DURUM USA

WEAR PROTECTION

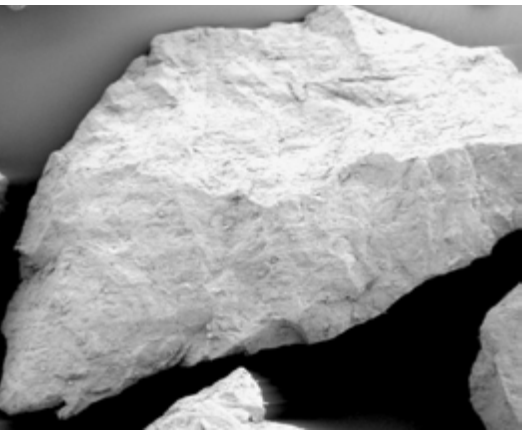
MATERIALS

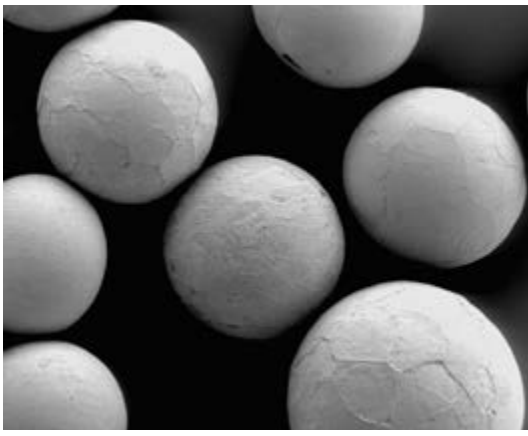
for

MAINTENANCE

&

REPAIR





www.durmat.com

made in Germany

THE COMPANY

DURUM VERSCHLEISS-SCHUTZ GMBH („DURUM“) was founded as a manufacturer of materials for wear protection in Mettmann near Düsseldorf in 1984.

For more than 30 years, DURUM has been dealing with development and manufacture of materials for application welding and thermal spraying to protect parts from wear and corrosion. The company sells its products in more than 80 countries around the world. Due to the many years of experience, new wear-resistant and high-quality materials on cobalt basis were developed as well and successfully introduced on the market as flux-cored wires, electrodes and powders.

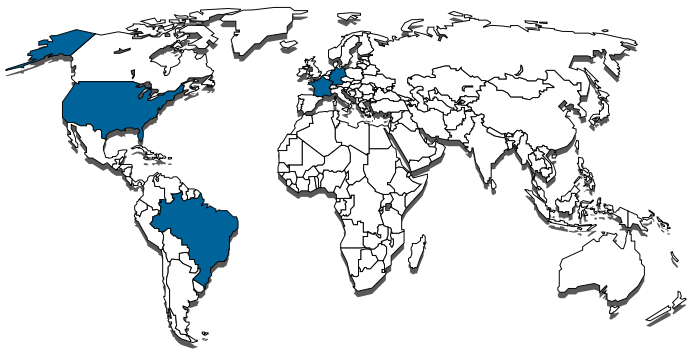
Due to the very high wear and corrosion resistance, in particular at high usage temperatures, DURMAT® hard alloys may permit considerable service life extensions. The user profits of:

- Longer component service lives
- Longer machine runtime
- Lower exchange costs
- Cost savings from longer service lives and reduced downtimes
- Regeneration of wear surfaces instead of purchase of new parts
- Implementation of use at higher working temperatures
- Higher economic efficiency

We coat the parts provided by you based on drawings or dimension sheets. DURUM cooperates with renowned institutes and universities that ensure close contact between researchers, metallurgists and customers in the development of new materials and technologies. We analyse your wear problem and will offer you a customised solution with clear added value for your product. Research, development and fabrication in the users’ interest is the leading principle of DURUM. Your success is our objective.

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 on the market.

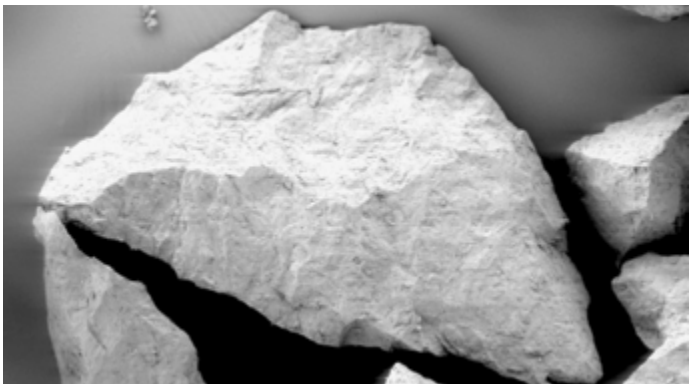


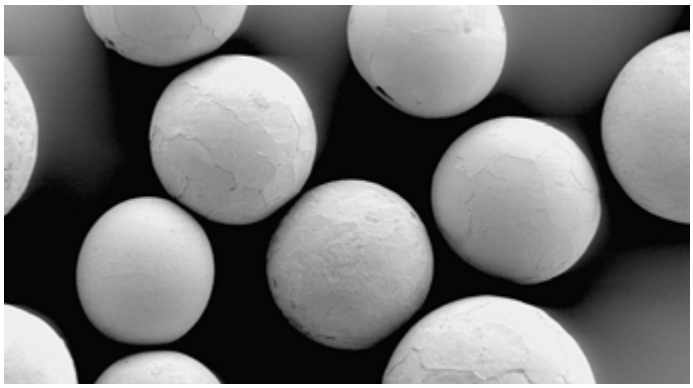
- Tungsten Carbide FCAW wires
- Tungsten Carbide Rods for Oxy-acetylene Welding
- Stellite* - Flux-Cored Wires
- Nickel-, and Iron-based Flux-Cored Wires
- Tungsten Carbides, Complex Carbides and Chromium Carbides for Manual Arc Welding (stick electrodes)
- PTA Welding Powders, Fe-Ni-Co based Powders and special blends
- PTA machines, torches and powder feeders
- Powders and Wires for Laser Cladding
- Powders for Oxy-acetylene Welding and Spraying
- Fused Crushed and Spherical Fused Tungsten Carbides
- Pre-manufactured replacement wear parts
- Tungsten Carbide Wear Plates
- Wear Plates with Chromium Carbides and Complex Carbides
- Thermal Spray Powders (conforming to DIN EN 1274)
- Thermal Spray Wires (conforming to DIN EN 14919)

* Stellite is a registered trademark of Kennametal Stellite

Please observe all appropriate safety regulations in force. The technical information given in this data sheet reflects the present state of knowledge. They do not form part of any sales contract as guaranteed properties of the delivered materials. The given values are typical values which can vary due to different processes and process parameters. Our delivery and sales conditions apply to all contracts included.

TUNGSTEN CARBIDE POWDERS





DURMAT® FTC

Fused Tungsten Carbide (FTC) is an extremely hard, wear resistant material. Its abrasion resistance is superior in terms of wear resistance to all other commercially available materials except diamond. It is far superior to any of the chromium carbide products presently in use and will always deliver very positive test results by comparison. This material forms the basis of all DURUM's abrasion-resisting products.

The properties of the FTC are very much dependent on its structure. FTC which demonstrates at least an 80 % "feather" structure has a macro-hardness of approximately 2,000 HV_{30}. The micro-hardness of this material has been measured at 2,300 - 2,500 $HV_{0.1}$.

FTC has a carbon content of 3.8 - 4.1 %. This corresponds to a ratio of 78 - 80 % W_2C and 20 - 22 % WC. Careful attention must be paid during the processing and application of products containing FTC, that the temperature does not exceed 1,800 °C. Higher temperatures would cause an alteration in the structure resulting in a loss of hardness. If this excessive overheating occurs during the welding procedure, an unproportionately high amount of FTC will be dissolved in the iron matrix, which would also result in a reduction of the material's superior ability to resist wear.

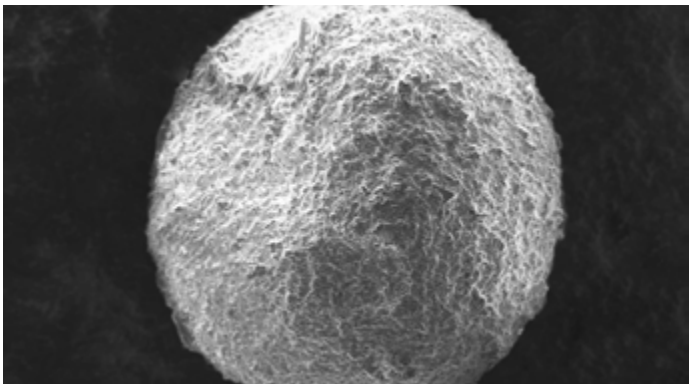
DURMAT® SFTC

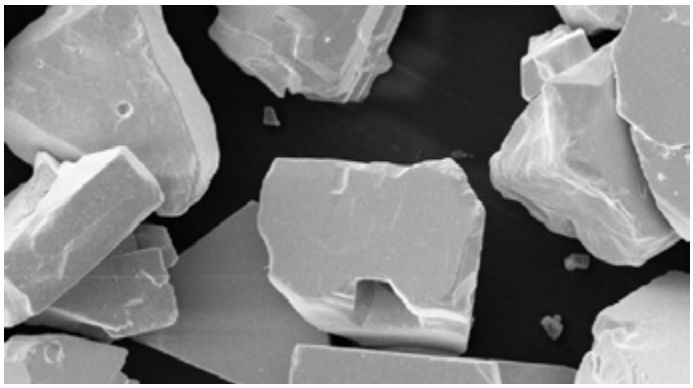
DURMAT® Spherical Fused Tungsten Carbide (SFTC) is the most wear resistant Fused Tungsten Carbide we can offer.

These 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 enables 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. Excellent for deep well drilling tools and rods, crusher jaws, mixers, concrete and stone saws, hot-pressed tools, screens and conveyors, extrusion housings and hard additives to diamond bits and saws.

Product	Unit	DURMAT® FTC	DURMAT® SFTC
Alloy type	-	**WC - W_2C**	**WC - W_2C**
Parameter	-	**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	$HV_{0.1}$	2,360	3,000
Structure	-	mainly feather	fine
Density	g/cm^3	16 - 17	16 - 17
Melting point	°C/°F	2,860/5,176	2,860/5,176





DURMAT® RF 13

According to their outstanding mechanical properties, hard-facing alloys based on Tungsten Carbide and cobalt take a central position in wear protection. The high demands, placed on the wear resistance of such alloys these days, have led to increasingly finer micro structures with optimized compositions, allowing improved, higher performance alloys to be achieved.

Their characteristic, fine-structured composition with crystallite grain sizes of max. 400 nm is their trademark and a guarantee for high wear resistance. Compared to common Tungsten Carbide-Cobalt alloys we have achieved better wear resistance, by using smaller WC structure. Our DURMAT® RF 13 development using fine-structured WC has resulted in hardness of approximately 1,750 $HV_{0.5}$. The higher hardness of the nano-scale hard-facing alloy associated with the decreasing WC grain size reduces wear from abrasion considerably. The harder “hard metal” counters abrasion with a greater resistance. Wear progresses significantly slower, as the binding metal layer between the fine grain crystallites is exceptionally thin, making it harder to wash out. Only very small particles are torn out. The spherical shape represents a further form of protection, which is further stabilized by the small grain size; a lot more energy has to be applied for fragmentation of small particles compared to large particles due to the presence of less defects. 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 hard-facing particles escape, corrosion is slowed down considerably.

DURMAT® MCWC

The Macro-Crystalline Tungsten Carbide (DURMAT® MCWC) is a fully carburized stoichiometric compound with a carbon content of 6.14 % by weight.

Based on its stable single-phase micro-structure, nearly no dissolution of the Macro-Crystalline Tungsten Carbides is observed after the welding process. MCWC has good weldability with nickel-based alloys during the PTA application process. The thermodynamically more stable MCWC has a blocky shape with low decarburization during processing.

The carbide hardness amounts 1,700 - 2,000 $HV_{0.1}$. The DURMAT® MCWC can stay in service up to 500 °C (930 °F).

DURMAT® NIFD

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

DURMAT® NIFD is a Flux Cored Wire (NiCrBSi) filled with Fused Tungsten Carbide (FTC) for semi-automatic welding application. DURMAT® NIFD protects surfaces where extreme abrasive wear in combination with corrosion is encountered. The deposit alloy consists of approximately 50 - 65 % FTC and 35 - 50 % Ni-Cr-B-Si-matrix. The alloy has a low melting range of between 900 - 1,050 °C (1,652 - 1,922 °F) and flows extremely well and leaves a smooth and clean surface. The matrix is highly resistant to acids, bases, lye and other corrosive media.

Application:

Repairing and hard-facing ferritic and austenitic steel tools and machine parts (steel castings) in the chemical industry and food industry; stabilizers in the petroleum industry, mixer blades, conveyors and screws in the chemical, dye industry and in the food processing industry; mineral and brick industry.

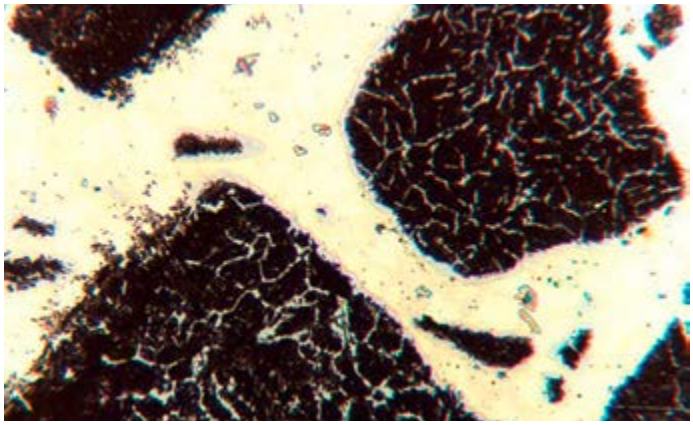
Typical hardness:

DURMAT® FTC:	≈ 2,360 HV
Matrix:	450 - 480 HV

Sales Units:

Ø mm	Ø inch	Coil size DIN EN 759	Amps	Voltage
1.2	0.045	BS-300 spools ≈15 kg	100 - 160 A	16 - 20 V
1.6	1/16	BS-300 spools ≈ 15 kg	110 - 180 A	18 - 20 V
2.0	5/64	BS-300 spools ≈ 15 kg	120 - 200 A	17 - 21 V
2.4	3/32	B-450 spools ≈ 25 kg	140 - 230 A	21 - 23 V
2.8	7/64	B-450 spools ≈ 25 kg	160 - 260 A	21 - 23 V
3.2	1/8	B-450 spools ≈ 25 kg	200 - 280 A	23 - 25 V

Patents:
Germany: No. 40 08 091.9-41, United Kingdom: No. 2.232.108, USA: No. 5.004.886



DURMAT® NIFD PLUS

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

DURMAT® NIFD PLUS is a Flux Cored Wire (NiCrBSi) filled with Spherical Fused Tungsten Carbide (SFTC) for semi-automatic welding application. These SFTC show a fine acicular structure with a higher hardness than FTC. DURMAT® NIFD PLUS was developed to protect surfaces where extreme abrasive wear in combination with corrosion are encountered.

