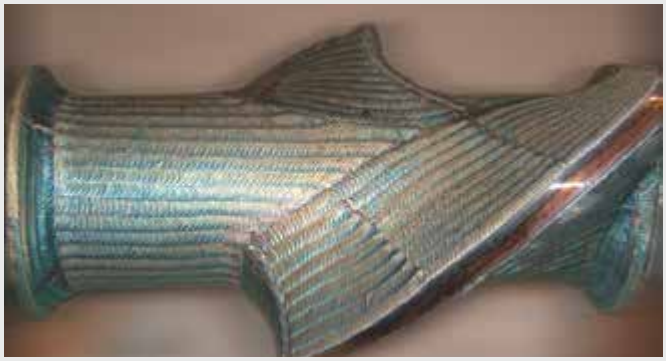
DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMISCAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD WZ 50 1.2567	DIN EN 14700: T Fe3-50-STW / DIN 8555: MF 3-50-ST												48 - 50 HRC After heat treatment: 50 - 52 HRC	• C-Cr-V-W-alloyed flux core wire. • Suitable for repair and build-up applications on hot working steels of Similar to or lower alloyed hot working tools, machinable. Retention of hardness up to 550°C.
	Slab shears, hot-forging dies, hot shear blades, drawing dies, crushing equipment and depressions created by forging, pressure and impact stress.													
	0.3	0.6	0.4	3	-	-	-	-	0.6	4.5	bal.	-		
FD WZ 55 ~1.2662	DIN EN 14700: T Fe3-55-STW / DIN 8555: MF 3-50-ST												53 - 56 HRC After heat treatment: 57 - 59 HRC	• Air hardening and wear resistant alloy. • Can be applied to reclaim hot-forging dies and to overlay the edges and flat areas of low alloyed high density steel tools.
	Slab shears, hot-forging dies, hot shear blades, drawing dies, crushing equipment and depressions created by forging, pressure and impact stress.													
	0.35	0.8	1.2	3	-	-	2	-	0.5	7	bal.	-		
FD WZ 57	DIN EN 14700: T Z Fe4-55-STW / DIN 8555: MF 4-55-ST												50 - 53 HRC After heat treatment: 55 - 59 HRC	• Air hardening and wear resistant alloy. • Can be applied to reclaim hot-forging dies and to overlay the edges and flat areas of low alloyed high density steel tools.
	Slab shears, hot-forging dies, hot shear blades drawing dies, containers, crushing equipment and depressions created by forging, pressure and impact stress.													
	0.35	0.8	0.8	13	-	2.2	10	-	0.25	5.5	bal.	-		
FD WZ 59	DIN EN 14700: T Z Fe4-55-ST / DIN 8555: MF 4-55-ST												57 - 59 HRC	• Wear and heat resistant. • Retention of hardness up to 550°C.
	Suitable for repair and manufacture of hot and cold working tools, stamps and counter dies, etc.													
	0.6	0.6	-	5	-	3.5	-	-	-	3.5	bal.	-		
FD WZ 60 1.3346	DIN EN 14700: T Fe4-60-ST / DIN 8555: MF 4-60-ST												After air cooling: 58 - 60 HRC	• Air hardening and wear resistant alloy. • Can be applied as high-temperature wear resistant hardfacing on low alloyed high density steel tools.
	New and repair hardfacing on plungers, dies, forging dies, press mandrils.													
	0.8	0.6	0.4	4.5	-	8	-	-	1.5	2	bal.	-		
FD WZ 6356 1.6356	Special Alloy												41-43 HRC After heat treatment: 53-56 HRC	• Hardness increase by artificial aging.
	Al-diecasting mold, Al-edge tools and shearing tools.													
	0.03	-	-	-	18	4	12	-	-	-	-	Ti+		

Cobalt Base Alloys

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
DUROLIT 1	DIN EN 14700: T Co3 / DIN 8555: MF 20-55-CGTZ												55 HRC 600°C: 44 HRC 800°C: 34 HRC	• Austenitic-ledeburitic structure. • Great resistance to corrosion, reducing acids, impact, extreme wear and temperature shocks . • Only machinable by grinding. • Tensile strength: 630 N/mm².
	Wear pads, rotary seal rings, pump sleeves; centre less grinder work rests, etc.													
	2.4	0.7	0.4	29	-	-	bal.	-	-	12	<3	-		

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
DUROLIT 6	**DIN EN 14700: T Co2 / DIN 8555: MF 20-45-CTZ**												40 - 43 HRC 300°C: 35 HRC 600°C: 29 HRC	• Austenitic-ledeburitic structure. • Great resistance to corrosion, reducing acids, impact, extreme wear and temperature shocks. • Machinable by hard faced tools. • Tensile strength: 900 N/mm².
	Steam and chemical valves, equipment handling hot steel such as tong bits, shear blades, pumps for high temperature liquids, etc.													
	1.1	1	0.6	27	-	-	bal.	-	-	4.5	<3	-		
DUROLIT 6 LC	**DIN EN 14700: T Co2 / DIN 8555: MF 20-40-CTZ**												36 - 39 HRC	• Austenitic structure bearing chrome and tungsten carbides. • Resistant to high corrosion and abrasion, high impact stress and extreme temperature shocks. • Machinable by hard metal tools.
	Abrasion, erosion, corrosion, cavitation at high temperatures, pumps, extrusion screws, bearing surfaces, chemical industry, hot shear blades, valves, etc.													
	0.8	1	0.8	28	-	-	bal.	-	-	4.5	<3	-		
DUROLIT 6 HC	**DIN EN 14700: T Co2 / DIN 8555: MF 20-45-CTZ**												43 - 46 HRC	• Austenitic structure bearing chrome and tungsten carbides. • Resistant to high corrosion and abrasion, high impact stress and extreme temperature shocks. • Machinable by hard metal tools.
	Steam and chemical valves, equipment handling hot steel such as tong bits, shear blades, pumps for high temperature liquids, etc.													
	1.3	1	0.8	29	-	-	bal.	-	-	4.5	<3	-		
DUROLIT 12	**DIN EN 14700: T Co3 / DIN 8555: MF 20-50 CTZ**												45 - 48 HRC 300°C: 37 HRC 600°C: 32 HRC	• Austenitic-ledeburitic structure. • Improved wear resistance compared to DUROLIT 6, used for applications exposed to reduced mechanical shock. • Machinable by hard faced tools. • Tensile strength: 850 N/mm².
	Cutting edges of long knifes and other tools used in the wood, plastic, paper, carpet and chemical industry, etc.													
	1.4	0.8	0.6	29	-	-	bal.	-	-	8	<3	-		
DUROLIT 21	**DIN EN 14700: T Co1 / DIN 8555: MF 20-350-CKTZ**												30 HRC After work hardening: 45 HRC	• Cobalt alloy with the highest corrosion and thermal resistance of all cobalt-base alloys • Machineable.
	Components which are exposed to high temperatures, corrosion and impact stress, such as valve seats, components in the chemical industry.													
	0.25	0.8	0.8	27	2.5	5.5	bal.	-	-	-	<3	-		
DUROLIT 25	**DIN EN 14700: T Z Co1 / DIN 8555: MF 20-300-CKTZ**												250 - 280 HB	• Contains approximately 10.5% nickel for matrix stability during elevated temperature service. • Resistant to hot corrosion, impact, wear and extreme temperature shocks and oxidation. • Machinable by hard faced tools.
	Hot forging tools, turbo charger buckets, parts subject to high operating temperatures with all types of wear such as impact, pressure, corrosion, erosion.													
	0.1	0.5	0.1	20	10	-	bal.	-	-	15	<3	-		
DUROLIT 712	**Sonderlegierung**												48 HRC	• Corrosion resistant in reducing acids . • High wear resistance.
	Conveying and extrusion screw, rock drill bits, wear rings, etc.													
	1.8	0.5	0.5	29	<3	9	bal.	-	-	-	<3	-		



Nickel Base Alloys

DURMAT®	CLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
DUROLOY 520W	**DIN EN 14700: T Ni2-40-CKPTZ / DIN 8555: MF 23-40-CKPTZ**												32 - 35 HRC Aftre work hardening: 45 HRC	• CrCoMoTiAlW-alloyed nickel based weld metal. • Designed for gas shielded welding with pure Argon. • Precipitation hardenable alloy with an exceptional combination of high temperature mechanical property, forgeability and corrosion resistance. Crack free.
	Critical high temperature applications like hot forging dies or hot shear blades.													
	0.05	-	-	19	bal.	6	10	-	0.3	5	-	Ti: 3 Al: 2		

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

Flux Cored Wires

DURMAT®	CLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
DUROLOY 521 W	DIN EN 14700: T Ni2-40-CKPTZ / DIN 8555: MF 23-40-CKPTZ												190 HB	• High-temperature hardness and heat resistance. • Good corrosion resistance and wear resistance.
	Armor of hammer saddles													
	0.06	-	-	19	bal.	6	11.5	-	-	0.8	-	Ti: 3 Al: 2		
DUROLOY 625 2.4621	Ni Cr 20 Mo 9 Nb / E Ni Cr Mo 3													• Ni- based flux cored wire for the shielded gas welding application. • High resistance against many corrosive mediums, pittings, tension cracking and gap corrosion, high scaling resistance and heat hardening treatment.
	Chemical industry, furnace parts. Also suitable in freezing temperatures as well as cold hardened metals.													
	0.05	0.3	0.5	22	bal.	9	-	3.5	-	-	<3	-		
DUROLOY CO 2.4887	DIN EN 14700: T Ni2-250-CKNPT / DIN 8555: MF 23-250-CKNPTZ												260 - 280 HB Aftrer work hardening: 420 HB	• Applied by shielded arc welding, resulting in a heat and wear resistant hard facing. • Resistant to oxidation, reduction and other corrosive media. • High resistance to impact and pressure load and even at elevated temperature.
	Hardfacing on forging dies and other hot working tools.													
	0.08	-	-	16	bal.	16	2.5	-	0.3	4.5	<5	-		
DUROLOY SE 1/58	DIN EN 14700: T Ni1-60CGTZ / DIN 8555: MF 22-60-CGTZ												58 - 62 HRC	• Nickel based alloy deposit with properties like those of its Stellite counterpart with good hardness, heat resistance, temperature shock resistance, corrosion and wear resistance.
	Chemical, automobile and food industry along with nuclear technology.													
	0.75	4.7	-	20	bal.	-	-	-	-	-	<5	B: 3.2		
DUROLOY SE 6/40	DIN EN 14700: T Ni1-40CGTZ / DIN 8555: MF 22-40-CGTZ												41 - 43 HRC	• Flux core wire for oxy-acetylene, WIG or MIG welding. • Hot hardness, temperature shock resistance and corrosion and wear resistance.
	Chemical, automobile and food industry along with nuclear technology.													
	0.35	4.5	-	22	bal.	-	-	-	-	2	<5	B: 1.6		
DUROLOY SE 12/50	DIN EN 14700: Ti Ni1-50ZGTC / DIN 8555: MF 22-50-CGTZ												48 - 52 HRC	• High hot hardness, corrosion resistance, heat resistance, wear resistance and thermal shock constancy.
	Chemical industry, nuclear technology field, etc.													
	0.6	4.9	-	21	bal.	2.5	-	-	-	-	<5	B: 2.8		
DUROLOY SE 21/35	DIN EN 14700: T Ni1-35-CGTZ / DIN 8555: MF 22-35-CGTZ												34 - 36 HRC	• High hot hardness, corrosion resistance, heat resistance, wear resistance and thermal shock constancy.
	Chemical, automobile and food industries along with nuclear technology.													
	0.4	4.5	-	20	bal.	2	-	-	-	-	<4	B: 0.7		
DUROLOY SE 56	DIN EN 14700: T Ni 1-55CGTZ / DIN 8555: MF 22-55-CGTZ												55-58 HRC	• High hot hardness, corrosion resistance, heat resistance, wear resistance and thermal shock constancy.
	Oil press screw, chemical industry.													
	0.65	4.6	0.2	21	bal.	2.5	-	-	-	-	-	B: 2.9		