Application:

While having similar properties as DURMAT® NIFD, DURMAT® NIFD PLUS can be applied in many NIFD applications when even superior wear protection through spherical SFTC is needed.

Typical hardness:

DURMAT® SFTC:	> 3,000 HV
Matrix:	450 - 480 HV

Patents:
Germany: No. 40 08 091.9-41, United Kingdom: No. 2.232.108, USA: No. 5.004.886

DURMAT® NI-2

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

DURMAT® NI-2 is a cored metal wire filled with a combination of very hard special carbides together with Fused Tungsten Carbides (FTC) and NiCrBSi for semi-automatic welding application. DURMAT® NI-2 was developed to protect surfaces against extreme abrasive wear in combination with corrosion attacks. The alloy has a low melting range of between 900 - 1,050 °C (1,652 - 1,922 °F) and features a self fluxing characteristic producing a smooth and clean surface. The matrix is highly resistant to acids, bases, lye and other corrosive media.

Application:

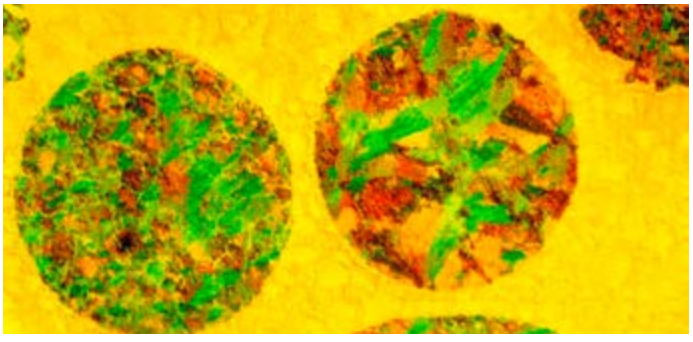
While having similar properties as DURMAT® NIFD, DURMAT® NI-2 can be applied in many NIFD applications when extra matrix protection is needed. This is the case with parts prone to aggressive erosion attack with direct particle impact.

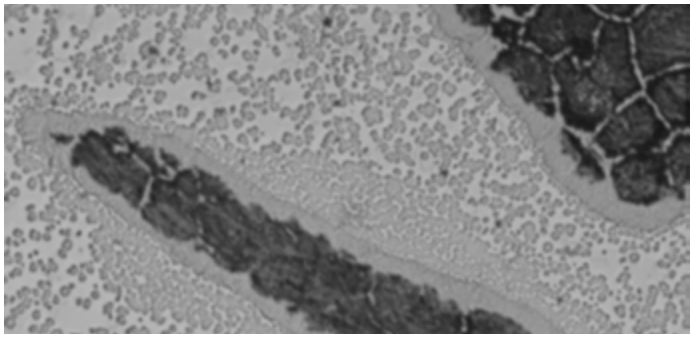
Typical hardness:

DURMAT® FTC:	≈ 2,360 HV
Other carbides:	≈ 2,900 HV
Matrix:	450 - 480 HV

Sales Units:

DURMAT®	Ø mm	Ø inch	Coil size DIN EN 759	Amps	Voltage
NI-2	1.6	1/16	BS-300 spools ≈ 15 kg	110 - 180 A	18 - 20 V
NIFD PLUS / NI-2	2.4	3/32	B-450 spools ≈ 25 kg	140 - 230 A	21 - 23 V
NIFD PLUS / NI-2	2.8	7/64	B-450 spools ≈ 25 kg	160 - 260 A	21 - 23 V
NIFD PLUS / NI-2	3.2	1/8	B-450 spools ≈ 25 kg	200 - 280 A	23 - 25 V





DURMAT® NICRW

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

DURMAT® NICRW is a flux-cored wire with approx. 50 % FTC and 40 % NiCrBSi-matrix, similar DURMAT® NIFD, but containing higher Chrome content. Good corrosion protection against chloride media. DURMAT® NICRW was developed to protect surfaces against extreme abrasive wear in combination with corrosion attacks. The alloy has a low melting range of between 900 - 1,050 °C (1,652 - 1,922 °F) and feature self fluxing characteristic producing a smooth and clean surface. The matrix is highly resistant to acids, bases, lye's and other corrosive media.

Application:

While having similar properties as DURMAT® NIFD, NICRW can be applied in many NIFD applications when even superior wear protection to acids, bases, lye's and other corrosive media is needed.

Typical hardness:

DURMAT® FTC: ≈ 2,360 HV
Matrix: 490 - 540 HV

Sales Units:

Ø mm	Ø inch	Coil size DIN EN 759	Amps	Voltage
1.6	3/32	BS-300 spools ≈ 15 kg	160 - 180 A	18 - 20 V
2.4	7/64	B-450 spools ≈ 25 kg	200 - 230 A	21 - 23 V
2.8	1/8	B-450 spools ≈ 25 kg	220 - 260 A	21 - 23 V

DURMAT® FD 773

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

DURMAT® FD 773 is a flux-cored wire with approx. 50 % DURMAT® RF 13 and 40 % NiCrBSi-matrix. Good corrosion protection against chloride media. DURMAT® FD 773 was developed to protect surfaces against extreme abrasive wear in combination with corrosion attacks.

Typical hardness:

DURMAT® RF 13: > 1,950 HV
Matrix: 490 - 540 HV

Sales Units:

Ø mm	Ø inch	Coil size DIN EN 759	Amps	Voltage
1.6	3/32	BS-300 spools ≈ 15 kg	160 - 180 A	18 - 20 V
2.0	7/64	B-450 spools ≈ 25 kg	190 - 200 A	19 - 21 V

DURMAT® FD 774

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

DURMAT® FD 774 is a flux-cored wire with approx. 50 % DURMAT® RF 13 and 40 % Co-matrix. Good corrosion protection against chloride media. DURMAT® FD 774 was developed to protect surfaces against extreme abrasive wear in combination with corrosion attacks.

Typical hardness:

DURMAT® RF 13: > 1,950 HV
Matrix: 450 - 480 HV

Sales Units:

Ø mm	Ø inch	Coil size DIN EN 759	Amps	Voltage
1.6	3/32	BS-300 spools ≈ 15 kg	160 - 180 A	18 - 20 V
2.0	7/64	B-450 spools ≈ 25 kg	190 - 200 A	19 - 21 V

DURMAT® FD 778

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

DURMAT® FD 778 was developed to protect surfaces against extreme abrasive wear in combination with corrosion attacks. The deposit alloy consists of 50 - 65 % FTC and an austenitic NiFe-matrix and has a much lower melting point than commonly used iron based Flux-Cored Wires with tungsten carbide filling and feature self fluxing characteristic producing a smooth and clean surface. The matrix shows a good resistance to corrosive media.

Typical hardness:

DURMAT® FTC:	≈ 2,360 HV
Matrix:	490 - 540 HV

DURMAT® FD 780

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

DURMAT® FD 780 was developed to protect surfaces against extreme abrasive wear in combination with corrosion attacks. The deposit alloy consists of approx. 50 - 65 % MCWC and an austenitic NiFe-matrix. The alloy has a much lower melting point than commonly used iron based Flux-Cored Wires with MC tungsten carbide filling and feature self fluxing characteristic producing a smooth and clean surface. The matrix shows a good resistance to corrosive media.

Typical hardness:

DURMAT® MCWC:	> 1,700 HV
Matrix:	490 - 540 HV

DURMAT® FD 779

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

DURMAT® FD 779 consists of approx. 50 - 65 % MCWC and an austenitic Ni-matrix. The deposit alloy with a low melting point protects surfaces against extreme abrasive wear in combination with corrosion attacks. The matrix shows a good resistance to corrosive media.

Typical hardness:

DURMAT® MCWC:	> 1,700 HV
Matrix:	490 - 540 HV

Sales units:

Ø mm	Ø inch	Coil size DIN EN 759	Amps	Voltage
1.6	3/32	BS-300 spools ≈ 15 kg	160 - 180 A	18 - 20 V
2.4	7/64	B-450 spools ≈ 25 kg	200 - 230 A	21 - 23 V
2.8	1/8	B-450 spools ≈ 25 kg	220 - 260 A	21 - 23 V

DURMAT® FD 789

Flux-Cored Wire DIN EN 14700: T Ni20
(DIN 8555: MF21-55-CGZ)

General characteristics:

Good corrosion protection against chloride media. DURMAT® FD 789 was developed to protect surfaces against extreme abrasive wear in combination with corrosion attacks. The deposit alloy consists of approx. 50 % DURMAT® RF 13 and 40 % NiBSi-matrix.

Typical hardness:

DURMAT® RF 13:	> 1,950 HV
Matrix:	450 - 480 HV

Sales units:

Ø mm	Ø inch	Coil size DIN EN 759	Amps	Voltage
1.6	3/32	BS-300 spools ≈ 15 kg	160 - 180 A	18 - 20 V
2.4	7/64	B-450 spools ≈ 25 kg	200 - 230 A	21 - 23 V
2.8	1/8	B-450 spools ≈ 25 kg	220 - 260 A	21 - 23 V

DURMAT® B

Welding Rod DIN EN 14700: T Ni20-CGTZ
(DIN 8555: G21-UM-55-CG)

General characteristics:

DURMAT® B is a nickel core flexible rod coated with both Fused Tungsten Carbide (FTC) and Ni-Cr-B-Si developed for oxyacetylene welding. The deposited alloy consists of approximately 65 % FTC and 35 % Ni-Cr-B-Si-matrix with a matrix hardness of 45 HRC. The overlay is highly resistant to acids, bases, lye and other corrosive media and excessive wear conditions. The rod has a low melting range of between 950 - 1,050 °C (1,742 - 1,922 °F) and features a self fluxing characteristic producing a smooth, clean welded surface.

Typical hardness:

DURMAT® FTC:	≈ 2,360 HV
NiCrBSi-Matrix:	≈ 420 - 450 HV

Application:

Hard-facing of ferritic and austenitic steels (steel castings), applied for overlaying mixer blades, screws and conveyors in chemical and dye industries and the food industry. Especially recommended for stabilizer blades in the petroleum industry.

Sales units:

Type	Ø mm	Ø inch	Grain size in mm	US mesh size
4005	4.0	5/32	0.25 - 0.70	24 - 60
4010	4.0	5/32	0.70 - 1.20	14 - 24
5005	5.0	3/16	0.25 - 0.70	24 - 60
5010	5.0	3/16	0.70 - 1.20	14 - 24
5020	5.0	3/16	1.00 - 2.00	9 - 16
6005	6.0	1/4	0.25 - 0.70	24 - 60
6010	6.0	1/4	0.70 - 1.20	14 - 24
6020	6.0	1/4	1.00 - 2.00	9 - 16
8005	8.0	5/16	0.25 - 0.70	24 - 60
8010	8.0	5/16	0.70 - 1.20	14 - 24
8020	8.0	5/16	1.00 - 2.00	9 - 16

DURMAT® BK

Welding Rod DIN EN 14700: T Ni20-CGTZ
(DIN 8555: G21-UM-55-CG)

General characteristics:

DURMAT® BK is a nickel cored flexible rod coated with mainly Spherical Fused Tungsten Carbide (SFTC) and Ni-Cr-B-Si-matrix with a matrix hardness of 45 HRC. The hard-facing is highly resistant to acids, bases, lye, and other corrosive media and excessive wear conditions. The rod has a low melting range of between 950 - 1,050 °C (1,742 - 1,922 °F) and features a self fluxing characteristic producing a smooth, clean welded surface.

Typical hardness:

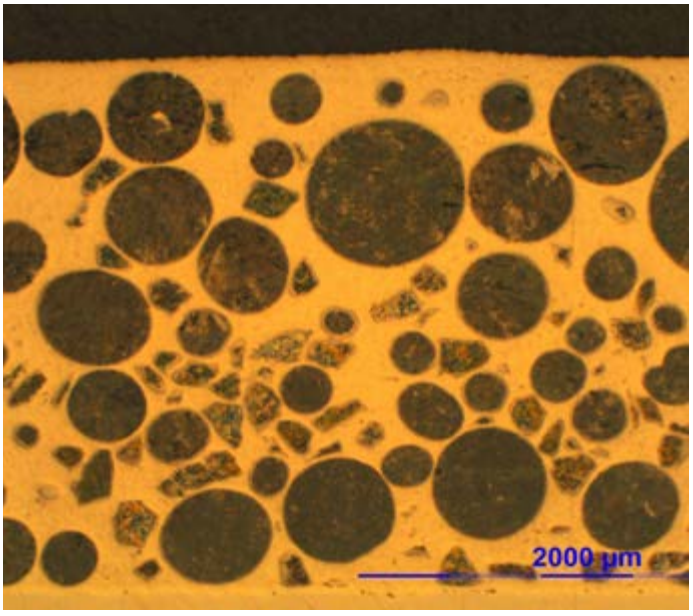
DURMAT® SFTC: ≈ 3,000 HV
NiCrBSi-Matrix: ≈ 420 - 450 HV

Application:

Hard-facing of ferritic and austenitic steels (steel castings), applied for overlaying mixer blades, screws and conveyors in chemical and dye industries and the food industry. Especially recommended for stabilizer blades in the petroleum industry.

Sales units:

Type	Ø mm	Ø inch	Grain size in mm	US mesh size
4005	4.0	5/32	0.25 - 0.70 / 0.25 - 0.84	24 - 60 / 20 - 60
5005	5.0	3/16	0.25 - 0.70 / 0.25 - 0.84	24 - 60 / 20 - 60
6005	6.0	1/4	0.25 - 0.70 / 0.25 - 0.84	24 - 60 / 20 - 60
8005	8.0	5/16	0.25 - 0.70 / 0.25 - 0.84	24 - 60 / 20 - 60



DURMAT® NISE

Stick Electrode DIN EN 14700: E Ni20
(DIN 8555: E21-GF-UM-60-CGZ)

General characteristics:

DURMAT® NISE is a tubular electrode filled with Fused Tungsten Carbide (FTC) and a special nickel alloy for manual welding. This alloy is specially designed for application where extreme abrasion in combination with corrosion is expected. DURMAT® NISE can be applied on steel castings, nickel based and stainless steel alloys. The alloy combination of DURMAT® NISE is specially designed for surfaces that are exposed to corrosive media and excessive wear conditions. The matrix is highly resistant to acids, lye and other corrosive media.

Typical hardness:

DURMAT® FTC:	≈ 2,360 HV
Ni-Matrix:	480 - 520 HV

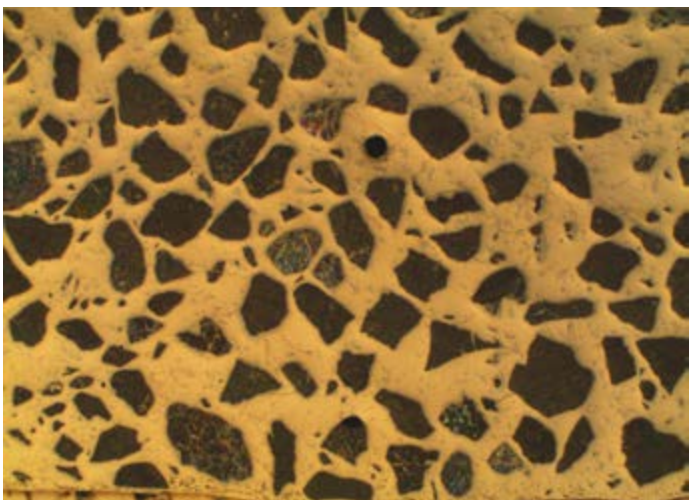
Application:

Repairing and hard-facing ferritic and austenitic steels (steel castings), stabilizer blades, conveyor screws, milling plates, deep drilling tools and mixer blades. This type of stick electrodes require the least amount of equipment and provides maximum flexibility for welding in remote locations.

Sales units:

Type	Ø mm	Ø inch	Length of Rod	Amps	Voltage
4005	4.0	5/32	350 mm	100 A	= + / ~
5005	5.0	3/16	350 mm	120 A	= + / ~
6005	6.0	1/4	350 mm	160 A	= + / ~
8005	8.0	5/16	450 mm	160 A	= + / ~

Patents:
Germany: No. 40 08 091.9-41, United Kingdom: No. 2.232.108, USA: No. 5.004.886



DURMAT® NISE PLUS

Stick Electrode DIN EN 14700: E Ni20
(DIN 8555: E21-GF-UM-60-CGZ)

General characteristics:

DURMAT® NISE-PLUS is a tubular electrode filled with Spherical Fused Tungsten Carbide (SFTC) and a special nickel matrix for manual welding. This alloy is specially designed for application against extreme abrasion in combination with corrosion attacks. DURMAT® NISE PLUS can be applied on steel castings, nickel based and stainless steel alloys. The alloy combination of DURMAT® NISE PLUS is specially designed for surfaces that are exposed to corrosive media and excessive wear conditions. The matrix is highly resistant to acids, lye and other corrosive media.

Typical hardness:

DURMAT® SFTC:	> 3,000 HV
Ni-Matrix:	480 - 520 HV

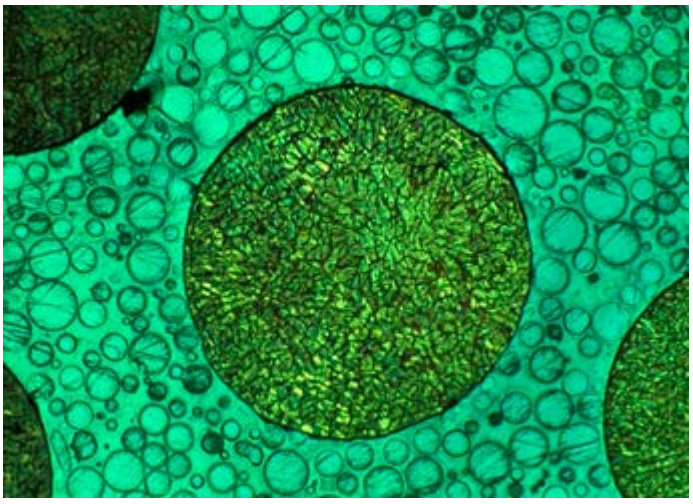
Application:

Repairing and hard-facing ferritic and austenitic steels (steel castings), stabilizer blades, conveyor screws, milling plates, deep drilling tools, and mixer blades, as well as machine parts in the chemical and food industry.

Sales units:

Type	Ø mm	Ø inch	Length of Rod	Amps	Voltage
4005	4.0	5/32	350 mm	100 A	= + / ~
5005	5.0	3/16	350 mm	120 A	= + / ~
6005	6.0	1/4	350 mm	160 A	= + / ~
8005	8.0	5/16	450 mm	160 A	= + / ~

Patents:
Germany: No. 40 08 091.9-41, United Kingdom: No. 2.232.108, USA: No. 5.004.886



DURMAT® NI-3

Stick Electrode DIN EN 14700: E Ni20
(DIN 8555: E21-GF-UM-60-CGZ)

General characteristics:

DURMAT® NI-3 is a tubular electrode filled with a mixture of FTC and special carbides in a combination with a specially developed nickel alloy for manual welding. This alloy is designed for applications where extreme abrasion in combination with corrosion is expected. The alloy combination of DURMAT® NI-3 is specially designed for items that are exposed to corrosive media and excessive wear conditions. The matrix is highly resistant to acids, lye and other corrosive media.

Typical hardness:

DURMAT® FTC:	≈ 2,360 HV
Other carbides:	≈ 2,900 HV
Ni-matrix:	480 - 520 HV

Application:

Repairing and hard-facing ferritic and austenitic steels (steel castings), stabilizer blades, conveyor screws, milling plates, deep drilling tools, and mixer blades, as well as machine parts in the chemical and food industry.

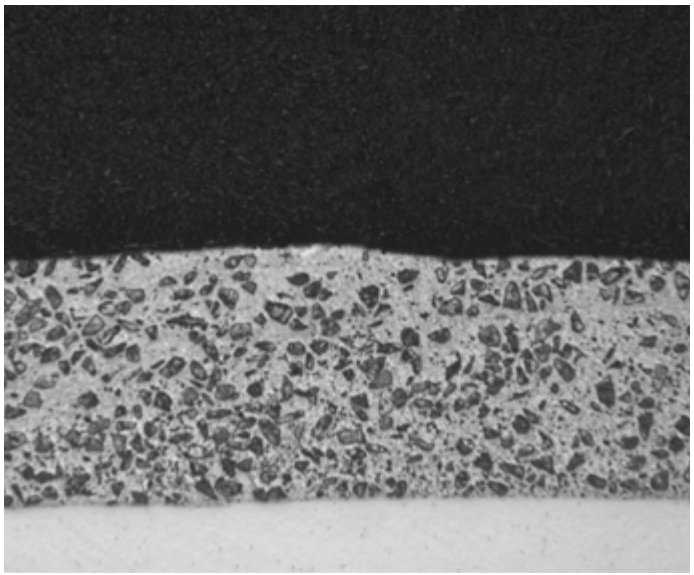
Sales units:

Type	Ø mm	Ø inch	Length of Rod	Amps	Voltage
4005	4.0	5/32	350 mm	100 A	= + / ~
5005	5.0	3/16	350 mm	120 A	= + / ~
6005	6.0	1/4	350 mm	160 A	= + / ~
8005	8.0	5/16	450 mm	160 A	= + / ~

Patents:
Germany: No. 40 08 091.9-41, United Kingdom: No. 2.232.108, USA: No. 5.004.886

DURMAT® A

Welding Rod DIN EN 14700: T Fe20
(DIN 8555: G21-GF-55-CG)



General characteristics:

DURMAT® A consists of a special pre-alloyed tube filled with coarsely grained Fused Tungsten Carbide (FTC) for oxyacetylene welding. The FTC has an exceptionally high hardness of over 2,360 HV giving outstanding wear protection to hard-faced areas. For special hard-facing on machine parts of unalloyed, low alloyed or cast steel with carbon content up to 0.45 %. Higher carbon content could lead to cracking. Depending on the size and composition of the area to be hard-faced, the proper rod diameter and grain size should be chosen. If the area will encounter heavy abrasion a small grain size is recommended. If a cutting action is desired a larger grain size is preferable.

Typical hardness:

DURMAT® FTC: >2,360 HV

Application:

Hard-facing and repairing tools and machine parts exposed to wear in mining, road construction, ceramic, petroleum, excavation and dredging applications.

Sales units:

Type	Ø mm	Ø inch	Grain size (mm)	US Mesh size
3505	3.5	1/8	0.25 - 0.70	24 - 60
3510	3.5	1/8	0.70 - 1.20	14 - 24
4005	4.0	5/32	0.25 - 0.70	24 - 60
4010	4.0	5/32	0.70 - 1.20	14 - 24
4020	4.0	5/32	1.00 - 1.60	10 - 16
5005	5.0	3/16	0.25 - 0.70	24 - 60
5010	5.0	3/16	0.70 - 1.20	14 - 24
5020	5.0	3/16	1.00 - 2.00	9 - 16
6005	6.0	1/4	0.25 - 0.70	24 - 60
6010	6.0	1/4	0.70 - 1.20	14 - 24
6020	6.0	1/4	1.00 - 2.00	9 - 16
8010	8.0	5/16	0.70 - 1.20	14-24
8020	8.0	5/16	1.00 - 2.00	9 - 16
8030	8.0	5/16	1.50 - 3.00	7 - 12

Standard rod lengths: 350mm (14“) and 700mm (28“)

DURMAT® A-PLUS

Welding Rod DIN EN 14700: T Fe20
(DIN 8555: G21-GF-55-CG)

General characteristics:

DURMAT® A-PLUS consists of a special pre-alloyed tube filled with Spherical Fused Tungsten Carbide (SFTC) for oxyacetylene welding. The SFTC has an exceptionally high hardness of over 3,000 HV giving outstanding wear protection to hard-faced areas. For special hard facing on machine parts of unalloyed, low alloyed or cast steel with carbon content up to 0.45%. Higher carbon content could lead to cracking. Depending on the size and composition of the area to be hard faced, the proper rod diameter and grain size should be chosen. If the area will encounter heavy abrasion a small grain size is recommended. If a cutting action is desired a larger grain size is preferable.

Typical hardness:

DURMAT® SFTC: ≈ 3,000 HV

Application:

For hard-facing and repairing tools and machine parts, exposed to wear in mining, road construction, ceramic, petroleum, excavation and dredging applications.

Sales units:

Type	Ø mm	Ø inch	Grain size (mm)	US Mesh size
3505	3.5	1/8	0.25 - 0.84	20 - 60
4005	4.0	5/32	0.25 - 0.84	20 - 60
5005	5.0	3/16	0.25 - 0.84	20 - 60
6005	6.0	1/4	0.25 - 0.84	20 - 60
8005	8.0	5/16	0.25 - 0.84	20 - 60

Standard rod lengths: 350mm (14“) and 700mm (28“)

DURMAT® OA

Flux-Cored Wire DIN EN 14700: T Fe20
(DIN 8555: MF21-65-CG)

General characteristics:

DURMAT® OA is an open arc iron-based tubular wire filled with Fused Tungsten Carbide for semi-automatic application, where extreme abrasive wear is anticipated.

Application:

For hard-facing low alloyed steels that have a maximum of 0.45 % carbon. Higher carbon content could lead to cracking. Also for hard-facing and repairing tools and machine parts that are exposed to wear in mining, excavation, earth moving, tunneling shields, road construction, well drilling and deep drilling applications.

Typical hardness:

Weld metal:	1st layer: approx. 64 - 66 HRC
	2nd layer: approx. 66 - 68 HRC
DURMAT® FTC:	> 2,360 HV

Sales units:

Ø mm	Ø inch	Coil size DIN EN 759	Amps	Voltage
1.2	0.045	B 300 (approx. 15 kgs)	130 - 600 A	24 - 26 V
1.6	1/16	B 300 (approx. 15 kgs)	180 - 220 A	24 - 26 V
2.4	3/32	B 435 (approx. 25kgs)	240 - 280 A	26 - 28 V
2.8	7/64	B 435 (approx. 25 kgs)	240 - 280 A	26 - 28 V
3.2	1/8	B 435 (approx. 25 kgs)	250 - 300 A	26 - 28 V

Welding recommendation:

The area to be hard-faced should be free of rust, scale, grease or other dirt. Depending on the base metal's alloy and the size of the area to be hard-faced the advisable pre-heating temperature should be between 350 - 500 °C (662 - 932 °F). If the amps are kept on the lowest setting possible the tungsten carbide granular will be prevented from melting. During welding, position the arc that the weld metal is deposited in coarse droplets.

NOTE: The base material that is to be hard-faced should have enough tensile strength so that the hard-facing overlay cannot be pressed into it.

DURMAT® E

Stick Electrode DIN EN 14700: E Fe20
(DIN 8555: E21-GF-UM-60-CG)

General characteristics:

DURMAT® E is a tube metal filled with medium size Fused Tungsten Carbide developed for manual welding application. This electrode can be applied by alternating or direct current trouble free once the proper machine setting is obtained.

Application:

For hard-facing unalloyed and low alloyed steels (cast steels) with a maximum carbon content of 0.5 %. Higher carbon content can lead to cracking. For welding on high alloyed steels after a buffer layer is recommended. Also for hard-facing tools and machine parts that are exposed to wear in mining, excavation, digging, road construction and deep drilling applications.

Typical hardness:

55 - 58 HRC

Sales units:

Type	Ø mm	Ø inch	Length of rod	Amps	Voltage
3505	3.5	1/8	350 mm	90 A	= + / ~
4005	4.0	5/32	350 mm	110 A	= + / ~
5005	5.0	3/16	350 mm	140 A	= + / ~
6005	6.0	1/4	350 mm	160 A	= + / ~
8005	8.0	5/16 (18")	350 / 450 mm	200 A	= + / ~

Welding recommendation:

Depending on the base metal's alloy and the area to be hard-faced, a pre-heating temperature between 350 - 500 °C (662 - 932 °F) is advised.

NOTE: DURMAT® E is a hollow tube metal filled with Fused Tungsten Carbide powder, the lowest amp setting possible should be used when depositing it in order to avoid any decomposition to the carbides.

DURMAT® CS

General characteristics:

DURMAT® CS consists of sintered tungsten carbide fragments in a ductile Cu-Ni-Zn matrix. The alloy exhibits a tensile strength of 100,000 psi. DURMAT® CS production methods ensure an homogeneous distribution of the sintered tungsten carbide particles. DURMAT® CS composite rods are available in two grades: Wear resistant and cutting.

Application:

Downhole reamers, openers, fishing tools (spears), coring tools, reamers, milling tools and stabilizers.

Carbide content:

Standard percentage: 60 %.
Other percentages available are: 40 %, 50 % or 70 %.

Sales units:

Standard composite rod length:	Carbide grain sizes:
450 mm (18“)	1/16 to 1/8
450 mm (18“)	1/8 to 3/16
450 mm (18“)	3/16 to 1/4
450 mm (18“)	1/4 to 5/16
450 mm (18“)	5/16 to 1/2

Other grain sizes are available on request.

Welding Tips:

1. Select a mesh size suitable for the job. Stabilizers require a mesh size approximately 1/16“ below finish thickness of deposit or distance between inserts .
2. Thoroughly clean the areas to be coated. Rust, scale, mud and oil prevent the matrix from wetting.
3. Pre-heating is probably necessary an larger components such as stabilizers and big mills. The maximum pre-heat temperature is 500 °C., minimum 300 - 350 °C .
4. Pre-tin using a slightly oxidising flame, matrix rod and adequate DURUM flux .
5. Deposite the DURMAT® CS composite rod using a neutral flame, heating the work and the DURMAT® CS. As the DURMAT® CS drops onto the work, push the carbides together, arranging the points for cutting as required .
6. Infill with matrix as the work proceeds. Avoid overheating the carbides.