Stellite Replacement Alloys

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL TYPICAL APPLICATIONS												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
SER	0.1	3.5-5.5	4.5-6.0	18-20	8-9	3.5-5.5	-	0.8-1.2	-	-	bal.	-		
SER 1			Cobalt-free alloys in the nuclear field; inserts at high surface pressures with a low coefficient of friction; valves, guides, slideways										52-57 HRC	• Ferritic-austenitic microstructure. • High contentof ferrite and ETA phases. • With DURMAT ® DUROLIT alloys comparable properties. • Cavitation, corrosion, erosion resistant. • Impact and thermal shock resistant. • Heat resistant up to 600 ° C.
SER 6													40-44 HRC	
SER 12													45-50 HRC	
SER 21													280-350 $HV_{0.1}$	

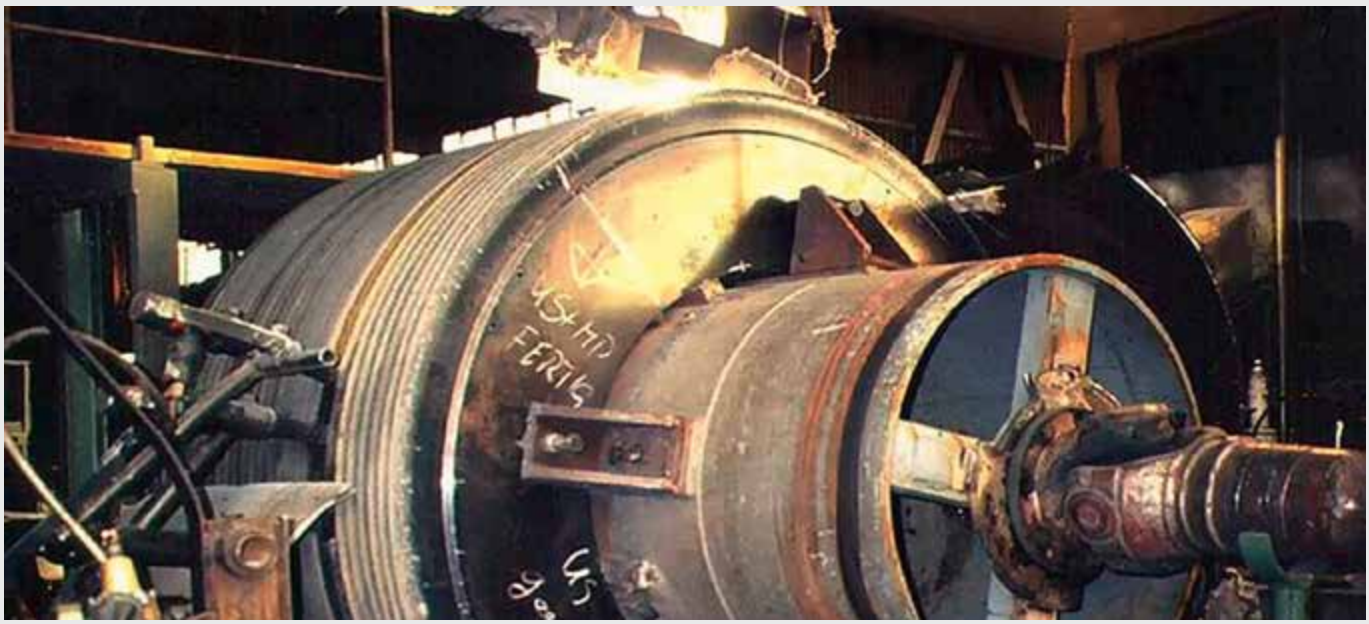
* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

Cast Iron Welding

DURMAT®	KLASSIFIZIERUNG TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD NiFe36 1.3912	Special alloy												≈160 HB	• Flux cored wire electrode for welding cast iron, joining steel and cast iron and cast cavity welding. • Extremely low coefficient of thermal expansion. • Machinable.
	Joint welding and repair welding of cast iron, centrifugally cast, malleable cast iron etc.													
	0.1	1	3	-	36	-	-	-	-	-	bal.	-		
DUROLOY NiFe 60/40	Special alloy												160 - 190 HB	• Nickel alloyed iron based tubular wire. • Suitable for grey cast iron parts and spherolitic cast iron. • Machinable.
	Joining and repairing on nearly all types of cast iron													
	<0.5	<1	4	-	bal.	-	-	-	-	-	40	Cu +		

Build-Up Wires

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD CROMO 1	DIN EN 14700: T Fe1-300-P / DIN 8555: MF 1-300-P												280 HV_{30} Tensile strength: ≈680 N/mm²	• Suitable for medium alloyed steels, that are considered to be hard to weld; for high tensile steel, heat treatable hard facing and designed for build up welding on worn-out parts. • Very high crack resistance, highly resistant against impact and pressure wear.
	Tool steel, armour steel, crane pulley wheels, transport-rollers, moulds or dies , built up welding.													
	0,1	0,5	1	1,3	-	0,6	-	-	-	-	bal.	-		
FD CROMO 2	DIN EN 14700: T Fe1-350-P / DIN 8555: MF 1-350-P												≈300 HV_{30} Tensile strength: ≈700 N/mm²	• Suitable for medium alloyed steels, that are considered to be hard to weld; for high tensile steel, heat treatable hard facing and designed for build up welding on worn-out parts. • Very high crack resistance, highly resistant against impact and pressure wear.
	Tool steel, armour steel, crane pulley wheels, transport-rollers, mould or dies, built-up welding.													
	0,10	0,4	1,2	2,4	-	0,8	-	-	-	-	bal.	-		
FD NiCrMo 2.2	DIN EN 14700: T Fe13-300-P / DIN 8555: MF 1-350-P												280 - 320 HV_{30} Tensile strength: 900-960 N/mm²	• Flux cored wire, suitable for medium alloyed steels and high strength steels. Can be used as a buffer and build-up layer. • Highly crack resistant and is highly resistant to impact and pressure wear.
	Build-up layers for carbon steels, buffer layers for continuous casting rolls and cement rolls.													
	0,06	-	1,6	0,4	2,2	0,4	-	-	-	-	bal.	Ti+		



* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

Flux Cored Wires

Submerged Arc Wires

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 310 UP	DIN EN 14700: T Fe7-45-CPT / DIN 8555: MF 5-45-PRT Continuous casting rolls.												42 - 44 HRC	• Corrosion and impact load resistant. • Excellent resistance to thermal fatigue. • Heat treatment is possible. • Tough and can be worked with cutting tools.
	0.12	0.7	2	13.8	3.5	1.1	-	0.2	0.2	-	bal.	-		
FD 328 UP	DIN EN 14700: Fe Z1-300-PT / DIN 8555: MF 5-300-PT Slabbing rolls, bar mill rolls.												280 - 325 HB	• Alloy cored wire for submerged arc. • Suitable for operating temperatures up to 550 ° C.
	0.08	0.4	0.8	6	-	0.7	-	-	-	-	bal.	-		
FD 337 UP	DIN EN 14700: Fe3-50-PT / DIN 8555: MF 5-50-PT Back-up rolls, pinch rolls, plate-mill leveler, slabbing-mill rolls, edger rolls, looper-tension rolls.												52 - 54 HRC	• Flux cored wire for the submerged arc process. • Resistant against high pressure and abrasion also an excellent resistance to high thermal fatigue.
	0.33	0.4	1.2	5.6	0.3	3.3	-	-	0.25	-	bal.	-		
FD 341 UP	DIN EN 14700: T Fe13-300-P / DIN 8555: MF 1-300-P Build-up layers for carbon steels, buffer layers for continuous casting rolls and cement rolls.												300-340 HB Tensile strength: ≈1200 N/mm²	• Flux cored wire, suitable for medium alloyed steels and high strength steels. • Can also be used as a buffer and build-up layer. • Highly crack resistant and is highly resistant to impact and pressure wear.
	0.12	0.4	1.6	2.5	0.5	2.5	-	-	0.4	-	bal.	-		
FD 356 UP	DIN EN 14700: T Fe7-40-CPT / DIN 8555: MF 5-40-CPT Continuous casting rolls.												42 - 44 HRC	• Resistant against corrosion, impact, continuos-rating wear in addition to effect of heat. • Best results are achieved by 2 - 3 layers.
	0.05	0.4	1.2	17	4.6	1.1	-	0.2	0.25	-	bal.	-		
FD 4351 UP 1.4351	DIN EN 14700: T Z Fe7-45-CPT / DIN 8555: MF 5-45-PRT Wear stressed components of seawater- and power plants, as well as in the food and paper industry. Water turbines, continuous casting rolls in the steel industry.												38 - 42 HRC	• Good corrosion resistance. • Very good resistance to cavitation and erosion. • Thermal shock resistant. • High-pressure resistant in continuous exposure to heat.
	0.05	0.4	1	14	5	0.75	-	-	-	-	bal.			
FD 440 UP	DIN EN 14700: T Fe7-450-CPT / DIN 8555: MF 5-450-PRT Hot strip mill table rolls, pinch rolls , continuous casting rolls, continuous billet.												500 HB 500°C: 480 HB 600°C: 300 HB	• Flux cored wire for submerged arc welding. • Resistant against impact and medium abrasive wear. • Resistant against corrosion and continuous rating through heat effect.
	0.3	0.4	1.0	13	2.4	1.5	-	-	1	-	bal.	-		
FD 476 UP	DIN EN 14700: T Fe7-50-CPT / DIN 8555: MF 5-450-PRT Steel mill rolls, hardfacing of rolls for hot rolling.												48 - 50 HRC	• Flux cored wire for submerged arc welding. • Corrosion resistant and wear resistant. • Resistant against impact and continuous rating through heat effect and high pressure.
	0.3	0.4	1.4	16	4	1.5	1.5	-	1	1	bal.	-		
FD 502 UP	DIN EN 14700: T Fe8-50-CPT / DIN 8555: MF 6-50-PRT Continuous casting rolls and other steel mill rolls as scale breaker rolls, hot strip mill rolls, furnace rolls.												48 - 52 HRC Hot hardness 530-540°C: 54-56 HRC	• Flux cored wire for the submerged arc welding process. • Excellent for components subjected to metal-to-metal wear, corrosion and thermal fatigue cracking.
	0.3	-	-	13	-	1.5	2	-	2	1.2	bal.	-		