DURMAT® TINNING-RODS

AWS	*ASME*	*BS*
A5.27 (1978)	*SFA-5.27 (1978)*	*1453 C5*
A5.8 (1981)	*SFA-5.8 (1981)*	
RBCuZn-A RBCuZn-D		

General characteristics:

DURMAT® TINNING-RODS are fume reduced nickel bronze rods containing 10 % nickel developed for oxyacetylene welding. Coatings have high mechanical properties and are used in preference to other welding alloys; especially the nickel colour (silver) should be matched. One of DURMAT® TINNING-RODS unique applications is a binder for the sintered tungsten carbide particles with DURMAT® TINNING-RODS.

Application:

Deposits on drilling tools and equipment used in oil and gas well drilling, for tinning and filling in combination with DURMAT® CS.

Typical physical characteristics:

Hardness:	74 HRB; 120 HB	Average tensile strength:	505 test: 70,000 psi
Melting point:	915 °C (1,680 °F)	Average elongation:	25 %
Solidification point:	905 °C (1,661 °F)		

DURMAT® BRAZING FLUX

General characteristics:

DURMAT® BRAZING FLUX is a welding flux for copper base alloys.

Typical chemical composition:

Boric acid and tetraborate of sodium decahydrate.

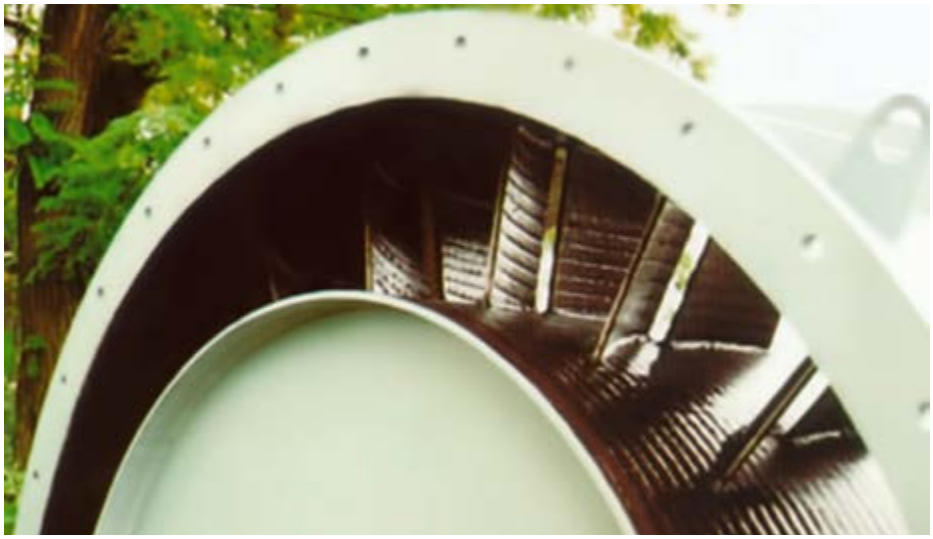
Applications:

Used for cleaning and oxide elimination on surface before welding DURMAT® TINNING-ROD and DURMAT® CS. It reduces the superficial tension of the melted tinning. Prepare the surface by grinding to reduce all contamination.

Procedure:

Spread a layer of moistened DURMAT® Brazing Flux pre-heat the piece with a neutral oxyacetylene flame without concentration of the heat of the flux. As soon as the flux becomes liquid, apply the DURMAT® TINNING-ROD or DURMAT® CS. Weld the product drop to drop keeping the heat of the area to be welded.

TYPICAL APPLICATIONS FLUX-CORED WIRE



Abrasion Resistant

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS			
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	RT	400 °C	600 °C	800 °C
FD 42	1.8	0.9	1.2	28	3	0.8	-	-	-	-	bal.	-	41 - 44 HRC	-	-	-
FD 50	3.2	1.8	1.8	15	-	-	-	-	-	-	bal.	-	50 - 54 HRC	-	-	-
FD 51	4.8	0.8	0.8	21	-	-	-	-	-	-	bal.	B: +	58 - 59 HRC	-	-	-
FD 53 ES	3.5	1.2	-	32	0.5	0.4	-	-	1	-	bal.	-	52 - 54 HRC	-	-	-
FD 55	4.8	1.2	0.2	29	-	-	-	-	-	-	bal.	-	55 - 59 HRC	-	-	-
FD 55 Mo	5	1.2	0.2	28	-	1.3	-	-	-	-	bal.	-	57 - 60 HRC	-	-	-
FD 56	5.4	1	0.2	32	-	-	-	-	-	-	bal.	-	58 - 60 HRC	-	-	-
FD 56 Mo	5.3	1	0.2	30	-	1.0	-	-	-	-	bal.	-	60 - 64 HRC	-	-	-
FD 59	5.0	1.2	0.2	33	-	0.5	-	-	-	-	bal.	-	59 - 61 HRC	-	-	-
FD 59 L	3.8	1.2	0.2	33	-	0.5	-	-	-	-	bal.	-	57 - 59 HRC	-	-	-
FD 59 XL	3	1.3	0.2	32	3	0.5	-	-	-	-	bal.	-	50 - 53 HRC	-	-	-
FD 60	5.2	1.1	0.2	22	-	-	-	7	-	-	bal.	-	61 - 63 HRC	-	-	-
FD 61	5.2	1.3	0.2	22	-	-	-	7	-	-	bal.	B:1	62 - 65 HRC	-	-	-
FD 62	5.4	1.2	0.2	27	-	-	-	3	-	-	bal.	-	60 - 63 HRC	-	-	-
FD 64	5	1.2	0.2	26	-	-	-	-	0.8	1.0	bal.	B: 1	63 - 65 HRC	58 HRC	48 HRC	-
FD 65	5.2	1	0.2	21	-	7	-	7	1	2	bal.	-	63 - 65 HRC	62 HRC	59 HRC	53 HRC
FD 67	5.4	1	0.2	21	-	-	-	-	10	-	bal.	-	64 - 67 HRC	-	-	-
FD 68	5	0.8	0.2	38	-	-	-	-	-	-	bal.	B: 2	66 - 68 HRC		60 HRC	54 HRC
FD 69	5.2	0.8	0.2	32	-	-	-	5.8	-	-	bal.	B: 1.8	64 - 67 HRC	-	-	-
FD 70	5.2	1	0.2	27	-	-	-	-	6	-	bal.	-	62 - 64 HRC	-	-	-
FD 75	5.2	1.2	0.6	21	-	4	-	6.2	0.6	1.2	bal.	-	62 - 64 HRC	61 HRC	58 HRC	-
FD 78	5	1.3	0.2	18	-	-	-	6.5	6	-	bal.	B: 1.2	64 - 68 HRC	-	-	-
FD 79	5	1	0.2	20	-	-	-	6	2.5	-	bal.	B: 1.2	64 - 68 HRC	-	-	-
FD 164	5.3	1.2	0.2	28	-	-	-	-	-	-	bal.	Zr: 0.35	60 - 64 HRC	-	-	-
FD 720	0.7	1	2	-	2	-	-	-	-	-	bal.	B: 4.5	64 - 66 HRC	-	-	-
FD 721	1.5	1	2	16	-	-	-	-	-	-	bal.	B: 3.5	64 - 66 HRC	-	-	-
FD 723	1.6	1.4	0.2	7.5	-	-	-	-	-	-	bal.	B: 4.6	65 - 70 HRC	-	-	-
FD 733	3.5	1	1	18	-	-	-	4	-	-	bal.	B: 1.4	66 - 68 HRC	-	-	-
FD 739	1	-	-	20	-	3.3	-	3.4	-	5.7	bal.	B: 4.4	67 - 70 HRC	-	-	-

DURMAT® FD 42

DIN EN 14700: T Fe14-45-CGT / DIN 8555: MF 10-45-CGT

High Cr-, Ni-, Mo- and C-alloyed deposit can be used against corrosive as well as abrasive wear. Application: meat processing, food industry, vegetable oil extrusion presses, chemical industry.

DURMAT® FD 50

DIN EN 14700: T Z Fe14-50-GP / DIN 8555: MF 10-50-GP

High Cr-, C-, Si-alloyed weld metal with resistance to abrasion and medium impact. Application: excavator teeth, mixer blades, conveying screws and others.

DURMAT® FD 55

DIN EN 14700: T Z Fe14-60-G / DIN 8555: MF 10-60-GR

High CrC-alloyed stainless weld metal with excellent resistance to abrasion and medium impact. Application: pumps, mixer parts, conveyer screws, shovel buckets, scrapers, fan blades etc.

DURMAT® FD 55 Mo

DIN EN 14700: T Z Fe14-60-GT / DIN 8555: MF 10-60-GT

Similar to DURMAT® FD 55, but additionally alloyed with 1.3 % Mo: higher warm strength of the deposit.

DURMAT® FD 59 L

DIN EN 14700: T Fe14-60-CG / DIN 8555: MF 10-60-CGT

High chrome carbide alloyed weld metal with excellent resistance to abrasion, corrosion and moderate impact.

FLUX-CORED WIRES

DURMAT® FD 60

DIN EN 14700: T Fe15-60-G / DIN 8555: MF 10-60-G

Deposit with excellent resistance against abrasion. The deposit is free of slag, weldability is excellent. Application: coal mining equipment, cement and mineral industries.

DURMAT® FD 61

DIN EN 14700: T Z Fe15-65-G / DIN 8555: MF 10-65-G

The deposit has a ledeburitic structure with a high content of different hard phases. Application: hard-facing on parts for coal mining equipment, cement and mineral industries.

DURMAT® FD 62

DIN EN 14700: T Z Fe15-60-G / DIN 8555: MF 10-60-G

Developed for overlaying parts, which are exposed to very extreme abrasive mineral wear related to the high amount of hard phases like hypereutectic M_7C_3-carbides.

DURMAT® FD 64

DIN EN 14700: T Fe16-65-GZ / DIN 8555: MF 10-65-GZ

Resistant to heavy mineral abrasion at elevated temperature. Application: cement, mining, mineral and brick industries.

DURMAT® FD 65

DIN EN 14700: T Fe16-65-GTZ / DIN 8555: MF 10-65-GZ

Ledeburitic structure with different very hard types of carbides. It can be used where extreme abrasive wear is expected, even at elevated temperatures up to 800 °C. Application: blast furnace bells, coke oven screens and doors, sinter wheel breakers, smelter loading chutes, etc.

DURMAT® FD 67

DIN EN 14700: T Fe16-65-GZ / DIN 8555: MF 10-65-GZ

The fine grain structure of the weld deposit prevents a washout of the matrix and therefore has an extreme high scratch hardness. The deposit has a ledeburitic structure with many different hard phases.

DURMAT® FD 68

DIN EN 14700: T Fe16-70-CGZ / DIN 8555: MF 10-70-CGZ

The deposit has a ledeburitic structure containing a high amount of different hard phases. It can be used up to 800 °C. Application: blast furnace bells, coke oven screens and doors, sinter wheel breakers, smelter loading chutes, etc.

DURMAT® FD 69

DIN EN 14700: T Fe16-65-GZ / DIN 8555: MF 10-65-GRZ

The deposit with a ledeburitic structure contains a high amount of different hard phases. Application: Concrete industry, mixer parts, scrapers.

DURMAT® FD 70

DIN EN 14700: T Fe16-65-G / DIN 8555: MF 10-65-G

The weld deposit consists of chromium- and vanadium-carbides. The weld metal is not machineable. Application: steel, coal, cement and mineral industries.

DURMAT® FD 75

DIN EN 14700: T Fe16-65-GZ / DIN 8555: MF 10-65-GZ

High resistance to mineral wear up to 600 °C. Application: slag conveyer screws, hot sinter breakers.

DURMAT® FD 78

DIN EN 14700:T Fe16-70-G / DIN 8555: MF 10-70-G

High scratch hardness. The resulting deposits cannot be heat-treated, machined or forged. Application: applications are sinter plants, lignite mining machines, gravel industry, chains, clinker industry, concrete pumps.

DURMAT® FD 164

DIN EN 14700: T Fe14-60-CG / DIN 8555: MF 10-65-GR

Suitable for parts subject to severe abrasive wear with exposed mineral substances.

DURMAT® FD 720

DIN EN 14700: T Fe13-65-G

Complete martensitic deposit is rich in iron-borides and iron-carbides. Application: dredges, concrete pumps, driving screws, fine particle (sand) wearing parts.

DURMAT® FD 721

DIN EN 14700: T Z Fe8

Suitable for highly abrasion resistant hard-facings that are exposed to minor impact and high wear at temperatures of up to 450 °C.

DURMAT® FD 723

DIN EN 14700: T Z Fe8

High wear resistance up to 450 °C.

DURMAT® FD 733

DIN EN 14700: T Z Fe12-70-G / DIN 8555: MF 10-70-GT

Very fine-grained deposit contains extremely hard chrome-carbides and niobium-carbides embedded in a FeBC matrix. It is suitable for hard-facing on parts requiring high abrasion resistance with, at the same time, minor impact resistance and wear resistance up to a working temperature of approx. 450 °C.

DURMAT® FD 739

DIN EN 14700: T Fe16-70-CG

Deposit contains complex carbide phases, which are precipitated more fine than in common used hard-facings. These shows a better resistance against abrasive and erosive load because of the finely divided hard particles, which have a submicron grain size.

Impact Resistant

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	
FD 300	0.1	0.5	2	2.5	-	0.3	-	-	-	-	bal.	Ti	280 - 325 HB
FD 310	0.2	1	1	13.5	3.5	1	-	0.2	0.15	-	bal.	-	40 - 44 HRC
FD 356	0.1	0.3	0.8	17	4.6	1.1	-	0.2	0.15	-	bal.	-	40 - 42 HRC
FD 400	0.2	-	-	3	-	0.3	-	-	-	-	bal.	-	38 - 42 HRC
FD 450	0.2	-	-	4.5	-	0.6	-	-	0.3	-	bal.	-	43 - 45 HRC
FD 476	0.3	0.3	0.8	16	4	1.5	1.5	-	1	1	bal.	-	48 - 50 HRC
FD 495	0.2	0.7	0.4	15	-	3.2	14	-	-	-	bal.	-	48 - 50 HRC, 53 HRC workhardened
FD 580	0.25	0.6	1.8	6.5	-	1.5	-	-	0.3	1.2	bal.	-	48 - 52 HRC
FD 600	0.5	1	3	6.5	-	0.8	-	-	0.2	-	bal.	-	55 - 58 HRC
FD 600 TIC	1.8	1.6	1.4	7	-	1.4	-	-	-	-	bal.	Ti: 5	56 - 58 HRC
FD 601	0.5	1	2	6.5	-	1.5	-	-	0.4	1.5	bal.	-	56 - 60 HRC
FD 609	0.5	2.8	0.8	9.5	0.3	-	-	-	-	-	bal.	-	55 - 57 HRC
FD 627	2.6	1	0.8	12	-	-	-	-	11	-	bal.	-	55 - 60 HRC
FD 615	0.5	-	-	17 - 18	0.6	1.3	-	-	-	-	bal.	SC: 16	48-52 HRC
FD 628	0.6	-	-	7	-	3	-	-	-	-	bal.	SC: 20	58 - 63 HRC
FD 710	1.4	1	1	8	-	1	-	-	1	-	bal.	B: 1	62 - 65 HRC
FD 760	1.4	0.7	1.3	7	0.8	1.2	-	8	0.5	1.2	bal.	-	55 - 57 HRC

DURMAT® FD 300

DIN EN 14700: T Fe1-300-P / DIN 8555: MF 1-300-P

Tough deposit is not sensitive to impact loads. The number of layers is not limited. DURMAT® FD 300 is excellent for buffer layers before hard-facing. The deposit is forgeable and can be additionally treated with cutting tools. Application: cable rolls, rails, couplings, back up rolls of caterpillars crane wheel rims, shafts, tool-joints, etc.

DURMAT® FD 310

DIN EN 14700: T Fe7-45-CPT / DIN 8555: MF 9-45-CPT

Cr-, Ni-, Mo- alloyed flux-cored wire. Corrosion resistant deposit is not susceptible to impact loads. The number of layers is not limited. The deposit is tough and can be worked with cutting tools. Application: continuous casting rolls, cable rolls, rails, couplings, back up rolls of caterpillars crane wheel rims

DURMAT® FD 356

DIN EN 14700: T Fe7-40-CPT / DIN 8555: MF 9-40-CPT

DURMAT® FD 356 is a high Cr, Ni, Mo, Nb, V - alloyed flux-cored wire. The welding deposit is resistant against corrosion, impact, continuos-rating wear in addition to effect of heat.

DURMAT® FD 400

DIN EN 14700: T Fe1-40-P / DIN 8555: MF 1-40-P

Tough and not sensitive to impact loads deposit is forgeable and can be additionally treated with cutting tools. The number of layers is not limited. Application: cable rolls, rails, couplings, back up rolls of caterpillar crane wheel rims, shafts, etc.

DURMAT® FD 450

DIN EN 14700: T Fe1-45-P / DIN 8555: MF 1-45-P

Tough and not sensitive to impact loads deposit is forgeable and can be additionally treated with cutting tools. The number of layers is not limited. Application: cable rolls, rails, couplings, back up rolls of caterpillar crane wheel rims, shafts, etc.

DURMAT® FD 476

DIN EN 14700: T Z Fe7-50-CPT / DIN 8555: MF 9-50-CPT

High Cr-, Ni-, Mo-, Co-, V-, W alloyed flux-cored wire was developed for the hard-facing of rolls for hot rolling. The weld deposit is corrosion resistant and wear resistant. Furthermore, it is resistant against impact and continuous rating through heat effect and high pressure. Application: steel mill rolls.

FLUX-CORED WIRES

DURMAT® FD 495

DIN EN 14700: T Z Fe8-50-CKTZW / DIN 8555: MF 3-50-CKTZ

The stainless weld deposit on Fe, Cr, Co, Mo-basis has a high wear resistance even at elevated temperatures, a high tensile strength and a high resistance against sliding wear of metallic objects. Deposits can be work hardened up to 53 HRC and show good thermal shock resistance. Application: hard-facing of forging presses, hot piercing dies, stretching rolls, pinch rolls, hot strip mill table rolls and back-up rolls.

DURMAT® FD 580

DIN EN 14700: T Fe3-50-PT / DIN 8555: MF 6-50-PT

This C-, Cr-, Mo-, W- alloyed Flux-Cored Wire is suitable for hard-facing areas that require a deposit that is durable and abrasive resistant. Pre-heating when welding DURMAT® FD 580 is solely dependant on the base material. With complex base materials, a buffer layer should be used such as DURMAT® 200K or 250K. Application: hot working tools, guiding rolls

DURMAT® FD 600

DIN EN 14700: T Fe3-60-PS / DIN 8555: MF 6-60-P

DURMAT® FD 600 is a Flux-Cored Wire which enables a CrMoV alloyed deposit for semi automatic and automatic surfacing. The weld metal enables hardness up to 58 HRC even with relatively slow cooling rates. Crack resistance is good in case of adequate pre-heat and interpass temperature together with slow cooling after welding. Resistance to tempering is good. Application: parts subjected to abrasion, impact and compressive loads, sand pumps, dredge pump parts, dredge ladder rolls, etc.

DURMAT® FD 600 TIC

DIN EN 14700: T Fe8-60-GP / DIN 8555: MF 6-60-GP

DURMAT® FD 600 TIC is a Flux-Cored Wire for hard-facing. The deposit is tough and not sensitive to impact loads. It shows excellent resistance to impact in combination with abrasion. Application: roller press, bucket teeth and lips, sand pumps, impellers and screws.

DURMAT® FD 601

DIN EN 14700: T Fe3-60-PST / DIN 8555: MF 6-60-PST

DURMAT® FD 601 is a Flux-Cored Wire which enables a Cr-Mo-W-V alloyed deposit for semi-automatic and automatic surfacing. The weld metal enables hardness up to 60 HRC even with relatively slow cooling rates. Crack resistance is good in case of adequate pre-heat and interpass temperature together with slow cooling after welding. Resistance to tempering is good. Application: parts subjected to abrasion, impact and compressive loads, sand pumps, dredge pump parts, dredge ladder rolls, tool-joints , etc.

DURMAT® FD 609

DIN EN 14700: T Z Fe6-55-CGPT / DIN 8555: MF 6-55-GPT / 1.4718

High Cr-alloyed flux core wire for wear resistant hard-facing with a ferritic-martensitic micro-structure. The welding deposit is high resistant against impact stress and medium abrasion. The deposit is despite the high hardness crack-free also in multiple layers and can be used up to 700° C. Application: Crusher wheels and hammers, rock processing shredders, cutting-tools, and fluid valves and protection welding on Mn-Hadfield-steel.

DURMAT® FD 615

DIN EN 14700: T Z Fe8-50-CGP/ DIN 8555: MF 6-50-RPS

DURMAT® FD 615 is resistant against heavy abrasion and impact. Due to the precipitation of fine special carbides (SC), hard-facings shows an extreme hardness of 55 - 60 HRC, combined with a high tenacity. In comparison to DURMAT® FD 605 these hard-facings are more resistant against heavy abrasion and impact due to the higher content of fine primary refractory and special (SC) carbides. Application: mining equipment, scraper blades for brick and clay, technical knifes, agriculture, fans

DURMAT® FD 710

DIN EN 14700: T Z Fe13-60-GPT / DIN 8555: MF 6-65-GPT

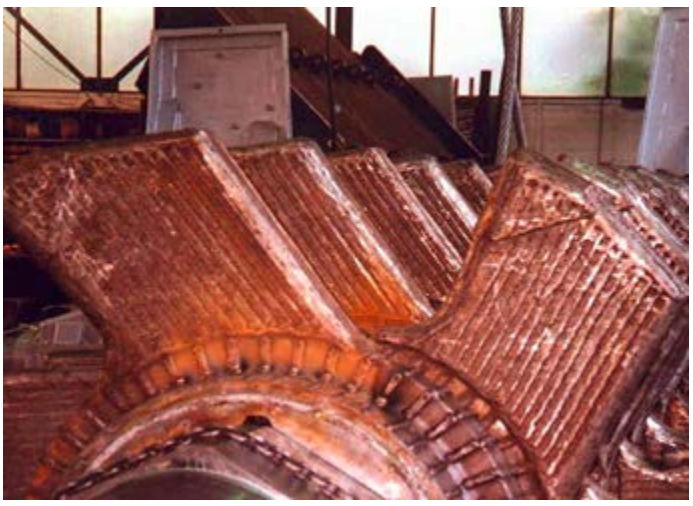
DURMAT® FD 710 is a slag-free metal-cord wire with a martensitic structure with inserted Cr-V-Mo carbides. The boron content guarantee a high hardness, also in the 1st layer. Crack-resistance is good in case of adequate pre-heat and slow cooling. The deposit is heat resistant up to 500 °C.

DURMAT® FD 760

DIN EN 14700: T Fe8-55-GP / DIN 8555: MF 6-55-GP

DURMAT® FD 760 shows a martensitic structure with high wear resistant niobium carbides embedded. The Vickers hardness of those Nb-carbides is approx. 2,700 HV and gives additional resistance against abrasive wear.

TYPICAL APPLICATIONS FLUX-CORED WIRES



Workhardening Austenitic

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	B	
FD 200 K	0.1	0.5	6	18.5	8.5	-	-	-	-	-	bal.	-	180 - 200 HB, 400 - 450 HB^{workhardened}
FD 240 K	1.1	0.3	14	4	0.6	-	-	-	-	-	bal.	-	200 - 230 HB, 400 - 450 HB^{workhardened}
FD 250 K	0.5	0.5	16	14	1.2	0.6	-	-	0.2	-	bal.	-	230 - 260 HB, 450 - 500 HB^{workhardened}
FD 270 K	1.1	-	19	8	-	-	-	3	-	-	Rest	-	250 HB, 500 HB^{workhardened}
FD 295 HY	0.2	< 3	9 - 11	18 - 20	-	-	9 - 11	-	-	-	bal.	N+	280 - 300 HB, 450 HB^{workhardened}

DURMAT® FD 200 K

DIN EN 14700: T Fe-10-200-CKNPZ / DIN 8555: MF 8-200-CKNPZ / AWS 307

DURMAT® FD 200 K is a Flux-Cored Wire of the CrNiMn-type (1.4370). The complete austenitic weld material shows high plasticity and can be applied as a buffer layer. The deposits can be work hardened, are heat resistant up to 850 °C, stainless and non-magnetic. DURMAT® FD 200 K is suitable for welding steels with more than 0.7 % C and other difficult combinations, because it deposits a most ductile weld metal. The deposits resists high shrinkage and impact stresses. Application: repair of manganese steel buckets and shovels, high tensile tools and dies, clutches, crane wheels, earthmoving undercarriage parts, gear wheels, etc.

DURMAT® FD 240 K

DIN EN 14700: T Fe9-250-KNP / DIN 8555: MF 7-250-KNP

Non-magnetic austenitic 14 %-Mn alloy, which is tough, crack-free and and can be work hardened up to 450 HB. DURMAT® FD 240 K is designed for repairing worn parts of similar base materials as well as for hard-facing carbon steel parts to severe impact loads. In that case an austenitic buffer layer should be applied. The alloy should be welded with a minimum heat input in one or more layers. Application: hard-facing of crushers, swing hammers, railway crossings, dredge buckets, etc.

DURMAT® FD 250 K

DIN EN 14700: T Fe9 / DIN 8555: MF 7-250-KNP

DURMAT® FD 250 K is a Flux-Cored Wire of the Mn-Cr-type. The complete austenitic weld material shows high plasticity and can be applied as a buffer layer. Deposits can be work hardened up to 500 HB, are stainless and non-magnetic. The deposits resist high shrinkage and impact stresses. Application: repair of manganese steel buckets and shovels, high tensile tools and dies, clutches, crane wheels, earthmoving undercarriage parts, gear wheels, etc.

DURMAT® FD 295 HY

DIN EN 14700: T Fe9 / DIN 8555: MF 7-250-KNP

The deposit of DURMAT® FD 295 HY is a stainless material with special alloys. The austenitic deposit is resistant against corrosion, erosion and cavitation and has a high resistance to hot cracking. The deposit has a much longer lifetime than other used conventional alloys like Stellite*, 13 Cr - 4 Ni or martensitic chrome-steels. Typical applications are coatings on parts with cavitation and erosion wear like water-turbines or hydraulic or gas system components.

** Stellite is a registered trademark of Kennametal Stellite*

Hot Forging Molds

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS	TENSILE STRENGTH
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD 812	0.1	0.5	0.6	10	1	2	-	-	-	-	bal.	Ti: 0.2	38 - 44 HRC	1200 - 1400 N/mm²
FD 813	0.12	0.6	0.6	10	1.7	3	-	-	-	-	bal.	Ti: 0.2	41 - 47 HRC	1300 - 1500 N/mm²
FD 814	0.2	0.6	0.6	10	1.7	3	-	-	-	-	bal.	Ti: 0.2	44 - 48 HRC	1400 - 1600 N/mm²
FD 816	0.28	0.7	0.6	10	1.7	3	-	-	0.2	-	bal.	Ti: 0.2	48 - 53 HRC	1600 - 1800 N/mm²
FD 818	0.36	0.7	0.6	10	1.7	3	-	-	0.3	2	bal.	Ti: 0.2	52 - 55 HRC	1800 - 2000 N/mm²
FD 862	0.15	0.7	0.6	4.5	-	1	-	-	0.2	1	bal.	-	34 - 40 HRC	1100 - 1300 N/mm²
FD 864	0.25	0.7	0.6	5	-	1.5	-	-	0.4	1.4	bal.	Ti: 0.2	44 - 48 HRC	1400 - 1600 N/mm²
FD 866	0.3	0.7	0.6	5.5	-	2.5	-	-	0.6	2.4	bal.	Ti: 0.2	48 - 52 HRC	1600 - 1800 N/mm²
FD 868	0.4	0.8	0.6	6	-	3	-	-	0.7	3	bal.	Ti: 0.2	52 - 55 HRC	1800 - 2000 N/mm²

Cast Iron Welding

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	
FD NiFe36 (1.3912)	0.1	1	3	-	36	-	-	-	-	-	bal.	-	≈ 160 HB
DUROLOY NiFe 60/40	< 0.5	< 1	4	-	bal.	-	-	-	-	-	40	Cu +	160 - 190 HB

DURMAT® FD NiFe36

Special Alloy

DURMAT® FD NiFe 36 is a Ni-, Fe-alloyed Flux-Cored Wire electrode (36 % Ni) for welding cast iron, joining steel and cast iron. This alloy has an extremely low coefficient of thermal expansion and is machinable. Application: cast iron joining welding, cast cavity welding.

DUROLOY NiFe 60/40

Special Alloy

This Ni-, Fe-alloy Flux-Cored Wire electrode deposits a weld metal with a high percentage of nickel with globular graphite. This alloy is recommended for joining cast iron with globular graphite, tempered cast iron and for joining cast iron with steel. Application: wire for cast iron joining welding, cast cavity welding.