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

Chromium Steel

DURMAT®	KLASSIFICATION TYPICAL APPLICATIONS TYPICAL CHEMICAL COMPOSITION* (Wt.-%) OF WELD METAL												HARDNESS	TYPICAL PROPERTIES
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 4009 1.4009	DIN EN 14700: / DIN 8555: T Fe8-300-CP / AWS-Nr. 410												300 - 360 HB	• Tough and corrosion resistant, acid resistant • Suited for parts that encounter wear from sea water plant and power plant operations
	Bridge bearings, sealing surfaces for service temperatures up to 450°C, corrosion slide ring sealing, roller bearings, valves, continuous casting rolls, Cr- alloying buffer layers.													
	0.12	0.8	1.2	14.5	+	-	-	-	-	-	bal.	Ti+		
FD 4015 1.4015	DIN EN 14700: T Z Fe8-250-CP / DIN 8555: MF 5-250-CP												220 - 240 HB	• Flux cored wire for the Open-Arc welding process (available as MIG-wire) • Stainless, corrosion resistant against sea water, organic and inorganic acids • Suitable for joining of Similar to materials
	Sealing surfaces, fittings for water, steam and gas fittings, bridge bearings, continuous casting rolls, roller bearings, valves.													
	0.1	-	-	17	-	-	-	-	-	-	bal.	-		
FD 4028 1.4028	DIN EN 14700: T Z Fe8-50-CGPT / DIN 8555: MF6-50-CGPT												46 - 48 HRC	• Tough and stainless alloy. • Resistant to corrosion in seawater and dilute organic and inorganic acids.
	Connection of similar type materials, coating of different species; bridge bearings, sealing surface armor, slip rings, guide bearings, valves, centrifuges, valve seats.													
	0.3	-	0.8	14	0.4	-	-	-	-	-	bal.	-		
FD 4115 1.4115	DIN EN 14700: T Fe8-40-CP / DIN 8555: MF 6-40-CP												42 - 44 HRC	• Tough and corrosion resistant. • Suited for parts that encounter wear from sea water plant and power plant operations. Suited for sliding wear (metal on metal).
	Sealing surface of water-, steam- and gas armatures up to service temperatures of 450 °C.													
	0.2	-	-	17	0.4	1	-	-	-	-	bal.	-		
FD 4122 1.4122	DIN EN 14700: T Fe8-50-CP / DIN 8555: MF 6-50-CP												48 - 51 HRC	• Tough and corrosion resistant. • Suited for parts that encounter wear from sea water plant and power plant operations. Suited for sliding wear (metal on metal).
	Bridge bearings, sealing surfaces, corrosion slide ring sealing, roller bearings, valves, continuous casting rolls.													
	0.4	-	-	17	0.4	1	-	-	+	-	bal.	-		
FD 4122 Nb	DIN EN 14700: T Z Fe8-50-CGP / DIN 8555: MF 6-50-CGPT												48 - 51 HRC	• Flux cored wire for the Open-Arc welding process (available as MIG-wire). • Corrosion resistant against sea water. • Good wear resistance.
	Sealing surface of water, steam and gas armatures.													
	1.2	-	-	17	1	-	-	8	0.3	-	bal.	-		
FD 4351 N OA 1.4351	DIN EN 14700: T Z Fe7-45-CPT / DIN 8555: MF 5-45-PRT												38 - 42 HRC	• Flux cored wire for open arc welding (available as MIG-wire). • Tough and corrosion resistant, suited for parts that encounter wear from oxidation. • Capable of resisting pitting and cavitation.
	Continuous casting rolls, roller bearings, corrosion, valves, bridge bearings.													
	0.05	0.9	1.1	14	5	0.75	-	-	-	-	bal.	N+		

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

PTA Equipment

As a result of more than 15 years of in-house development and use, we have now introduced a durable, reliable, mobile PTA machine into the market.

The cost-efficient PTA welding system DURWELD 300/2 PTA is equipped with a powerful water cooling unit, powerful air cooled 220/110V plug and can be operated manually or, optionally, with external manipulation devices using CNC or robotic interfaces.

Developed and manufactured by DURUM in Germany, the mobile plasma powder cladding system DURWELD 300/2 PTA can also be supplied with an interface for connection to a robot system.

Pilot arc current:	2 - 170A (120A 100% Duty Cycle)	**Degree of protection:**	IP 23
Main arc current:	2 - 300A (190A 100% Duty Cycle)	**Plasma gas adjustment:**	manual flow meter, 0.2-5 l/min
Voltage supply:	3x400V + N ±10%	**Shielding gas adjustment:**	manual flow meter, 0.2-15 l/min
Supply frequency:	50/60 Hz	**Transport gas adjustment:**	manual flow meter, 0.2-15 l/min
Max power consumption:	16 KVA	**Recommended (max) gas inlet:**	1 bar (1.5 bars)
Open-circuit V main inverter:	92V	**Dimensions:**	68 x 60 x 120 cm
Open-circuit V pilot inverter:	89V	**Weight:**	104 kg
Supply fuse:	16 A	**Chiller Unit:**	4.5 KW

Flow meter: analog or digital (lit up). Can be used for TIG or Stick welding. Available with CNC- or Robot interface.

Plug & Play Control Unit is equipped with safety systems for water, gas and temperature. Interface for remote control, robot, CNC.
Optional with a touch screen available.

Control Accessories (optional):
foot pedal and remote control

Accessories

Powder Feeder PFU 4:

Carrier gas:	Ar, Ar-H_2
Carrier gas flow rate:	0 - 4 l/min
Powder reservoir:	2.3 l
Dimensions (L x W x H):	310 x 170 x 470 mm
Powder feed rate*:	2-200 g/min
Container size:	2.3 l
Gas pressure:	max. 2 bar
Power consumption:	max. 1 A
Weight:	6 kg

* Depending on feeding wheel configuration, torch, anode and powder density

Two PFU 4 can be driven in parallel (only by power sources with the optional second motor control card) for applications that require feeding of different powders in the weld pool: i.e. matrix and carbides.

Feeding rate step controlled via feeding wheel speed directly from inverter PLC

PTA Torch PT 150M

Construction:	manual hand held torch
Max current:	150A (100A 100% Duty Cycle)
Powder flow rate:	3 - 40 g/min (depending on powder density)
Weight without hose pack:	0.5 kg
Description:	liquid cooled powder handheld torch

PTA Torch PT 300AUT i

Discription:	machine torch for inner coatings of parts with diameter > 80mm
Construction:	horizontal
Max current:	300A (200A at 100% Duty Cycle)
Powder flow rate:	10 - 80 g/min (depending on powder density)
Length (other lengths on request):	500 mm (S), 1000 mm (M), 1500 mm (L)

PTA Torch PT 300M

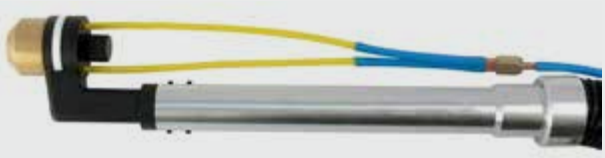
Construction:	manual hand held torch
Max current:	300A (200A 100% Duty Cycle)
Powder flow rate:	3 - 80 g/min (depend on powder density)
Weight without hose pack:	0.7 kg
Description:	liquid cooled powder handheld torch

PTA Torch PT 300AUT

Construction:	vertical
Max current:	300A (200A 100% Duty Cycle)
Powder flow rate:	3 - 80 g/min (depending on powder density)
Weight without hose pack:	0.8 kg
Description:	liquid cooled powder machine torch for high duty applications

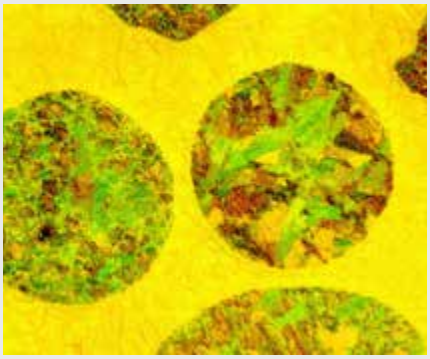
PTA Torch PT 400AUT

Construction:	vertical
Max current:	350A (300A 100% Duty Cycle)
Powder flow rate:	3 - 140 g/min (depending on powder density)
Weight without hose pack:	0.9 kg
Description:	liquid cooled powder machine torch for high duty applications



PTA Powders

DURMAT®	TYPICAL CHEMICAL COMPOSITION OF MATRIX (Wt.-%)													TYPICAL PROPERTIES AND APPLICATION
	C	Si	Mn	Cr	B	Ni	Mo	Co	Nb	V	W	Fe	+	
33-PTA	-	4.1	-	6	1	bal.	-	-	-	-	-	<3	-	• Special powder for glass industry. • Hardness NiSF: 33 HRC. • 6% Cr.
	NiSF-Alloy. Gas atomized.													
38-PTA	<0.1	2.5-3.5	-	6	1.8-2.4	bal.	-	-	-	-	-	<3	-	• Heat and corrosion resistant. • Abrasion resistant. • Hardness NiSF: 40 HRC.
	NiSF-Carbide. Blend.									70% Matrix + 30% FTC				
54-PTA	0.5-0.7	3.5-4.5	-	15-17	3-4	bal.	2-4	-	-	-	-	<4	Cu: 2-3	• Heat and corrosion resistant based on Mo and Cu content. • Abrasion resistant. • Hardness: 56-61 HRC.
	NiSF-Alloy. Gas atomized.													
55-PTA	0.4-0.6	3.5-4.5	-	12-14	2.5-3.5	bal.	-	-	-	-	-	<4	-	• Heat and corrosion resistant. • Abrasion resistant. • Hardness: 50-55 HRC.
	NiSF-Alloy. Gas atomized.													
56-PTA	0.25	3.2	-	7.5	1.8	bal.	-	-	-	-	-	<4	-	• Heat and corrosion resistant. • Abrasion resistant, low friction. • Hardness: 40 HRC.
	NiSF-Alloy. Gas atomized.													
57-PTA	0.9-1.1	4	-	15-17	3.2	bal.	-	-	-	-	-	<4	-	• Heat and corrosion resistant. • Abrasion resistant, low friction. • Hardness: 58-60 HRC.
	NiSF-Alloy. Gas atomized.													
58-PTA	0.75	4.3	-	15	3.1	bal.	-	-	-	-	-	<4	-	• Heat and corrosion resistant. • Abrasion resistant, low friction. • Hardness: 50-52 HRC.
	NiSF-Alloy. Gas atomized.													
59-PTA	<0.1	3	-	-	3	bal.	-	-	-	-	-	<2	-	• Heat and corrosion resistant. • Abrasion resistant. • Hardness: 50-52 HRC. • No Cr-content.
	NiSF-Alloy. Gas atomized.													
61-PTA	<0.1	3	-	-	3	bal.	-	-	-	-	-	<2	-	• Heat and corrosion resistant. • High abrasion resistance. • High content of Fused Tungsten Carbide.
	NiSF-Carbide. Blend.									DURMAT® 59-PTA: 40 % DURMAT® FTC: 60 %				
62-PTA	<0.1	3	-	-	3	bal.	-	-	-	-	-	<2	-	• Heat, corrosion and abrasion resistant. • High content of Spherical Fused Tungsten Carbide (SFTC).
	NiSF-Carbide. Blend.									DURMAT® 59-PTA: 40 % DURMAT® SFTC: 60 %				



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DURMAT®	TYPICAL CHEMICAL COMPOSITION OF MATRIX (Wt.-%)													TYPICAL PROPERTIES AND APPLICATION
	C	Si	Mn	Cr	B	Ni	Mo	Co	Nb	V	W	Fe	+	
63-PTA	0.25	3.2	-	7.5	1.8	bal.	-	-	-	-	-	<2.5	-	• Heat, corrosion and abrasion resistant. • Hardness Matrix: 45 HRC. • High content of Fused Tungsten Carbide.
	NiSF-Carbide. Blend.									DURMAT® 56-PTA: 40 % DURMAT® SFTC: 60 %				
65-PTA	0.75	4.3	-	15	3.1	bal.	-	-	-	-	-	<4	-	• Heat, corrosion and abrasion resistant. • Hardness Matrix: 52 HRC. • High content of Fused Tungsten Carbide (FTC).
	NiSF-Carbide. Blend.									DURMAT® 58-PTA: 40 % DURMAT® FTC: 60 %				
66-PTA	0.4	<0.1	-	15-17	3	bal.	-	-	-	-	-	<4	-	• Heat and corrosion resistant. • High abrasion resistance. • Hardness Matrix: 50 HRC. • <15% special carbides.
	NiSF-Carbide. Blend.									+Special Carbide: 10 - 15 %				
67-PTA	0.02	3	-	-	3	bal.	-	-	-	-	-	<2	-	• Heat and corrosion resistant. • High abrasion resistance. • Hardness Matrix: 50 HRC. • <8% special carbides.
	NiSF-Carbide. Blend.									DURMAT® 59-PTA: 35-40 % DURMAT® FTC: 56-60 % Special Carbide (SC): 6-8 %				
68-PTA	0.02	3	-	-	3	bal.	-	-	-	-	-	<2	-	• Heat and corrosion resistant. • High abrasion resistance. • Hardness Matrix: 50 HRC. • Mixture of Spherical Fused Tungsten Carbides and <8% special carbides.
	NiSF-Carbide. Blend.									DURMAT® 59-PTA: 35-40 % DURMAT® SFTC: 56-60 % Special Carbide (SC): 6-8 %				
71-PTA	<0.1	3	-	-	3	bal.	-	-	-	-	-	<45	-	• Heat and corrosion resistant. • High abrasion resistance. • High content of Fused Tungsten Carbide (FTC). • Hardness Matrix: 50-55 HRC.
	NiSF-Carbide. Blend.									DURMAT® 77-PTA: 40 % DURMAT® FTC: 60 %				
72-PTA	<0.1	3	-	-	3	bal.	-	-	-	-	-	<45	-	• Heat and corrosion resistant. • High abrasion resistance. • High content of Spherical Fused Tungsten Carbide (SFTC).
	NiSF-Carbide. Blend.									DURMAT® 77-PTA: 40 % DURMAT® SFTC: 60 %				
73-PTA	<0.1	3	-	-	3	bal.	-	-	-	-	-	<45	-	• Heat and corrosion resistant. • High abrasion resistance. • High content of mono crystalline TC (MCWC). • Hardness Matrix: 50-55 HRC.
	NiSF-Carbide. Blend.									DURMAT® 77-PTA: 40 DURMAT® MCWC: 60				
74-PTA	20-24	<0.1	-	-	3.5	bal.	-	-	-	-	-	<5	-	• Heat and corrosion resistant. • High abrasion resistance. • Hardness Matrix: 50 HRC. • <10% special carbides.
	NiSF-Carbide. Blend.									NiSF-Matrix: 40 % DURMAT® FTC: 50 % Special Carbide (SC): <10 %				
77-PTA	<0.1	3	-	-	3	bal.	-	-	-	-	-	<45	-	• Heat and corrosion resistant. • High abrasion resistance. • Hardness: 50-55 HRC.
	Ni-Alloy. Gas atomized.													
79-PTA	0.9-1.1	4	-	15-17	3.2	bal.	-	-	-	-	-	<4	-	• Heat and corrosion resistant. • High abrasion resistance. • High content of Fused Tungsten Carbide. • Hardness Matrix: 58-60 HRC.
	NiSF-Carbide. Blend.									DURMAT® 57-PTA: 40 % DURMAT® FTC: 60 %				
84-PTA	-	4.1	-	6	1	bal.	-	-	-	-	-	<4	-	• Heat and corrosion resistant. • High abrasion resistance. • High content of Mono Tungsten Carbide. • Hardness NiSF: 33 HRC.
	NiSF-Carbide. Blend.									DURMAT® 33-PTA: 40 % DURMAT® MWC: 60 %				
85-PTA	0.75	4.3	-	15	3.1	bal.	-	-	-	-	-	<4	-	• Heat and corrosion resistant. • High abrasion resistance. • High content of Mono Tungsten Carbide. • Hardness NiSF: 48-52 HRC.
	NiSF-Carbide. Blend.									DURMAT® 58-PTA: 40 % DURMAT® MWC: 60 %				

* The indicated values are average values, which can deviate from the actual values because of different processes and process parameters.

PTA Powders

DURMAT®	TYPICAL CHEMICAL COMPOSITION OF MATRIX (Wt.-%)													TYPICAL PROPERTIES AND APPLICATION
	C	Si	Mn	Cr	B	Ni	Mo	Co	Nb	V	W	Fe	+	
93-PTA	<0.1	3	-	-	3	bal.	-	-	-	-	-	<2	-	• Heat and corrosion resistant. • High abrasion resistance. • High content of a mixture of Special Tungsten Carbides (STC). • Hardness NiSF: 50-52 HRC.
	NiSF-Carbide. Blend.									DURMAT® 59-PTA: 40 % Special Carbide (SC): 60 %				
108-PTA	0.4	-	15-16	14-15	-	1.2	-	-	-	-	-	bal.	-	• Friction resistant. • High abrasion resistance. • High content of S inter WC-Co pellets. • Hardness Matrix : 250HB.
	FeCr-Carbide. Blend.									40% Matrix 60% Granulat WC-Co 94-6				
109-PTA	<0.1		6-7	18-19	-	9	-	-	-	-	-	bal.	-	• Friction resistant. • High abrasion resistance. • High content of Sinter WC-Co pellets. • Hardness Matrix : 170HB.
	FeCr-Carbide. Blend.									Matrix: 40% Granulat WC-Co 94-6: 60%				
110-PTA	0.25	3.2	-	7.5	1.8	bal.	-	-	-	-	-	<4	-	• Friction resistant. • High abrasion resistance. • High content of Sinter WC-Co pellets. • Hardness Matrix : 40 HRC.
	Carbide. Blend.									Matrix: 40% Granulat WC-Co 94-6: 60%				
401-PTA	<0.1	-	-	20-24	-	bal.	8-9	<4	3.5	<5	-	<5	-	• High heat and corrosion resistance. • High abrasion resistance. • High content of Fused Tungsten Carbides (FTC) and SC mixture.
	Ni-Carbide. Blend.									Matrix: 50% Carbide: 50%				
411-PTA	<0.1	-	-	20-24	-	bal.	8-9	<4	3.5	<5	-	<5	-	• High heat and corrosion resistance. • High abrasion resistance. • High content of Spherical Fused Tungsten Carbides (SFTC) and SC mixture.
	Boride, Carbide. Blend.									Matrix: 50% Carbide: 50%				
470-PTA	-	2.75	-	4	1	-	-	-	-	-	-	-	5	• Heat and corrosion resistant. • Hardness: 33 HRC.
	Boride, Carbide.													
505-PTA	2.5-2.8	-	-	<7	-	-	1-1.25	-	-	-	-	bal.	-	• Resistant against heavy impact and abrasion. • Fine special carbides (10-12%). • Hardness: 55-60 HRC.
	Fe- Alloy. Gas atomized.									Special Carbide (SC): 10-11 %				
506-PTA	3.1	-	-	<9	-	-	1.5-1.8	-	-	-	-	bal.	-	• Resistant against heavy impact and abrasion. • Fine special carbides (18%). • Hardness: 60-62 HRC.
	Fe- Alloy. Blend.									Special Carbide (SC): 15-18 %				
507-PTA	3.1	-	-	<9	-	-	1.3-1.8	-	-	-	-	bal.	-	• Resistant against heavy impact and abrasion. • Fine special carbides (20%). • Hardness: 60-65 HRC.
	Fe- Alloy. Blend.									Special Carbide (SC): 22-25 %				
516-PTA	0.03	-	-	18	-	13	3	-	-	-	-	bal.	-	• Austenitic weld metal with low carbon content. • Resistant against pitting corrosion and intercrystalline corrosion. • Max. temperature: 400°C.
	Fe-Alloy. Gas atomized.													
520-PTA	<0.1	-	6-7	18-19	-	9	-	-		-	-	bal.	-	• Austenitic weld metal with low carbon and Mn content. • Corrosion resistant.
	Fe-Alloy. Gas atomized.													
525-PTA	0.4	-	15-16	14-15	-	1.2	-	-	-	-	-	bal.	-	• Austenitic weld metal with low carbon and Mn content. • Corrosion resistant. • Thermal shock resistant up to 850°C.
	Fe-Alloy. Gas atomized.													

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DURMAT®	TYPICAL CHEMICAL COMPOSITION OF MATRIX (Wt.-%)													TYPICAL PROPERTIES AND APPLICATION
	C	Si	Mn	Cr	B	Ni	Mo	Co	Nb	V	W	Fe	+	
530-PTA	0.3	0.6	1	11	-	-	1.3	1.6	-	1	-	bal.	-	• Corrosion resistant. • Abrasion resistant. • Hardness: 47-52 HRC.
	Fe-Alloy. Gas atomized.													
536-PTA	1	-	-	4.2	-	-	7	-	-	2	2	bal.	-	• Corrosion resistant. • Abrasion resistant. • Fine carbide microstructure. • Hardness: 58 HRC.
	Fe-Alloy. Gas atomized.													
564-PTA	3.8	-	-	22	1	-	-	-	-	0.8	0.8	bal.	-	• FeCrC alloy with B and V. • Abrasion resistant. • Hardness: 62-64 HRC.
	Fe-Alloy. Gas atomized.													
601-PTA	0.2-0.6	-	-	4-6	-	-	1-1.6	-		0.5-1.5	-	bal.	-	• Crack resistant. • Resistant to tempering. • Suitable for impact wear conditions. • Hardness: 58 HRC.
	Fe-Alloy. Gas atomized.													
625-PTA	0.05	-	-	21	-	bal.	9.2	-	3.5	-	-	3	-	• High corrosion resistance e.g. in acids with chloride content. • Sea water resistant. • Good resistance against friction. • Hardness: 210 HV.
	Ni-Alloy. Gas atomized.													
F-PTA	1.5	1.2	-	26	-	23	-	bal.	-	-	12	-	-	• Abrasion and corrosion resistant. • Good resistance against friction and temperature (950°C). • Hardness: 42 HRC.
	Co-Alloy. Gas atomized.													
S1-PTA	2.5	1.1	-	30	-	-	-	bal.	-	-	12	-	-	• Abrasion and corrosion resistant. • Good resistance against friction and temperature (750°C). • Hardness: 55 HRC.
	Co-Alloy. Gas atomized.													
S6-PTA	1	1.2	-	28	-	-	-	bal.	-	-	4.2	-	-	• Abrasion and corrosion resistant. • Good resistance against friction and temperature (750°C). • Hardness: 42 HRC.
	Co-Alloy. Gas atomized.													
S12-PTA	1.4	1.2	-	27	-	<1	-	bal.	-	-	8	<1	-	• Abrasion and corrosion resistant. • Good resistance against friction and temperature (750°C). • Hardness: 46 HRC.
	Co-Alloy. Gas atomized.													
S21-PTA	-	0.5	-	26	-	1-3	5.2	bal.	-	-	-	-	-	• Good resistance against friction and temperature. • Buffer layer for thick Stellite coatings. • Hardness: 23 HRC.
	Co-Alloy. Gas atomized.													
S190-PTA	3-3.5	1	1	24-28	-	3	-	bal.	-	-	12-16	5	-	• Heat and corrosion resistant. • Good resistance against friction and temperature. • Hardness: 54-58 HRC.
	Co-Alloy. Gas atomized.													