Tool Steel

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	
FD WZ 50 1.2567	0.3	0.6	0.4	3	-	-	-	-	0.6	4.5	bal.	-	48 - 50 HRC, 50 - 52 HRC after heat treatment
FD WZ 55 1.2662	0.35	1	1.5	3	-	-	2	-	0.5	7	bal.	-	52 - 55 HRC, 55 - 57 HRC after heat treatment
FD WZ 59	0.6	0.6	-	5	-	3.5	-	-	-	3.5	bal.	-	57 - 59 HRC
FD WZ 60 1.3346	0.8	0.6	0.4	4.5	-	8	-	-	1.5	2	bal.	-	58 - 60 HRC after air cooling
FD WZ 6356	0.03	-	-	-	18	4	12	-	-	-	bal.	Ti+	41 - 43 HRC, 53 - 56 HRC after heat treatment

DURMAT® FD WZ 50

DIN EN 14700: T Fe3-50-STW / DIN 8555: MF 3-50-ST

This C-Cr-V-W-alloyed Flux-Cored Wire is suitable for repair and build-up applications on hot working steels of similar or lower alloyed hot working tools. The weld deposit is machinable. A heat treatment is possible and has retention of hardness up to 550 °C. Application: forging dies, hot shear blades.

DURMAT® FD WZ 55

DIN EN 14700: T Fe3-55-STW / DIN 8555: MF 3-50-ST

DURMAT® FD WZ 55 is a flux cored wire which deposits an air hardening and wear resistant alloy and can be applied to reclaim hot-forging dies and to overlay the edges and flat areas of low alloyed high density steel tools. DURMAT® FD WZ 55 is typically applied on: slab shears, hot-forging dies, drawing dies, containers, crushing equipment and depressions created by forging, pressure and impact stress. Application: forging tools, hot shear blades.

DURMAT® FD WZ 59

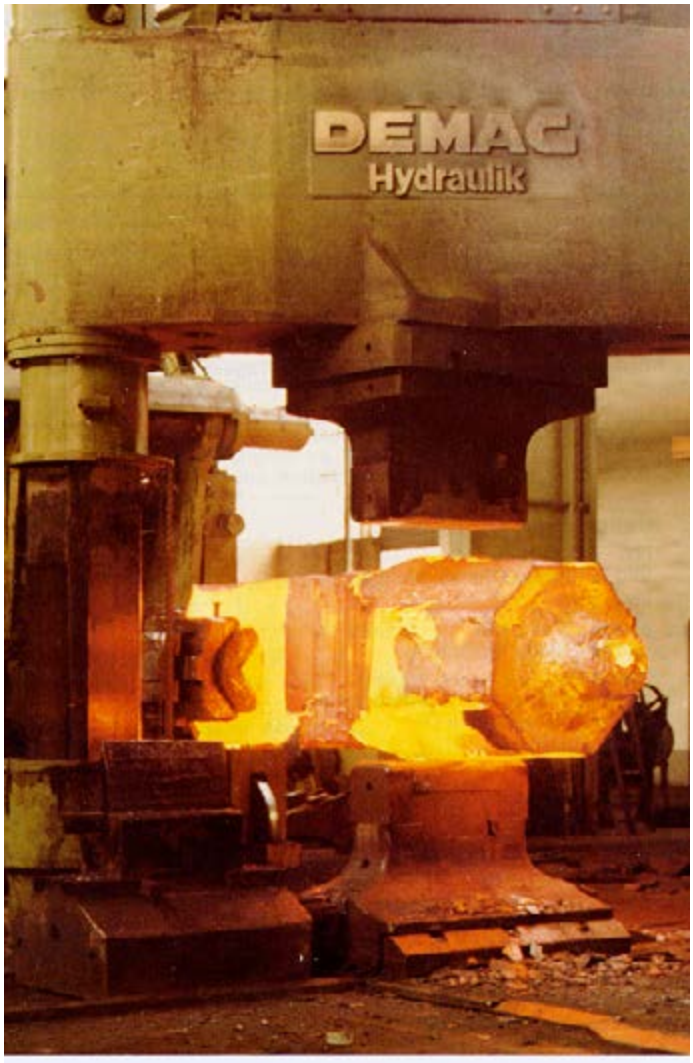
DIN EN 14700: T Z Fe4-55-ST / DIN 8555: MF 4-55-ST

The wear and heat resistant deposit of this Flux-Cored Wire electrode in high speed steel quality is suitable for repair and manufacture of hot and cold working tools, stamps and counter dies, etc. The weld deposit can be heat treated and has a retention of hardness up to 550 °C. Application: high speed steel tools, pinion-type cutters, chisels.

DURMAT® FD WZ 6356

DIN EN 14700: T Z Fe4-55-ST / DIN 8555: MF 4-55-ST

DURMAT® FD WZ 6356 is a special tool-steel MIG-wire (maragin-steel quality) for the hard-facing of tools, which are must be processed by machining and for connection of high-strength steels. The weld deposit consists of a martensitic hardening, high strength steel, which can be machined after welding. By hot hardening a significant increase in the hardness of the weld metal is reached, another is possible by nitration. Application: DURMAT® FD WZ 6356 is used for the plating of metal stamping, embossing and drawing dies, die casting molds and dies which are used for the deformation of thicker plates. Frequent Application: aluminium industry



Stellite* Replacement Alloys

DURMAT® FD SER are Iron-based Flux-Cored Wires, with the deposit located in the low leveled brittle phase. The deposit is also suitable for heat-hardening. This gives the deposit similar wear resistant properties as the Cobalt-based special alloys in that they have excellent abrasive wear at high temperatures. DURMAT® FD SER wires are ideal as a substitute alloy when Cobalt-based alloys are not useable, for example in the nuclear industry or when surface cracking is to be limited:

- With DURMAT® DUROLIT alloys comparable properties;
- Ferritic-austenitic microstructure;
- High content of ferrite and ETA phases;
- Cavitation, corrosion, erosion resistant;
- Impact and thermal shock resistant;
- Heat resistant up to 600 °C.

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL										HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	Fe	
SER 1	0.06 - 0.08	5	5.5	18.5	8.5	5.5	-	1.1	0.2	bal.	50 - 54 HRC
SER 6	0.06 - 0.08	5	4.8	18.5	8.5	4.5	-	1.1	0.2	bal.	40 - 44 HRC
SER 12	0.06 - 0.08	5.0	5.2	18.5	8.5	5.0	-	1.1	0.2	bal.	46 - 50 HRC
SER 21	0.06 - 0.08	3.5	5.4	18	9	3	-	1.1	0.2	bal.	280 - 350 HV
SER 290	0.06 - 0.08	5.8	2	18	8.5	-	-	-	0.2	bal.	260 - 290 HV

Build-Up Wires

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS	TENSILE STRENGTH
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+		
FD CROMO 1	0.1	0.5	1	1.3	-	0.6	-	-	-	-	bal.	-	280 HV_{30}	≈ 680 N/mm²
FD CROMO 2	0.10	0.4	1.2	2.4	-	0.8	-	-	-	-	bal.	-	≈ 300 HV_{30}	≈ 700 N/mm²
FD NiCrMo 2.2	0.06	-	1.6	0.4	2.2	0.4	-	-	-	-	bal.	Ti+	280 - 320 HV_{30}	900 - 960 N/mm²

DURMAT® FD CROMO 1

DIN EN 14700: T Fe1-300-P / DIN 8555: MF 1-300-P

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. Application: tool steel, armour steel, crane pulley wheels, transport-rollers, moulds or dies, built up welding.

DURMAT® FD CROMO 2

DIN EN 14700: T Fe1-350-P / DIN 8555: MF 1-350-P

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. Application: tool steel, armour steel, crane pulley wheels, transport-rollers, moulds or dies, built up welding.

DURMAT® FD NiCrMo 2.2

DIN EN 14700: T Fe13-300-P / DIN 8555: MF 1-350-P

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. Applications: build-up layers for carbon steels, buffer layers for continuous casting rolls and cement rolls.

** Stellite is a registered trademark of Kennametal Stellite*

Submerged Arc Wires

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	
FD 310 SAW	0.1	0.7	1.2	13.8	3.5	1.1	-	0.2	0.2	-	bal.	-	42 - 44 HRC
FD 328 SAW	0.08	0.4	0.8	6	-	0.7	-	-	-	-	bal.	-	280 - 325 HB
FD 337 SAW	0.33	0.4	1.2	5.6	0.3	3.3	-	-	0.25	-	bal.	-	52 - 54 HRC
FD 341 SAW	0.12	0.4	1.6	2.5	0.5	2.5	-	-	0.4	-	bal.	-	300 - 340 HB, Tensile strength: 1,200 N/mm²
FD 356 SAW	0.05	0.4	1.2	17	4.6	1.1	-	0.2	0.25	-	bal.	-	42 - 44 HRC
FD 4351 SAW	0.05	0.4	1	14	4.5	0.75	-	-	-	-	bal.	-	38 - 42 HRC
FD 440 SAW	0.3	0.4	1.0	13	2.4	1.5	-	-	1	-	bal.	-	500 HB, 480 HB$^{500°C}$, 300 HB$^{600°C}$
FD 476 SAW	0.3	0.4	1.4	16	4	1.5	1.5	-	1	1	bal.	-	48 - 50 HRC
FD 502 SAW	0.3	-	-	13	-	1.5	2	-	2	1.2	bal.	-	48 - 52 HRC, 54 HRC$^{540°C}$

DURMAT® FD 310 SAW

DIN EN 14700: T Fe7-45-CPT / DIN 8555: MF 5-45-PRT

Corrosion resistant and not susceptible to impact loads. A heat treatment in order to get a defined hardness is possible. Application: continuous casting rolls, cable rolls, rails, couplings, back up rolls of caterpillars crane wheel rims.

DURMAT® FD 328 SAW

DIN EN 14700: Fe3-50-PT / DIN 8555: MF 5-50-PT

The weld deposit is resistant against high pressure and abrasion and has also an excellent resistance to high thermal fatigue. Applications: back-up rolls, pinch rolls, plate-mill leveller, slabbing-mill rolls, edger rolls.

DURMAT® FD 341 SAW

DIN EN 14700: T Fe13-300-P / DIN 8555: MF 1-300-P

Suitable for medium alloyed steels and hight-tensile steels. This alloy can also be used as a buffer and built-up layer. The weld deposit is high crack resistant and is highly resistant against impact and pressure wear. Applications: build-up layers, buffer layers for continuous casting rolls and cement rolls.

DURMAT® FD 356 SAW

DIN EN 14700: T Fe7-40-CPT / DIN 8555: MF 5-40-CPT

The welding deposit is resistant against corrosion, impact, continuous rating wear in addition to effect of heat. Application: continuous casting rolls.

DURMAT® FD 4351 SAW

DIN EN 14700: T Z Fe7-45-CPT / DIN 8555: MF 5-45-PRT / AWS: 410 NiMo

Well suited for parts that encounter wear from oxidation. Protects transporting equipment in high pressure areas such as in steel industries and power stations. Application: continuous casting rolls, roller bearings, corrosion, valves, bridge bearings.

DURMAT® FD 440 SAW

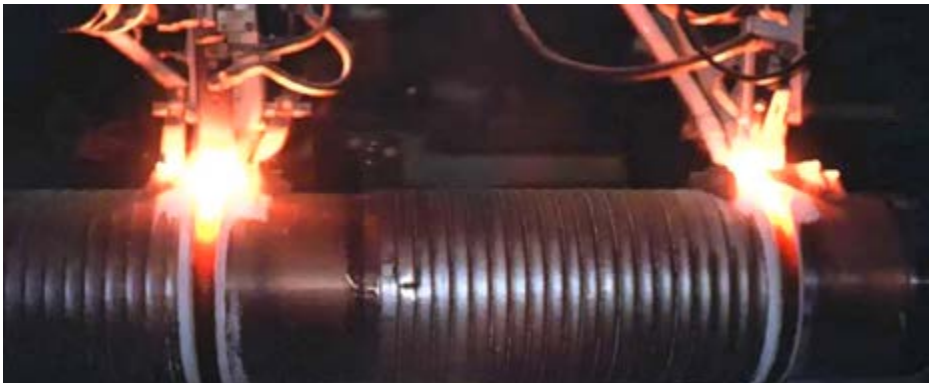
DIN EN 14700: T Fe7-450-CPT / DIN 8555: MF 5-450-PRT

Resistant against impact and medium abrasive wear, corrosion and continuous rating through heat effect. Not suitable in the external cooling-area of the caster, but excellent in the run out area.

DURMAT® FD 476 SAW

DIN EN 14700: T Fe7-50-CPT / DIN 8555: MF 5-450-PRT

Weld deposit is resistant against corrosion, impact and continuous rating through heat effect and high pressure. Application: steel mill rolls.



Chromium Steel

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	
FD 4009 1.4009	0.12	0.8	1.2	14.5	+	-	-	-	-	-	bal.	Ti+	300 - 360 HB
FD 4015 1.4015	0.08	0.8	1.2	17.5	-	-	-	-	-	-	bal.	-	220 - 240 HB
FD 4028 1.4028	0.3	0.8	1.2	14	0.4	-	-	-	-	-	bal.	-	46 - 48 HRC
FD 4115 1.4115	0.2	0.8	1.2	17	0.4	1	-	-	-	-	bal.	-	42 - 44 HRC
FD 4122 1.4122	0.4	0.8	1.2	17	0.4	1	-	-	+	-	bal.	-	48 - 51 HRC
FD 4122 Nb	1.2	0.8	1.2	17	1	-	-	8	0.3	-	bal.	-	48 - 51 HRC
FD 4351 N OA 1.4351	0.05	0.9	1.1	14	5	0.75	-	-	-	-	bal.	N+	38 - 42 HRC

DURMAT® FD 4009

DIN EN 14700: / DIN 8555: T Fe8-300-CP / AWS-Nr. 410

Tough and corrosion resistant, well suited for parts that encounter wear from sea water plant and power plant operation. Application: bridge bearings, sealing surfaces, corrosion slide ring sealing, roller bearings, valves, continuous cast rolls.

DURMAT® FD 4015

DIN EN 14700: T Z Fe8-250-CP / DIN 8555: MF 5-250-CP / AWS-Nr. 430

The weld deposit is of ferritic/matensitic structure, corrosion resistant. Application: a single layer for C-C-R to increase Cr-content prior to hard-facing.

DURMAT® FD 4028

DIN EN 14700: T Z Fe8-50-CGPT

DIN 8555: MF6-50-CGPT / AWS-Nr. 420

The tough and corrosion resistant overlay is well suited for parts that encounter wear from sea water plant and power plant operation. This acid corrosion resistance wire has a 14 % Cr content which forms the wearing analysis with a low Carbon content of 0,3 %. Application: bridge bearings, sealing surfaces, corrosion slide ring sealing, roller bearings, valves, continuous cast rolls.

DURMAT® FD 4115

DIN EN 14700: T Fe8-40-CP / DIN 8555: MF 6-40-CP

Corrosion resistant against see water and attenuated organic and an-organic acids. Suitable for joining of similar materials. Application: sealing surface of water-, steam- and gas fittings up to service temperatures of 450 °C.

DURMAT® FD 4122

DIN EN 14700: T Fe8-50-CP / DIN 8555: MF 6-50-CP

Tough and corrosion resistant, suited for parts that encounter wear from sea water plant and power plant operation. The 17 % Cr-content forms the wearing analysis with a low carbon content of 0,4 %. Application: bridge bearings, sealing surfaces, corrosion slide ring sealing, roller bearings, valves, continuous cast rolls.