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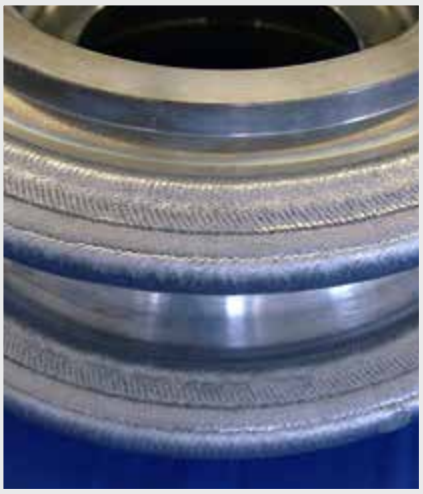
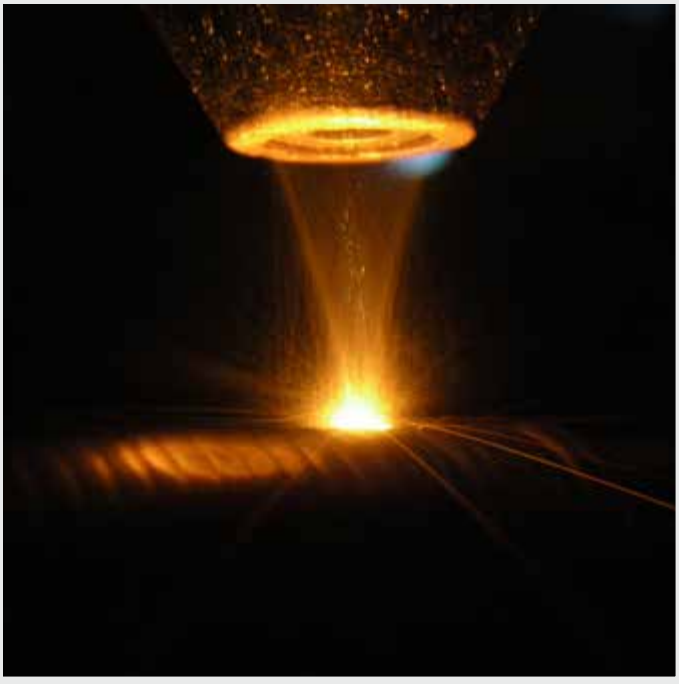
Laser Powders

DURMAT®	GRAIN SIZE (µm)	POWDER TYPE	TYPICAL PROPERTIES
114-LAS	-125+45	**NiSF-Carbide. Blend.** NiCrBSi + 65% FTC	• Heat and corrosion resistant • High abrasion resistance • High content of Fused Tungsten Carbide (FTC)
163-LAS	-125+45	**NiSF-Carbide. Blend.** NiCrBSi + 60% SFTC	• Heat and corrosion resistant • High abrasion resistance • High content of Spherical Fused Tungsten Carbide (SFTC)
625-LAS	-150+53	**Ni-Alloy. Gas atomized.** NiCrMoNb	• High corrosion resistance e.g. in acids with chloride content • Sea water resistant • Good resistance against friction • Hardness: 210 HV





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Carbide

PRODUCT	TYPICAL CHEMICAL COMPOSITION (Wt.-%)													TYPICAL PROPERTIES AND APPLICATIONS
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
WC-Co 88-12														• Abrasion and erosion resistant. • Max. operating temperature 500°C. • Spherical. • Used for rolls and steel industry.
DURMAT® 101	Carbide. Agglomerated. Sintered.													
DURMAT® 111	Carbide. Fine 1.3 µm. Agglomerated. Sintered.													• Similar to DURMAT® 101. • Improved deposition efficiency. • High abrasive wear resistance. • Less coating roughness.
DURMAT® 121	Carbide. Finest 0.7 µm. Agglomerated. Sintered.													
DURMAT® 131	Carbide. UltraFine 0.4 µm. Agglomerated. Sintered.													
	-	-	-		-	-	-	12	-	-	-	88	-	
WC-Co 83-17														• Max. operating temperature 500°C. • Abrasion and erosion resistant. • Used in extrusion dies, glass industry, pump parts.
DURMAT® 102	Carbide. Agglomerated. Sintered.													
DURMAT® 112	Carbide. Fine 1.3 µm. Agglomerated. Sintered.													• Improved deposition efficiency / wear resistance. Less coating roughness.
	-	-	-	-	-	-	-	17	-	-	-	83	-	
WC-Co-Cr 86-10-4														• Max. operating temperature 500°C. • Higher corrosion resistance than Co matrix. • Hard chrome replacement. • Used for paper rolls.
DURMAT® 105	Carbide. Agglomerated. Sintered.													
DURMAT® 115	Carbide. Fine 1.3 µm. Agglomerated. Sintered.													• Improved deposition efficiency / abrasion and corrosion resistance.
DURMAT® 125	Carbide. Submicron 0.7 µm. Agglomerated. Sintered.													• Improved deposition efficiency, less coating roughness. • High abrasive wear and corrosion resistance.
DURMAT® 135	Carbide. Ultrafine 0.4 µm. Agglomerated. Sintered.													
	-	-	-	4	-	-	-	10	-	-	-	86	-	
DURMAT® 103	WC-Ni 88-12 / Carbide. Agglomerated. Gesintert													• Ni-bond carbide powder. • Max. operating temperature 500°C. • Higher corrosion resistance than WC-Co.
	-	-	-	-	-	12	-	-	-	-	-	88	-	
DURMAT® 104	WC-Ni 83-17 / Carbide. Agglomerated. Sintered.													• Ni-bond carbide powder. • Max. operating temperature 500°C. • Higher corrosion resistance than WC-Co. • Higher ductility than WC-Co 88 12.
	-	-	-	-	-	17	-	-	-	-	-	83	-	
DURMAT® 106	WC-Co-Cr 86-6-8 / Carbide. Agglomerated. Sintered.													• Max. operating temperature 500°C. • Higher corrosion resistance than DURMAT® 105. • Hard chrome replacement. • Used for paper rolls.
	-	-	-	8	-	-	-	6	-	-	-	86	-	
DURMAT® 107	WC-W_2C (FTC) / Carbide. Sintered. Crushed.													• Fused tungsten carbide. • Hardness: >2,200 HV. • Used for powder blends for high abrasion resistance coatings.
	4	-	-	-	-	-	-	<0.3	-	bal.	-	-	Cfree: <0.1	
DURMAT® 108	WC-CrC-Ni 73-18-7 / Carbide. Agglomerated. Gesintert													• Max. operating temperature 750°C. • Higher corrosion ond oxidation resistance than WC-Co materials.
	6.5	-	-	17-19	-	7	-	-	-	bal.	-	-	-	

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Thermal Spray Powders

PRODUCT	TYPICAL CHEMICAL COMPOSITION (Wt.-%)													TYPICAL PROPERTIES AND APPLICATIONS
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
DURMAT® 109	WC-Co-Cr-Ni 85-10-4-1 / Carbide. Agglomerated. Sintered.													• Higher oxidation and corrosion resistance than WC-Co-based materials.
	-	-	-	4	-	1-1.5	-	10	-	-	-	bal.	-	
DURMAT® 250	Cr_3C_2 / Carbide. Sintered. Crushed.													• Cr-Carbide for blends. • Powder for wear resistant coatings. • Temperature resistant up to 870°C.
	12.7	-	-	bal.	-	-	-	-	-	-	-	-	-	
DURMAT® 251	Cr_3C_2-NiCr 75-25 / Carbide. Agglomerated. Sintered.													• Powder for wear and oxidation resistant coatings. • Max. operating temperature 870°C.
	10.5			bal.		14.5							O: <1	
DURMAT® 254	Cr_3C_2-NiCr 75-25 / Carbide-Alloy. Mix.													• Similar to DURMAT® 251, but blended.
Cr_3C_2	12.7	-	-	bal.	-	-	-	-	-	-	-	-	-	
NiCr	<0.25	-	-	18-21	-	bal.	-	-	-	-	-	-	-	

Ni-based

PRODUCT	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES AND APPLICATIONS
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
DURMAT® 339	50% NiCrBSi + 50% WC-Co / NiSF-Carbie. Blend.										-125+45 / -106+22			• Moderate corrosion resistance. • Erosion and abrasion resistant. • Hardness NiSF: 56 HRC.
NiCrBSi	0.8-1	3.8	-	16-17	3.3	bal.	-	-	-	-	-	-	-	
DURMAT® 102	-	-	-	-	-	-	-	17	-	-	-	83	-	
DURMAT® 346	60% NiCrBSi + 40% WC-Co / NiSF-Carbie. Blend.										-45+22			• Moderate corrosion resistance. • Erosion and abrasion resistant. • Hardness NiSF: 56 HRC.
NiCrBSi	0.8-1	3.8	-	16-17	3.3	bal.	-	-	-	-	-	-	-	
DURMAT® 101	-	-	-	-	-	-	-	12	-	-	-	88	-	
NiCrBSi+FTC														• Hardness NiSF: 56 HRC
DURMAT® 349	65% Matrix + 35% FTC / NiSF-Carbie. Blend.										-45+22			• Moderate corrosion resistance. • Erosion and abrasion resistant.
DURMAT® 350	60% Matrix + 40% FTC / NiSF-Carbie. Blend.										-125+45 / -106+22			
DURMAT® 351	50% Matrix + 50% FTC / NiSF-Carbie. Blend.										-125+45 / -106+22			
DURMAT® 352	40% Matrix + 60% FTC / NiSF-Carbie. Blend.										-125+45 / -106+22			
DURMAT® 353	20% Matrix + 80% FTC / NiSF-Carbie. Blend.										-125+45 / -106+22			
NiCrBSi	0.8-1	3.8	-	16-17	3.3	bal.	-	-	-	0.8-1	-	-	-	
FTC	3.9-4.1	-	-	-		-	-	-	-	bal.	-	-	-	
NiCrBSi + WC-Co														• Hardness NiSF: 56 HRC
DURMAT® 354	50% Matrix + 50% DURMAT® 101 / NiSF-Carbie. Blend.										-125+45 / -106+22			• Moderate corrosion resistance • High erosion and abrasion resistance
DURMAT® 355	20% Matrix + 80% DURMAT® 101 / NiSF-Carbie. Blend.										-125+45 / -106+22			
DURMAT® 356	65% Matrix + 35% DURMAT® 101 / NiSF-Carbie. Blend.										-125+45 / -106+22			
DURMAT® 372	60% Matrix + 40% DURMAT® 101 / NiSF-Carbie. Blend.										-125+45 / -106+22			
NiCrBSi	0.8-1	3.8	-	16-17	3.3	bal.	-	-	-	0.8-1	-	-	-	
DURMAT® 101	-	-	-		-	-	-	12	-	-	-	88	-	

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PRODUCT	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES AND APPLICATIONS
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
DURMAT® 383	**40% DURMAT® 456 + 60% DURMAT® 94/6 / NiSF-Carbie. Blend.**										-125+45 / -106+22			• Moderate corrosion resistance • Erosion and abrasion resistant • Spherical WC-Co carbides • Hardness NiSF: 56 HRC
DURMAT® 456	0.8-1	3.8	-	16-17	3.3	bal.	-	-	-	-	-	-	-	
DURMAT® 94/6	-	-	-	-	-	-	-	6	-	-	-	94	-	
DURMAT® 384	**NiCrBSi + SFTC / NiSF-Carbie. Blend.**										-125+45 / -106+22			• Moderate corrosion resistance • Erosion and abrasion resistant • Spherical Fused Tungsten Carbides (SFTC) • Hardness NiSF: 56 HRC
NiCrBSi	3.8	1.2-2.2	-	16-17	3.3	bal.	-	-	-	-	-	-	-	
SFTC	3.9-4.1	-	-	-	-	-	-	-	-	bal.	-	-	-	
DURMAT® 389	**50% NiCrBSi + 50% SFTC / NiSF-Carbie. Blend.**										-125+45 / -106+22			• Moderate corrosion resistance • Erosion and abrasion resistant • 50% DURMAT® 107 • Hardness NiSF: 40 HRC
NiCrBSi	<0.1	2.5-3.5	-	-	1.8-2.4	bal.	-	-	-	-	<0.5	-	-	
SFTC	3.9-4.1	-	-	-	-	-	-	-	-	bal.	-	-	-	
DURMAT® 390	**30% NiCrBSi + 70% FTC / NiSF-Carbie. Blend.**										-125+45 / -106+22			• Moderate corrosion resistance • Erosion and abrasion resistant • 70% DURMAT® 107 • Hardness NiSF: 56 HRC
NiCrBSi	0.8-1	3.8	-	16-17	3.3	bal.	-	-	-	0.8-1	-	-	-	
FTC	3.9-4.1	-	-	-	-	-	-	-	-	bal.	-	-	-	
DURMAT® 391	**50% NiCrBSi + 50% FTC / NiSF-Carbie. Blend.**										-125+45 / -106+22			• Moderate corrosion resistance • Erosion and abrasion resistant • 50% Spherical Fused Tungsten Carbides (SFTC) • Hardness NiSF: 56 HRC
NiCrBSi	<0.3	3-4	-	7-9	1.5-1.8	bal.	-	-	-	-	-	-	-	
SFTC	3.9-4.1	-	-	-	-	-	-	-	-	bal.	-	-	-	
DURMAT® 392	**40% NiCrBSi + 60% FTC / NiSF-Carbie. Blend.**										-125+45 / -106+22			• Moderate corrosion resistance • Erosion and abrasion resistant • 60% Spherical Fused Tungsten Carbides (SFTC) • Hardness NiSF: 56 HRC
NiCrBSi	<0.3	3-4	-	7-9	1.5-1.8	bal.	-	-	-	-	-	-	-	
SFTC	3.9-4.1	-	-	-	-	-	-	-	-	bal.	-	-	-	
DURMAT® 444	**NiCrBCuMo / Ni-Alloy. Gas atomized.**										-125+45 / -106+22			• Corrosion resistant • Heat and abrasion resistant • Hardness NiSF: 62 HRC
	0.5	4	-	16	4	bal.	3	-	-	-	4	-	Cu: 3	
DURMAT® 450	**Ni-Cr 80-20 / Ni-Alloy. Water atomized.**										-125+45 / -106+22			• Bond coating • Max. operating temperature 950°C
	≤0.25	≤1.5	≤2.5	18-20	-	bal.	-	-	-	-	≤1.5	-	-	
DURMAT® 451	**Ni-Cr 80-20 / Ni-Alloy. Gas atomized.**										-125+45 / -106+22			• Similar to DURMAT® 450, but gas atomized • Corrosion and oxidation resistant
	≤ 0.25	≤1.5	≤2.5	18-20	-	bal.	-	-	-	-	≤1.5	-	-	
DURMAT® 452	**Ni-Al 95-5 / Ni-Alloy. Gas atomized.**										-125+45 / -106+22			• Bond coating • Max. operating temperature 900°C
	-	≤0.5	-	-	-	bal.	-	-	-	-	≤1	-	Al: 3-6	
DURMAT® 453	**NiCrBSi / NiSF-Alloy. Gas atomized.**										-125+45 / -106+22			• Moderate corrosion resistance • Abrasion and erosion resistant • Hardness NiSF: 40 HRC
	<0.4	3-4	-	7-9	1.4-1.8	bal.	-	-	-	-	-	-	-	
DURMAT® 455	**NiCrBSi / NiSF-Alloy. Gas atomized.**										-125+45 / -106+22			• Moderate corrosion resistance • Abrasion and erosion resistant • Hardness NiSF: 40 HRC
	0.3-0.5	3.7	-	13-15	2.4-2.6	bal.	-	-	-	-	-	-	-	
DURMAT® 456	**NiCrBSi / NiSF-Alloy. Gas atomized.**										-125+45 / -106+22			• Moderate corrosion resistance • Abrasion and erosion resistant • Hardness NiSF: 50 HRC
	0.8-1	3.8	-	16-17	3.3	bal.	-	-	-	-	-	-	-	
DURMAT® 470	**NiCrBSi / NiSF-Alloy. Gas atomized.**										-125+45 / -106+22			• Special powder for glass industry • Hardness NiSF: 34 HRC • 5% Cr
	-	2.7	-	4	1	bal.	-	-	-	-	-	-	Other: 5	
DURMAT® 477	**NiCrBSi / NiSF-Alloy. Gas atomized.**										-125+45 / -106+22			• Special powder for glass industry • Hardness NiSF: 22 HRC • 2% Cr
	-	2.7	-	2	1	bal.	-	-	-	-	-	-	-	

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Thermal Spray Powders

PRODUCT	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES AND APPLICATIONS
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
DURMAT® 478	NiBSi / NiSF-Alloy. Gas atomized.										-125+45 / -106+22			• Special powder for glass industry • Hardness NiSF: 30 HRC • Cr-free
	-	3.6	-	-	1	bal.	-	-	-	-	-	-	-	
DURMAT® 491	NiCrBSiMoCu / NiSF-Alloy. Gas atomized.										-125+45 / -106+22			• Good corrosion resistance • Abrasion and erosion resistant • Heat resistant • Hardness NiSF: 58-60 HRC
	0.4-0.7	4-5	-	16-17	3.5-4	bal.	2.5-3.2	-	-	-	2.5-3.5	-	Cu: 2-3	
DURMAT® 498	NiCrBSi / NiSF-Alloy. Gas atomized.										-125+45 / -106+22			• Special powder for glass industry • Hardness NiSF: 32-37 HRC
	0.5	1.5	-	7.6	1.8	bal.	-	-	-	-	2	-	-	
DURMAT® 499	NiCrBSi / NiSF-Alloy. Gas atomized.										-125+45 / -106+22			• Special powder for glass industry • Hardness NiSF: 35-40 HRC
	0.45	2.25	-	10	2	bal.	-	-	-	-	2.5	-	-	
DURMAT® 583	NiCrBSi / NiSF-Alloy. Gas atomized.										-125+45 / -106+22			• Special powder for glass industry • Hardness NiSF: 45-50 HRC • 12 % Cr
	0.65	3.75	-	11.5	2.45	-	-	-	-	-	4.35	-	-	

Oxide

PRODUCT	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)									TYPICAL PROPERTIES AND APPLICATIONS
	Cr2O3	SiO2	Fe2O3	Al2O3	TiO2	Na2O	Fe2O3	Crfree	Acid Soluble:	Grain Size	
DURMAT® 600	Cr_2O_3 High Purity / Oxide. Fused. Crushed.									-45+10	• Protection against friction and sliding wear. • Chemical resistant. • Hardness: ~1,300 HV.
	>99	≤0.5	≤0.1	-	-	-	-	-	typical 0.03		
DURMAT® 601	Cr_2O_3 / Oxide. Fused. Crushed.									-45+10	• High hardness and chemical resistance . • Suitable for pump parts, bearings, seals and textile machinery.
	>92	≤1	≤0.1	≤1					typical 3		
DURMAT® 602	Cr_2O_3-TiO_2-SiO_2 / Oxide. Fused. Crushed.									-45+10	• High content of Cr_2O_3. • Lower hardness compared to DURMAT® 600. • Suitable for textile and pump parts.
	>96	4-5	<0.2	-	-	-	-	<1	-		
DURMAT® 603	Al_2O_3 High Purity / Oxide. Fused. Crushed.									-45+10	• APS. • Max. operating temperature 1,650°C • Excellent dielectric properties.
	-	≤0.02	≤0.05	>99.5	-	≤0.3	-	-	-		
DURMAT® 604	Al_2O_3-TiO_2 / Oxide. Fused. Crushed.									-45+10	• APS. • Max. operating temperature 1,100°C. • Corrosion and erosion resistant.
	-	≤0.6	≤0.05	>96	≤3.5	-	-	-	-		
DURMAT® 644	TiO_2 / Oxide.									-45+10	• APS. • Moderate wear resistance compared with DURMAT® 604. • Soluble in alkalic and sulfuric acid.
	-	<0.05	>0.5	0.05	bal.	-	-	-	-		

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Thermal Spray Wires

Highly Abrasion Resistant Materials

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 751	Flux-cored Wire for Thermal Spraying.													• Max. operating temperature 500°C. • 50% Fused Tungsten Carbide (FTC).
	0.4	-	-	-	1	bal.	-	-	-	-	-	-	FTC: 50	
AS 780	Flux-cored Wire for Thermal Spraying.													• High abrasion resistance. • 50% WC-Co.
	0.4	-	-	-	1	bal.	-	-	-	-	-	-	WC-Co 88/12: 50	
AS 781	Flux-cored Wire for Thermal Spraying.													• High abrasion resistance. • 30% WC-Co.
	0.4	-	-	-	2	bal.	-	-	-	-	-	-	WC-Co 88/12: 30	
AS 786	Flux-cored Wire for Thermal Spraying.													• High abrasion and corrosion resistant.
	0.4	1	<1	-	1	bal.	-	-	-	-	-	-	CrC: 35	

Highly Corrosion Resistant Materials

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 726	Flux-cored Wire for Thermal Spraying.													• Corrosion resistant. • Similar to 2.4606 / Inconel 686.
	<0.1	<0.1	0.7	22	-	bal.	16.5	-	-	4	-	-	Ti: 0.15	
AS 745	Flux-cored Wire for Thermal Spraying.													• High corrosion resistance. • Resistant against Acid with Cl-content. • Similar to 2.4617 / Hastelloy B-2.
	<0.1	-	<1	<1	-	bal.	28	<1	-	-	0.5	-	-	
AS 748	Flux-cored Wire for Thermal Spraying..													• High corrosion resistance. • Application in offshore industry. • Similar to 2.4602 / Hastelloy C-22.
	<0.1	-	0.5	22	-	bal.	13	<2.5	0.35	3	3	-	-	
AS 754	Flux-cored Wire for Thermal Spraying.													• Similar to DURMAT® AS 748. • High corrosion resistance. • Similar to 2.4610 / Hastelloy C-4.
	0.1	-	-	16	-	bal.	17	2	-	-	<3	-	Ti: <0.7	
AS 758	Flux-cored Wire for Thermal Spraying.													• Similar to DURMAT® AS 748. • High corrosion resistance. Suitable for acids with chloride content. • Good resistance against friction. • Similar to 2.4819 / Hastelloy C-276.
	0.1	-	-	16	-	bal.	16	-	-	3.5	4	-	-	

* The indicated values are average values, which can deviate from the actual values because of different process parameters or existing porosities.