DURMAT® FD 4351 N OA

DIN EN 14700: T Z Fe7-45-CPT

DIN 8555: MF 5-45-PRT / AWS-Nr. 410 NiMo

The tough and corrosion resistant overlay is well suited for parts that encounter wear from oxidation. The overlay also protects transporting equipment in high pressure areas such as in steel industries and power stations. DURMAT® FD 4351 is not only corrosion resistant, but also capable of resisting pitting, cavitation and corrosion. Application: continuous casting rolls, roller bearings, corrosion, valves, Bridge bearings

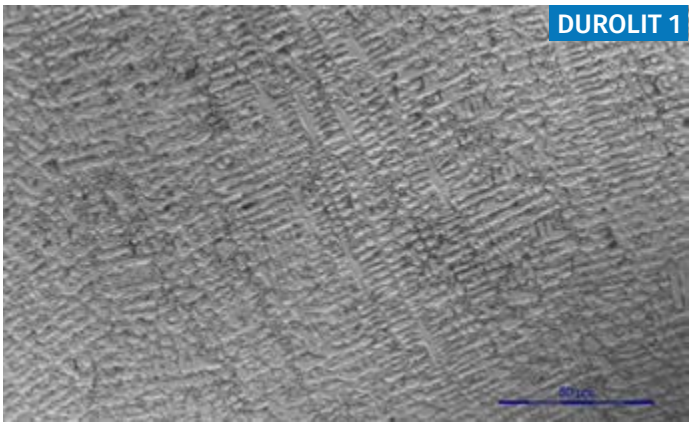
DUROLIT – Cobalt Base Alloys

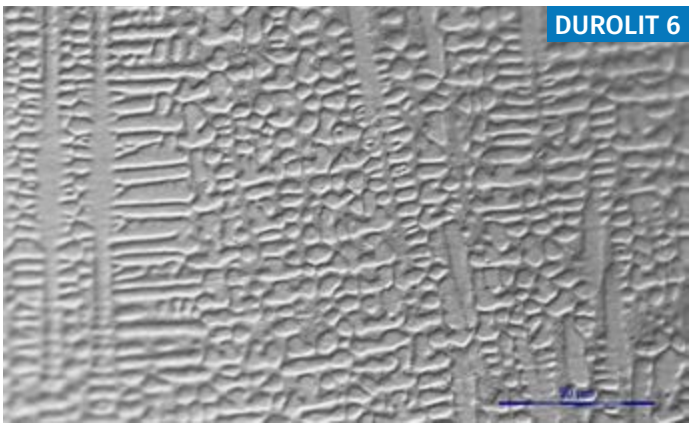
All currently used technical cobalt base alloys contain the elements of cobalt, chrome and carbon as main parts. Additives of molybdenum, tungsten and nickel are added to these depending on alloy type and application. The development of these alloys goes back to US-American Elwood Haynes at the end of the 19th century. Cobalt base hard alloys are preferably used at higher temperatures (above 700 °C), since they are still hard, heat-resistant, wear-resistant layers that at the same time are well resistant against oxidation, corrosion and tindering.

While DURMAT® Cobalt base hard alloys with a low carbon content (DUROLIT 21, 25 and 31 LC) are usually used for cavitation, sliding abrasion or moderate pitting, alloys with higher carbon contents (DUROLIT 1, 6, 12, S190 PTA) are typically used for abrasion, strong pitting and erosion.

DURMAT® cobalt base hard alloys are specifically adapted to the respective application area, so that the ratios of the alloy elements, which greatly influence the structural properties, vary. The substitionally integrated elements of chrome, molybdenum and tungsten achieve a mixed crystal hardening with concurrent increase of high-temperature strength in this area. Cobalt provides the necessary hardness and strength even in the high-temperature range. The high-temperature strength of cobalt is essentially provided by the very low stacking fault energy in the metal grid, which shifts the recovery and recrystallization start towards higher temperatures.

The primary relevance of chrome is in passivation. Accordingly, a ratio of approx. 25 - 30 % chrome is required if the corresponding cobalt base alloy is to have a good corrosion resistance. In addition to chrome, molybdenum and tungsten also contribute to increased corrosion resistance while stabilising the structure. Tungsten increases the wear resistance and high-temperature strength by carbide formation. Chrome and tungsten form the main mass of the carbides in differently characterised versions depending on the chemical composition of the alloy types. Chrome also forms part of the matrix, where it provides ductility as an cobalt-chrome alloy. The hardness of the cobalt base hard alloys depends on the carbide volume share and its morphology.


DUROLIT 1


DUROLIT 6

Typical structure examples are presented below using DUROLIT 1 and DUROLIT 6 (figures).

DURMAT® cobalt base hard alloys are mostly produced from the Co-Cr-W-C system, which was originally intended for cutting tools. Within these alloys, the metal matrix shows a Co-Cr-W-mixed crystal that may contain precipitated WC as well since the solubility of WC reduces with rising temperature. This way, metal matrices have micro-hardnesses of up to 450 $HV_{0.05}$. Cold hardening can even achieve structure strengths of up to 650 $HV_{0.05}$.

Cobalt base hard alloys tend to cold-harden due to their intrinsically low stacking fault energy that facilitates the planar and transverse sliding of offsets and thus gives the structure a high (creepage) strength. Such deformation mechanisms can permit these alloys to harden very quickly while at the same time ensuring good resistance against friction wear.

FLUX-CORED WIRES: COBALT BASE ALLOYS

The carbide-containing cobalt base alloys all have a high chrome ratio that tends to form a passive layer on the surface, similar to that of stainless steel. This phenomenon gives these alloys a good corrosion resistance, in particular in oxidising environments. The molybdenum-containing DURMAT® cobalt base hard alloys (e.g. Durolit 21) have been developed specifically for further improving corrosion resistance in reducing and complex atmospheres.

Furthermore, precipitation hardening through intermetallic phases is of high importance for cobalt base hard alloys. With the corresponding contents of tungsten and molybdenum, intermetallic phases of the Co_3 (W, Mo) type may precipitate after solution annealing. Therefore, such metal matrices are in the best case suitable even for applications at up to 1,000 °C, since the strength loss due to over-aging is low.

A further contribution to solidification of cobalt is the allotropic phase transformation: Cobalt has a face-centred cubic lattice structure (fcc) at high temperatures (> 417 °C) and transforms to a hexagonal close-packed lattice structure (hcp) during cooling. However, this conversion is so slow that a metastable fcc-phase in the weld metal occurs. This fcc-phase at ist turn can be transformed into the hcp-structure by special processes. This phase transformation as well as the low stacking fault energy give cobalt base alloys unique wear properties, especially with regard to sliding abrasion and fretting.

DURMAT® Cobalt base hard alloys may be used together with many base materials, such as carbon steels, un- and low-alloyed steels or stainless steels. Pre-heating is often necessary to ensure crack-free application. A buffer layer with DURMAT® FD 250K is recommended at multiple-layer welds.

The following table summarizes the effects of alloy elements in Co-base alloys. The feasible and meaningful contents depend on the phase state that as well as the required properties:

C	+	carbide formation
	+	stabilises the fcc-structure
	-	reduces the ductility
	-	decreases the solidus temperature
Si	+	reduces the viscosity of the melting
	+	desoxidises the melting
	-	supports the Laves-phase formation, causes embrittlement
Mn	+	desoxidises the melting
Cr	+	Cr_2O_3-oxide layer; increases the sulfidation resistance at higher contents in the mixed crystal
	+	carbide forming element, mostly $M_{23}C_6$
	-	supports the tcp-phase formation; max. content is limited (TCP - topologically closed packed; very brittle)
	-	stabilises the hcp-structure
Mo	+	solid solution hardening
	+	carbide forming element, type M_6C
	-	supports the tcp-phase formation (e.g. σ-phase, Laves-phase)
	-	stabilises the hcp-structure
	-	diminishes the oxidation and hot corrosion resistance
W	+	solid solution hardening
	+	increases the solidus temperature
	+	carbide forming element, type M_6C and MC
	-	supports the tcp-phase formation (e.g. σ-phase, Laves-phase)
	-	stabilises the hcp-structure
	-	diminishes the oxidation and hot corrosion resistance
	-	increases the density
Ni	+	stabilises the fcc-structure (complete mixed crystal formation in fcc-zone)
	+	improves the workability (increases the ductility because of higher stacking fault energy)
	-	increases the stacking fault energy; reduces the stability
Fe	+	stabilises the fcc-structure
	+	improves the workability
	-	reduces the stability at higher contents

DUROLIT 1

SERVICE TEMPERATURE:

up to 1,000 °C

Classification:

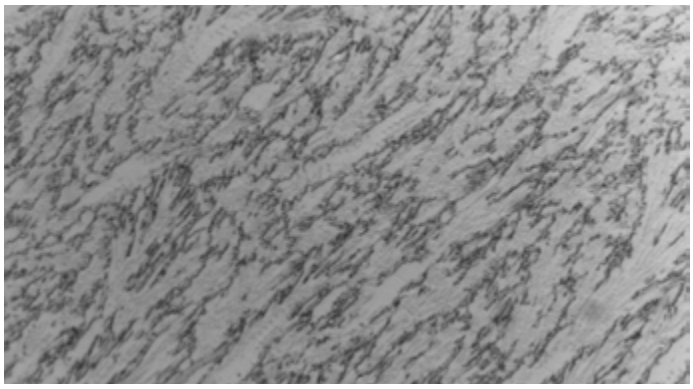
DIN EN 14700:	*DIN 8555:*	*AWS A 5.21:*
T Co3-55-CGTZ	*MF 20-55-CGTZ*	*ERCCoCr-C*

General characteristics:

DUROLIT 1 is a cobalt-based flux-cored wire for Gas Metal Arc Welding (GMAW) applications. DUROLIT 1 deposits a cobalt-based alloy with an austenitic structure. This structure exhibits hard chromium and tungsten carbides within the CoCr-matrix. The DUROLIT 1 alloy offers excellent resistance of chemical and mechanical degradation such as, corrosion (especially reducing acids), galling, erosion, high abrasion wear and thermal shock. The alloy bonds to all weldable steels and is not machinable. Forming may be performed by grinding only. DUROLIT 1 is the hardest of the cobalt-based alloys and is more sensitive for cracks. It retains the hardness up to high temperatures. A buffer layer with DURMAT® FD 200 K is recommended.

Nominal analysis of undiluted weld metal in % by wt.[1,3]:

C	Si	Mn	Cr	W	Fe	Co
2.4	0.7	0.4	28	11.5	< 4	bal.



Common applications:

- wear pads
- rotary seal rings
- bearings, guide rollers
- pump sleeves
- pump liners
- bushings
- centerless grinder tool rests

Thermal and electrical characteristics:

Thermal conductivity:	Electrical resistivity:	Magnetism:
14.5 W/(m*K)	96 µΩ*cm	no

Physical characteristics:

Hardness[2]			Melting Range	Tensile Strength:	Density:
20 °C	400 °C	600 °C			
52 - 55 HRC	46 HRC	40 HRC	1,190 - 1,345 °C	630 N/mm²	8.69 g/cm³

Nominal thermal expansion coefficient (average for the stated temperature range) [µm/(m*K)]:

20 - 100 °C	20 - 200 °C	20 - 300 °C	20 - 400 °C	20 - 500 °C	20 - 600 °C	20 - 700 °C	20 - 800 °C	20 - 900 °C
10.5	11.3	11.8	12.1	12.5	12.8	13.5	13.9	14.4

Pre-heating: pre-heat temperature and working temperature should be chosen based on variables such as base material and its construction. **Machining:** only by carbide tools and grinding.

1. **Nominal analysis** is a guideline only for standard products. Does not include all incidental elements and may differ depending on the exact specification/standard used when ordering.
2. **Hardness:** When written certification to a standard is required, please specify this when ordering. Certain products can also be certified to EN DIN, AMS, SAE and or other standards. Please contact us for mare details. Hardness numbers depend on the degree of cold working.
3. **Undiluted weld metal:** Please note undiluted weld metal is depending upon the process parameters the chemistry and the hardness of weld deposit can vary from the values provided in the tables above.

DUROLIT 6

SERVICE TEMPERATURE:

up to 750 °C

Classification:

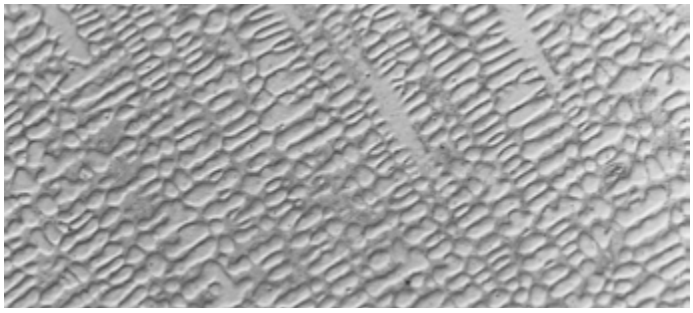
DIN EN 14700:	*DIN 8555:*	*AWS A 5.21:*
T Co2-40	*MF 20-45-CTZ*	*ERCCoCr-A*

General characteristics:

DUROLIT 6 is the most commonly used cobalt-based flux-cored wire for Gas Metal Arc Welding (GMAW) applications. DUROLIT 6 deposits a cobalt-based alloy with an austenitic structure. This structure exhibits dispersed hard chromium and tungsten carbides within the CoCr-matrix. The DUROLIT 6 alloy offers excellent resistance of chemical and mechanical degradation such as, corrosion, impact, self-mated anti-galling, cavitation-erosion, wear at high temperatures and thermal shock. The alloy bonds to all weldable steels and is machinable with carbide tools. DUROLIT 6 is available in the grades: Low-Carbon (LC), Standard and High-Carbon (HC). A buffer layer with DURMAT® FD 200 K is recommended.

Nominal analysis of undiluted weld metal in % by wt.[1,3]:

DUROLIT	C	Si	Mn	Cr	W	Fe	Co
6	1.1	1.2	0.7	29	4.5	< 4	bal.
6 LC	0.9	1.2	0.7	29	4.5	< 4	bal.
6 HC	1.3	1.2	0.7	29	4.5	< 4	bal.



Common applications:

- valves
- seats
- tong bits
- shear blades
- bearing areas
- bushings (rollers)
- extrusion screw flights
- pumps (high-temp liquides)

Thermal and electrical characteristics:

Thermal conductivity:	Electrical resistivity:	Magnetism:
14.82 W/(m*K)	106 µΩ*cm	no

Pre-heating: pre-heat temperature and working temperature should be chosen based on variables such as base material and its construction. **Machining:** only by carbide tools and grinding.