Thermal Spray Wires

Wear and Corrosion Resistant Materials

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 711	Flux-cored Wire for Thermal Spraying.													• Good erosion resistance. • Resistant to corrosive gasest.
	-	4	-	20	4	bal.	6	-	-	-	<2	-	Nb: 3.5	
AS 752	Flux-cored Wire for Thermal Spraying.													• High B-content. • High resistance against abrasion.
	0.7	4.8	-	21	3	bal.	-	-	-	-	-	-	-	
AS 753	Flux-cored Wire for Thermal Spraying.													• Ni-Cr-B-Alloy for wear and corrosion protection. • Suitable in chemical and food industry.
	0.4	5	-	22	2.7	bal.	-	-	-	-	-	-	-	
AS 755	Flux-cored Wire for Thermal Spraying.													• Higher resistance against wear. • Corrosion resistant.
	0.05	-	-	22	-	bal.	9	-	-	-	-	-	Nb: 3.5	
AS 761	Flux-cored Wire for Thermal Spraying.													• Flux-cored wire alloy with 50% FTC . • High resistance against abrasion. • Corrosion resistant.
	0.4	-	-	10	2	bal.	-	-	-	-	-	-	FTC: 50	
AS 760	Flux-cored Wire for Thermal Spraying.													• Ni-Cr-B-Alloy with 10% refractory carbides for high wear and corrosion protection. • Can be fused.
	0.4	3.7	-	21	3	bal.	-	-	-	-	-	-	SC: 10	

Corrosion and Temperature Resistant Materials

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 741	Flux-cored Wire for Thermal Spraying.													• High temperature resistance. • Corrosion resistant.
	-	-	-	16	-	bal.	-	-	-	-	3	-	Al: 4.5	
AS 763	Flux-cored Wire for Thermal Spraying.													• Bond and top coat. • Good resistance against corrosion and oxidation.
	-	-	-	50	-	bal.	-	-	-	-	-	-	-	
AS 768	Flux-cored Wire for Thermal Spraying.													• Resistant against corrosive gases in boiler atmosphere. • Temperature resistant up to 980°C.
	-	-	-	50	-	bal.	-	-	-	-	-	-	Ti: 1	

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DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 777	Flux-cored Wire for Thermal Spraying.													• Oxidation resistant. • Corrosion resistant. • Bond coat.
	-	-	-	22	-	bal.	-	-	-	-	-	-	Al: 10, Y: 1 other: <3	

Bonding Layer Materials

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 746	Flux-cored Wire for Thermal Spraying.													• Temperature resistant. • Excellent for bond coating. • Corrosion resistant.
	-	-	-	30	-	bal.	-	-	-	-	-	-	-	
AS 757	Flux-cored Wire for Thermal Spraying.													• Bond and top coat. • Good resistance against corrosion and oxidation.
	-	-	-	20	-	bal.	-	-	-	-	-	-	-	
AS 767	Flux-cored Wire for Thermal Spraying.													• Ni-alloy designed to be self-bonding. • Good particle erosion resistance.
	-	-	-	-	-	bal.	6	-	-	-	-	-	Al: 5	
AS 762	Flux-cored Wire for Thermal Spraying.													• Alloy for bond and buffer coatings.
	-	-	-	9	-	bal.	5	-	-	-	<5	-	Al: 7	
AS 756	Flux-cored Wire for Thermal Spraying.													• Bond and top coat. • Good resistance against particle erosion and oxidation.
	-	-	-	-	-	bal.	-	-	-	-	-	-	Al: 5	
AS 775	Flux-cored Wire for Thermal Spraying.													• Bond and top coat. • Very good bonding characteristics.
	-	-	-	-	-	bal.	-	-	-	-	-	-	Al: 10	
AS 776	Flux-cored Wire for Thermal Spraying.													• Bond and top coat. • Very good bonding characteristics.
	-	-	-	-	-	bal.	-	-	-	-	-	-	Al: 15	
AS 765	Flux-cored Wire for Thermal Spraying.													• Bond coat. • Dense and resistant to high temperature oxidation. • Thermal shock resistant.
	-	-	-	-	-	bal.	-	-	-	-	-	-	Al: 20	

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Highly Wear Resistant Materials

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 815	Flux-cored Wire for Thermal Spraying.													• Thermal Spray coatings with high resistance against mineral wear and friction.
	4.8	1.4	-	28	-	-	-	-	-	-	bal.	-	-	
AS 816	Flux-cored Wire for Thermal Spraying.													• Thermal Spray coatings with high resistance against mineral wear and friction.
	5.1	1.7	-	22	-	-	-	-	-	-	bal.	-	Nb: 4	
AS 827	Flux-cored Wire for Thermal Spraying.													• MnCr-Alloy. • Non-magnetic. • Resistant against high shrinkage and impact.
	0.5	0.4	16	14	-	1.2	0.5	-	0.2	-	bal.	-	-	
AS 829	Flux-cored Wire for Thermal Spraying.													• Coatings with special primary carbides. • High resistance against impact and erosion.
	0.5	-	-	9	-	-	1.3	-	-	-	bal.	-	SC: 16	
AS 805	Flux-cored Wire for Thermal Spraying.													• Impact resistant. • Abrasion and erosion resistant. • Contains finest SC-carbides.
	2.6	-	-	7	-	-	1.3	-	-	-	bal.	-	SC: 5	
AS 839	Flux-cored Wire for Thermal Spraying.													• Fe-Alloy contains complex carbide phases. • Resistant against erosion and wear.
	1	-	-	<25	<6	-	<5	-	-	<10	bal.	-	Nb: <5	
AS 850	Flux-cored Wire for Thermal Spraying.													• Flux-cored wire with 50% Fused Tungsten Carbide (FTC) for highly abrasion resistant coatings.
	2	-	0.4	-	-	-	-	-	-	-	bal.	-	FTC: 50	
AS 864	Flux-cored Wire for Thermal Spraying.													• Highly resistant against mineral wear. • Temperature resistant (max. 600°C).
	4.5	1	1.6	24	1	-	-	-	0.8	0.8	bal.	-	-	
AS 865	Flux-cored Wire for Thermal Spraying.													• High resistance against wear and temperature.
	5.2	1	0.4	21	-	-	7	-	1	2	bal.	-	Nb: 7	
AS 868	Flux-cored Wire for Thermal Spraying.													• High resistance against mineral wear. • Temperature resistance (max. 800°C).
	5	0.8	0.4	38	2	-	-	-	-	-	bal.	-	-	
AS 897	Flux-cored Wire for Thermal Spraying.													• Abrasion and wear resistant. • High bond strength. • Non-skid surface.
	-	1.3	0.6	14	1.8	4.5	-	-	-	26	bal.	-	Ti_2C_3: 6	

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DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 898	Flux-cored Wire for Thermal Spraying.													• Abrasion and corrosion resistant. • Increasing hardness in service.
	1.7	1.6	1.6	26	-	3	0.8	-	-	-	bal.	-	-	

Corrosion Resistant Materials

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 813	Flux-cored Wire for Thermal Spraying.													• Austenitic stainless steel similar to AISI 316L/1.4404.
	0.15	1	1.8	17	-	12	2.5	-	-	-	bal.	-	-	
AS 814	Flux-cored Wire for Thermal Spraying.													• Austenitic stainless steel similar to AISI 202, geringe Schrumpfung und gute Bearbeitbarkeit.
	0.15	1	8	18	-	5	-	-	-	-	bal.	-	-	
AS 842	Flux-cored Wire for Thermal Spraying.													• Corrosion resistant.
	0.03	1	2	22	-	6	3	-	-	-	bal.	-	N: 0.2	
AS 852	Flux-cored Wire for Thermal Spraying.													• Martensitic stainless steel similar to AISI 403/1.4000. • Moderate corrosion resistance.
	0.3	0.5	0.3	13	-	0.5	-	-	-	-	bal.	-	P: 0.02 S: 0.02	

Wear, Corrosion and Temperature Resistant Materials

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 802	Flux-cored Wire for Thermal Spraying.													• Temperature resistance (max. 920°C). • High wear and corrosion resistance.
	-	1.6	1	30	4.5	-	-	-	-	-	bal.	-	-	
AS 812	Flux-cored Wire for Thermal Spraying.													• Similar to DURMAT® AS 802. • Wear and corrosion resistant coatings for feeding systems, e.g. for the chemical industry.
	-	1.6	1	30	4	-	-	-	-	-	bal.	-	-	
AS 888	Flux-cored Wire for Thermal Spraying.													• Similar to DURMAT® AS 802. • Temperature resistance (max. 870°C).
	0.1	1.3	1	30	2.8	-	-	-	-	-	bal.	-	-	

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Thermal Spray Wires

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 880	Flux-cored Wire for Thermal Spraying.													• High erosion and abrasion resistance. • Temperature resistant (max. 650°C).
	0.6	1.5	1	20	1	-	-	-	-	-	bal.	-	Ti: 3.5	
AS 890	Flux-cored Wire for Thermal Spraying.													• Abrasive and corrosion resistant. • Heat resistance. • Temperature resistant (max. 870°C).
	-	-	-	25	2	10	4	-	-	-	bal.	-	Cu: 2	
AS 896	Flux-cored Wire for Thermal Spraying.													• High corrosion protection. • Abrasion resistant.
	0.2	1.1	1.2	21	2.2	8	3.2	-	-	-	bal.	-	Cu: 1.9	

Special Materials (repair, high temperature corrosion, cavitation)

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 811	Flux-cored Wire for Thermal Spraying.													• Reconditioning of seats of rolling bearings.
	0.2	0.3	1.3	-	-	-	-	-	-	-	bal.	-	-	
AS 821	Flux-cored Wire for Thermal Spraying.													• Moderate wear resistance. • Good for basic wear and corrosion protection of machine parts.
	0.3	1.1	1	13	-	1	-	-	-	-	bal.	-	-	
AS 810	Flux-cored Wire for Thermal Spraying.													• Resistance against corrosion. • Oxidation resistant (up to 870°C) in fluids with S-contamination.
	-	0.5	-	26	-	-	-	-	-	-	bal.	-	Al: 6	
AS 820	Flux-cored Wire for Thermal Spraying.													• FeCrAl-alloy for coatings against corrosive gases in boiler atmospheres and oxidation temperatures up to 870°C.
	-	0.8	-	22	-	-	-	-	-	-	bal.	-	Al: 4.5	
AS 836	Flux-cored Wire for Thermal Spraying.													• Fe-Alloy with high Ni-content (36%). • Low expansion coefficient.
	<0.1	0.6	1	-	-	36	-	-	-	-	bal.	-	-	
AS 895	Flux-cored Wire for Thermal Spraying.													• Austenitic alloy with high chrome and cobalt content. • Extremely resistant against corrosion. • Erosion and cavitation resistant.
	0.3	2.8	10	19	-	-	-	10	-	-	bal.	-	-	

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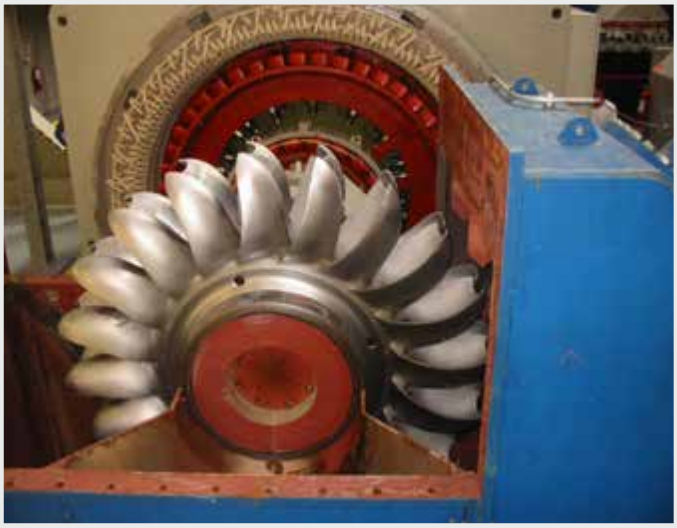
Co-based

DURMAT®	TYPICAL CHEMICAL COMPOSITION* (Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
AS 901	Flux-cored Wire for Thermal Spraying.													• Excellent against abrasion and friction wear. • Corrosion resistance. • Temperature resistant up to 950°C.
	2.4	0.7	0.4	29	-	-	-	bal.	-	11	<3	-	-	
AS 906	Flux-cored Wire for Thermal Spraying.													• Excellent against abrasion and impact wear. • Corrosion resistant.
	1.1	1	0.6	28	-	-	-	bal.	-	4.5	<3	-	-	
AS 912	Flux-cored Wire for Thermal Spraying.													• Superior wear and corrosion resistance. • For extrusion screws, wood and paper shredder.
	1.4	0.8	0.6	29	-	-	-	bal.	-	8	<3	-	-	
AS 921	Flux-cored Wire for Thermal Spraying.													• High impact and wear resistance. • Corrosion resistant. • High toughness.
	0.25	0.8	0.8	27	-	2.5	5.5	bal.	-	-	<3	-	-	
AS 931	Flux-cored Wire for Thermal Spraying.													• Excellent against abrasion and impact wear. • Corrosion resistant.
	0.5	1	1	26	-	-	-	bal.	-	7.5	<2	-	-	
AS 936	Flux-cored Wire for Thermal Spraying.													• Excellent against abrasion and impact wear. • High toughness. • Corrosion resistant.
	1	-	-	25	-	10	-	bal.	-	8	-	-	-	
AS 951	Flux-cored Wire for Thermal Spraying.													• High abrasion resistance based on 50% WC-Co. • High toughness. • Corrosion resistant.
	-	1.25	-	14	1	-	-	bal.	-	-	-	-	WC-12Co: 50	



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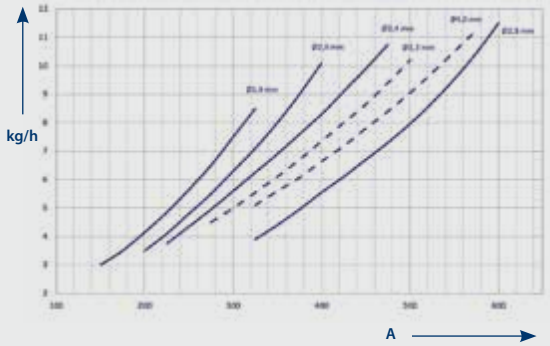
Help Information

DIMENSIONS, WELDING CURRENT (TYPICAL VALUES)						
Process	Ø [mm]	Welding current [A]	Arc Voltage [V]	Welding Speed [cm/min]	Stick out [mm]	Power type, Polarity
Open Arc	1.6 2.0 2.4 2.8 3.2	180 – 200 200 – 250 250 – 300 300 – 350 350 – 400	26 – 30 26 – 30 26 – 30 26 – 30 26 – 30	- - - - -	30 – 35 35 – 40 35 – 40 35 – 40 35 – 40	Direct current (electrode to + pole)
UP	3.2 4.0	325 – 450 400 – 500	28 – 30 28 – 30	35 – 45 40 – 45	30 – 35 30 – 35	Direct current (+)

DEPOSITION RATE (Typical values at 100% ED - stick out approx. 35 mm)



MESH-MICRON CONVERSION TABLE			
Micron	Mesh UK	Mesh USA (ASTM)	Mesh USA (TYLER)
8000	n/a	5/16 in	2.5
6700	1	0.265 in	3
5600	3	3.5	3.5
4750	3.5	n/a	4
4000	4	5	5
3350	5	6	6
2800	6	7	7
2360	7	8	8
2000	8	10	9
1700	10	12	10
1400	12	14	12
1180	14	16	14
1000	16	18	16
850	18	20	20
710	22	25	24
600	25	30	28
500	30	35	32
425	36	40	35
355	44	45	42
300	52	50	48
250	60	60	60
212	72	70	65
180	85	80	80
150	100	100	100
125	120	120	115
106	150	140	150
90	170	170	170
75	200	200	200
63	240	230	250
53	300	270	270
45	350	325	325
38	400	400	400
32	440	450	n/a
25	n/a	500	500
0	n/a	635	n/a

SHIELDING GAS (DIN EN 439)						
Symbol		Oxidising		Inert		Reductive
Group	Ident.-No.	CO_2	O_2	Ar	He	H_2
I	1	-	-	100	-	-
	2	-	-	-	100	-
	3	-	-	bal.	0.95	-
M1	1	0 - 5	-	bal.	-	0 - 5
	2	0 - 5	-	bal.	-	-
	3	-	0 - 3	bal.	-	-
	4	0 - 5	0 - 3	bal.	-	-
M2	1	5 - 25	-	bal.	-	-
	2	-	3 -10	bal.	-	-
	3	0 - 5	3 -10	bal.	-	-
	4	5 - 25	0 -8	bal.	-	-
M3	1	25 - 50	-	bal.	-	-
	2	-	10 - 15	bal.	-	-
	3	5 - 50	8 - 15	bal.	-	-
C	1	100	-	-	-	-
	2	bal.	0 - 30	-	-	-

WELDING RECOMENDATIONS				
Process	Ø [mm]	Welding Current [A]	Arc voltage [V]	Deposition rate [kg/h]
Oxy-acetylene:				
- powder	-	-	-	0.2 - 1
- rod	3 - 8	-	-	<2 kg
Standard Electrode	4	180	24	1.62
	5	250	25	2.01
High Performance EleCtrode	4	240	25	2.97
	5	350	26	4.30
Solid wire	1.2	150 - 300	23-30	2.2 / 5
	1.6	200 - 390	25 - 33	3 / 5.5
Cored wire	1.6	150 - 300	25 - 29	3 / 6.5
	2.4	240 - 400	26 - 31	4 / 7.5
	2.8	270 - 450	26 - 31	5 / 9.5
	3.2	300 - 500	26 - 31	6 / 11
PTA	-	50 - 400	20 - 50	0.5 - 20

SALES UNITS	Wire Coil	Wire Coil	Wood or Steel Coil	Drum	Drum
Net Weight (kg)	15	25	250/300	150	250
Ø outer (mm)	300	435	760	550	550
Ø hole (mm)	51.5	300	41	-	-
Width (mm)	103	105	290	-	-
Height (mm)	-	-	-	400	800
Standard	EN 759 - BS 300	EN 759 - B 435	EN 759 - S 760	-	-

ALLOY TYPES ACCORDING TO DIN EN 14700:2005

Alloy symbol [a]	Suit-ability	Alloy ratio of the pure weld metal deposit [weight-%]									
		C	Cr	Ni	Mn	Mo	W	V	Nb	other	rest
Fe1	p	≤0.4	≤3.5	-	0.5 - 3	≤1	≤1	≤1	-	-	Fe
Fe2	p	0.4 - 1.2	≤7	≤1	0.5 - 3	≤1	≤1	≤1	-	-	Fe
Fe3	s t	0.4 - 0.5	1 - 8	≤5	≤3	≤4.5	≤10	≤1.5	-	Co, Si	Fe
Fe4	s t (p)	0.4 - 1.2	2 - 6	≤4	≤3	≤10	≤19	≤4	-	Co, Ti	Fe
Fe5	c p s t w	≤0.5	≤0.1	17 - 22	≤1	3 - 5	-	-	-	Co, Al	Fe
Fe6	g p s	≤2.5	≤10	-	≤3	≤3	-	-	≤10	Ti	Fe
Fe7	c p t	≤0.2	4 - 30	≤6	≤3	≤2	-	≤1	≤1	Si	Fe
Fe8	g p t	0.2 - 2	5 - 18	-	0.3 - 3	≤4.5	≤2	≤2	≤10	Si, Ti	Fe
Fe9	k (n) p	0.3 - 1.2	≤19	≤3	11 - 18	≤2	-	≤1	-	Ti	Fe
Fe10	c k (n) p z	≤0.25	17 - 22	7 - 11	3 - 8	≤1.5	-	-	≤1.5	Si	Fe
Fe11	c n z	≤0.3	18 - 31	8 - 20	≤3	≤4	-	-	≤1.5	Cu	Fe
Fe12	c (n) z	≤0.08	17 - 26	9 - 26	0.5 - 3	≤4	-	-	≤1.5	-	Fe
Fe13	g	≤1.5	≤6.5	≤4	0.5 - 3	≤4	-	-	-	B, Ti	Fe
Fe14	g (c)	1.5 - 4.5	25 - 40	≤4	0.5 - 3	≤4	-	-	-	-	Fe
Fe15	g	4.5 - 5.5	20 - 40	≤4	0.5 - 3	≤2	-	-	≤10	B	Fe
Fe16	g z	4.5 - 7.5	10 - 40	-	≤3	≤9	≤8	≤10	≤10	B, Co	Fe
Fe20	c g t z	hard materials [b]	-	-	-	-	-	-	-	-	Fe
Ni1	c p t	≤1	15 - 30	bal.	0.3 - 1	≤6	≤2	≤1	-	Si, Fe, B	Ni
Ni2	c k p t z	≤0.1	15 -30	bal.	≤1.5	≤28	≤8	≤1	≤4	Co, Si, Ti	Ni
Ni3	c p t	≤0.1	1 - 15	bal.	0.3 - 1	≤6	≤2	≤1	-	Si, Fe, B	Ni
Ni4	c k p t z	≤0.1	1 - 15	bal.	≤1.5	≤28	≤8	≤1	≤4	Co, Si, Ti	Ni
Ni20	c g t z	hard materials [b]	-	-	-	-	-	-	-	-	Ni
Co1	c k t z	≤0.6	20 - 35	≤10	0.1 - 2	≤10	≤15	-	≤1	Fe	Co
Co2	t z (c s)	0.6 - 3	20 - 35	≤4	0.1 - 2	-	4 - 10	-	-	Fe	Co
Co3	t z (c s)	1 - 3	20 - 35	≤4	≤2	≤1	6 - 14	-	-	Fe	Co
Cu1	c (n)	-	-	≤6	≤15	-	-	-	-	Al, Fe, Sn	Cu
Al1	c n	-	-	10 - 35	≤0.5	-	-	-	-	Cu, Si	Al
Cr	g n	1 - 5	bal.	-	≤1	-	-	15 - 30	-	Fe, B, Si, Zr	Cr

c: stainless
g: abrasion resistant
k: work hardenable

n: non-magnetizable
p: impact-resistant
s: edge retention

t: heat resistant
z: scale resistant
w: precipitation hardened

() may not apply to all alloys of this type

[a] Alloys which are not included in this table are analogies signified, but the letter Z shall be put in front
[b] Tungsten fused carbide or tungsten carbide broken or spherical

Hardness Conversion		
HV	HB	HRC
200	200	12.6
205	205	13.4
210	210	14.2
215	215	15.0
220	220	16.0
225	225	17.0
230	230	18.0
235	235	19.0
240	240	20.0
245	245	21.0
250	250	22.0
255	255	22.8
260	260	23.6
265	265	24.4
270	270	25.2
275	275	26.0
280	280	26.8
285	285	27.6
290	290	28.3
300	300	29.7
305	305	30.4
310	310	31.1
315	315	31.8
320	320	32.4
325	324	33.0
330	328	33.6
335	332	34.2
340	336	34.8
345	340	35.4
350	345	36.0
355	349	36.5
360	353	37.0
365	357	37.5
370	360	38.0
375	365	38.5
380	369	39.0
385	373	39.5
390	377	40.0
395	381	40.5
400	385	40.9
405	389	41.3
410	394	41.7
415	398	42.1
420	402	42.5
425	406	42.9
430	410	43.3
440	418	44.1
455	430	45.3

Hardness Conversion		
HV	HB	HRC
460	434	45.7
465	438	46.0
470	442	46.4
475	447	46.8
480	452	47.2
485	457	47.6
490	462	47.9
500	469	48.5
510	477	49.1
520	485	49.7
530	493	50.3
540	501	50.9
550	509	51.5
560	517	52.1
570	525	52.7
580	533	53.3
590	540	53.9
600	546	54.5
610	555	55.0
620	563	55.5
630	571	56.0
640	579	56.5
650	588	57.0
660	596	57.5
670	-	58.0
680	-	58.5
690	-	59.0
700	-	59.5
710	-	60.0
720	-	60.5
730	-	61.0
740	-	61.4
750	-	61.8
760	-	62.2
770	-	62.6
780	-	63.0
790	-	63.4
800	-	63.8
810	-	64.2
820	-	64.6
830	-	65.0
840	-	65.4
850	-	65.7
860	-	66.0
870	-	66.4
880	-	66.7
890	-	67.0
900	-	67.3

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