Physical characteristics:

Product	Hardness[2] 20 °C	300 °C	600 °C	Melting Range	Tensile Strength:	Density:
DUROLIT 6	40 - 43 HRC	35 HRC	26 HRC	1,285 - 1,410 °C	900 N/mm²	8.44 g/cm³
DUROLIT 6 LC	36 - 39 HRC					
DUROLIT 6 HC	42 - 46 HRC					

Nominal thermal expansion coefficient (average for the stated temperature range) [µm/(m*K)]:

20 - 100 °C	20 - 200 °C	20 - 300 °C	20 - 400 °C	20 - 500 °C	20 - 600 °C	20 - 700 °C	20 - 800 °C	20 - 900 °C
11.35	12.95	13.6	13.9	14.2	14.5	14.7	15.05	15.5

1. **Nominal analysis** is a guideline only for standard products. Does not include all incidental elements and may differ depending on the exact specification/standard used when ordering.
2. **Hardness:** When written certification to a standard is required, please specify this when ordering. Certain products can also be certified to EN DIN, AMS, SAE and or other standards. Please contact us for mare details. Hardness numbers depend on the degree of cold working.
3. **Undiluted weld metal:** Please note undiluted weld metal is depending upon the process parameters the chemistry and the hardness of weld deposit can vary from the values provided in the tables above.

DUROLIT 12

SERVICE TEMPERATURE:

up to 750 °C

Classification:

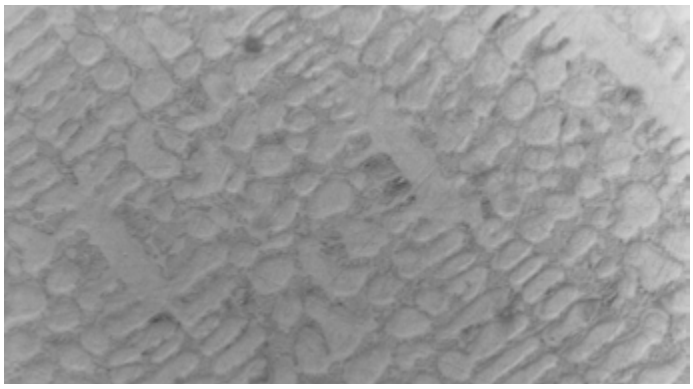
DIN EN 14700:	*DIN 8555:*	*AWS A 5.21:*
T Co3-50	*MF 20-50-CTZ*	*ERCCoCr-B*

General characteristics:

DUROLIT 12 is a cobalt-based Flux-Cored Wire for Gas Metal Arc Welding (GMAW) applications. DUROLIT 12 deposits a cobalt-based alloy with an austenitic structure that results in a median alloy between the DUROLIT 1 and the DUROLIT 6. The structure exhibits more hard chromium and tungsten carbides within the CoCr-matrix. The DUROLIT 12 alloy offers excellent resistance of chemical and mechanical degradation such as, corrosion, impact, galling, erosion, abrasion wear and thermal shock. DUROLIT 12 can be used for higher temperature properties compared to DUROLIT 6 because of the higher content of tungsten. The alloy bonds to all weldable steels and is machinable with carbide tools.

Nominal analysis of undiluted weld metal in % by wt.[1, 3]:

C	Si	Mn	Cr	W	Fe	Co
1.4	1	0.8	29	8	< 4	bal.



Common applications:

- knife edges
- slitters
- rollers
- valves
- cutters
- vane edges
- shear blades
- bearing surfaces

Thermal and electrical characteristics:

Thermal conductivity:	Electrical resistivity:	Magnetism:
14.6 W/(m*K)	98 µΩ*cm	no

Physical characteristics:

Hardness[2]			Melting Range	Tensile Strength:	Density:
20 °C	400 °C	600 °C			
46 - 48 HRC	38 HRC	36 HRC	1,200 - 1,365 °C	850 N/mm²	8.53 g/cm³

Nominal thermal expansion coefficient (average for the stated temperature range) [µm/(m*K)]:

20 - 100 °C	20 - 200 °C	20 - 300 °C	20 - 400 °C	20 - 500 °C	20 - 600 °C	20 - 700 °C	20 - 800 °C	20 - 900 °C
11.5	12.1	12.6	12.9	13.3	13.8	14.3	14.8	15.2

Pre-heating: pre-heat temperature and working temperature should be chosen based on variables such as base material and its construction. **Machining:** only by carbide tools and grinding.

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2. **Hardness:** When written certification to a standard is required, please specify this when ordering. Certain products can also be certified to EN DIN, AMS, SAE and or other standards. Please contact us for mare details. Hardness numbers depend on the degree of cold working.
3. **Undiluted weld metal:** Please note undiluted weld metal is depending upon the process parameters the chemistry and the hardness of weld deposit can vary from the values provided in the tables above.

DUROLIT 21

SERVICE TEMPERATURE:

up to 900 °C

Classification:

DIN EN 14700:	*DIN 8555:*	*AWS A 5.21:*
T Co1-300	*MF 20-300-CKTZ*	*ERCCoCr-E*

General characteristics:

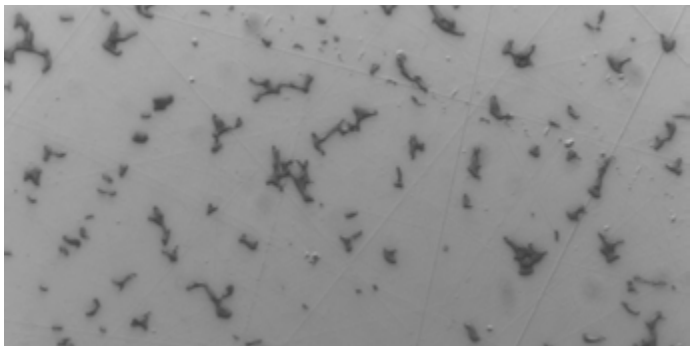
DUROLIT 21 is a cobalt-based flux-cored wire for Gas Metal Arc Welding (GMAW) applications. DUROLIT 21 deposits a cobalt-based alloy with a low carbon austenitic structure. This structure exhibits dispersed hard chromium and molybdenum carbides within the CoCrMo-matrix and is the toughest of the cobalt alloys. The DUROLIT 21 alloy offers excellent resistance of chemical and mechanical degradation such as, corrosion, impact, self-mated anti-galling, erosion, metal-to-metal sliding wear and thermal and mechanical shock. DUROLIT 21 is higher resistant in reducing gas-atmospheres than DUROLIT 6. DUROLIT 21 is work-hardening during impact wear and machining. The alloy bonds to all weldable steels and is machinable with carbide inserts or tooling.

Common applications:

- steam valves
- petrochemical valves
- hot shears
- piercing plugs
- chemicals valves
- forging dies
- stamping dies
- acid & sour gas components

Nominal analysis of undiluted weld metal in % by wt.[1, 3]:

DUROLIT	C	Si	Mn	Cr	Ni	Mo	Fe	Co
21	0.25	1	0.8	28	2.5	5.5	< 4	bal.
21 LC	0.2	1	0.8	28	2.5	5.5	< 4	bal.



Thermal and electrical characteristics:

Thermal conductivity:	Electrical resistivity:	Magnetism:
14.5 W/(m*K)	87.38 µΩ*cm	no

Physical characteristics:

Product	Hardness[2] 20 °C	Melting Range	Tensile Strength:	Density:
DUROLIT 21	30 - 35 HRC (up to 45 HRC work hardened)	1,295 - 1,435 °C	850 N/mm²	8.33 g/cm³
DUROLIT 21 LC	25 - 30 HRC (up to 40 HRC work hardened)			

Nominal thermal expansion coefficient (average for the stated temperature range) [µm/(m*K)]:

20 - 100 °C	20 - 200 °C	20 - 300 °C	20 - 400 °C	20 - 500 °C	20 - 600 °C	20 - 700 °C	20 - 800 °C	20 - 900 °C
11.0	11.2	12.0	12.6	13.1	13.6	14.3	14.7	15.2

1. **Nominal analysis** is a guideline only for standard products. Does not include all incidental elements and may differ depending on the exact specification/standard used when ordering.
2. **Hardness:** When written certification to a standard is required, please specify this when ordering. Certain products can also be certified to EN DIN, AMS, SAE and or other standards. Please contact us for mare details. Hardness numbers depend on the degree of cold working.
3. **Undiluted weld metal:** Please note undiluted weld metal is depending upon the process parameters the chemistry and the hardness of weld deposit can vary from the values provided in the tables above.

DUROLIT 25

SERVICE TEMPERATURE:

up to 980 °C

Classification:

DIN EN 14700: *T Co1-300*

DIN 8555: *MF 20-300-CKTZ*

General characteristics:

DUROLIT 25 is a cobalt-based flux-cored wire for Gas Metal Arc Welding (GMAW) applications. DUROLIT 25 deposits a cobalt-based alloy with a low carbon austenitic structure. This alloy contains approximately 10 % nickel for matrix stability during elevated service temperature. It is resistant to hot corrosion, impact, wear and extreme temperature shocks and oxidation. The alloy is machineable by carbide tools. DUROLIT 25 is used for parts subjects to high operating temperatures in combination with all types of wear such as impact, pressure, corrosion, erosion.

Nominal analysis of undiluted weld metal in % by wt[1, 3]:

C	Si	Mn	Cr	Ni	W	Fe	Co
0.1	1	0.5	20	10	14.5	< 4	bal.

Common applications:

- hot forging tools
- aerospace industry
- turbo charger buckets
- gas turbine components
- steam valves
- chemical valves
- tong bits
- shear blades, pumps (high-temp liquides)

Physical characteristics:

Hardness[2]	Melting Range	Tensile Strength:	Density:
20 - 30 HRC (up to 45 HRC work hardened)	1,329 - 1,410 °C	630 N/mm²	8.31 g/cm³

Nominal thermal expansion coefficient (average for the stated temperature range) [µm/(m*K)]:

20 - 100 °C	20 - 200 °C	20 - 300 °C	20 - 400 °C	20 - 500 °C	20 - 600 °C	20 - 700 °C	20 - 800 °C	20 - 900 °C
12.3	12.9	13.6	14.0	14.3	14.6	15.1	15.8	16.5

Pre-heating: pre-heat temperature and working temperature should be chosen based on variables such as base material and its construction. **Machining:** only by carbide tools and grinding.

1. **Nominal analysis** is a guideline only for standard products. Does not include all incidental elements and may differ depending on the exact specification/standard used when ordering.
2. **Hardness:** When written certification to a standard is required, please specify this when ordering. Certain products can also be certified to EN DIN, AMS, SAE and or other standards. Please contact us for mare details. Hardness numbers depend on the degree of cold working.
3. **Undiluted weld metal:** Please note undiluted weld metal is depending upon the process parameters the chemistry and the hardness of weld deposit can vary from the values provided in the tables above.

FLUX-CORED WIRES: COBALT BASE ALLOYS

Application	Abrasion	Corrosion	Erosion	Oxidation	Adhesive wear	Cavitation	Impact	Heat	Thermal Shock	Fatigue	Fretting	Cutting	Typical Co-based alloy
Steel													
Sheet and scale breaker rollers	+	+			+			+					DUROLIT 12
Tube mill – piercing plugs	+		+		+				+				DUROLIT 6, 21
Soaking pit – tong bits	+							+	+				DUROLIT 1, 6, 12
Bar mill – twist and guide rolls					+		+	+	+				DUROLIT 12
Hot shears					+			+	+				DUROLIT 6, 21
Galvanizing rolls		+			+			+					DUROLIT 6
Forging and Pressing													
Forging dies and other hot working tools			+				+	+	+	+			DUROLIT 6, 21
Cold working tools (sheet metal pressing)					+							+	DUROLIT 1, 12
Power Generation													
Steam valves			+			+		+					DUROLIT 6
Erosion shields			+			+		+					DUROLIT 6
Valves, pumps, etc.	+	+	+		+			+					DUROLIT 1, 6, 12, 21, 25
Cutting													
Chain saw bars					+			+	+				DUROLIT 6, 12
Scraper knives	+	+											DUROLIT 6, 12
Saw tipping	+				+			+	+				DUROLIT 12
Knives: carpet, rubber	+	+			+			+					DUROLIT 6, 12
Cutter rolls	+	+											DUROLIT 12
Aircraft													
Turbine blade tipping			+					+					DUROLIT 12
High pressure blade (deposits on interlocking)			+					+					DUROLIT 6
Gas turbine lock plates				+							+		DUROLIT 25, 31
Timber, Paper, Pulp													
Tipping saw blades	++	+											DUROLIT 12
Chain saw guide bars	+	+			+								DUROLIT 12
Chipping knives	+	+											DUROLIT 12
Hydropulper disc segments	+	+						+					DUROLIT 1
Rotary feeder	+	+											DUROLIT 6, 12
Paper slitters / knives	+												DUROLIT 12
Petrol engine													
Valve seats, stem tips	+	+	+		+			+	+	+			DUROLIT F, 6, 12
Combustion engines													
Valve seats, cages, rocker pads, stem tips	+	+	+		+			+	+	+			DUROLIT 6, 12
Crossheads					+			+	+				DUROLIT 1
Shipbuilding													
Bearings and bushes for rudder stocks	+	+			+								DUROLIT 6
Rudders, stabilizers, hydroplanes	+	+			+								DUROLIT 6
Associated steering gear	+	+			+								DUROLIT 6
Chemical & Petrochemical													
Valves: seats, discs, gates, balls, plugs	+	+	+		+			+					DUROLIT 1,6, 12, 21, 25
Pumps: impeller and casing rings, rotors, seals	+		+		+	+		+					DUROLIT 1, 6, 12, 21, 25
Pumps: balancing drums, pump shafts	+		+		+	+		+					DUROLIT 1, 6, 12, 21, 25
Agitators: bearings and paddles	+	+			+			+					DUROLIT 6
Screws: conveyor and extruder	+	+	+		+			+					DUROLIT 6, 12
Oil drilling: rock bits	+				+								DUROLIT 1, 190
Rubber													
Fly and dead knives	+												DUROLIT 12
Mixer rotors, bodies and tips sides	+	+	+					+					DUROLIT 1, 6
Others													
Screws, sewage, plastic extrusion	+	+			+			+					DUROLIT 1, 6, 12
Rendering, oil extraction	+	+			+			+					DUROLIT 1, 6, 12
Centrifuge screw flights	+	+						+					DUROLIT 1
Mechanical seals		+			+								DUROLIT 6, 12
Dry cell battery tooling	+	+						+					DUROLIT 6
Brick trimming dies	+												DUROLIT 6

Nickel base Alloys

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	
DUROLOY 520W	0.05	-	-	19	bal.	6	10	-	0.3	5	-	Ti: 3, Al: 2	32 - 35 HRC, 45 HRC workhardened
DUROLOY 521	0.06	-	-	20	bal.	6	11	-	-	0.8	-	Ti: 3, Al: 2	32 - 35 HRC, 45 HRC workhardened
DUROLOY 625 2.4621	0.05	0.3	0.5	22	bal.	9	-	3.5	-	-	< 3	-	
DUROLOY CO 2.4887	0.08	-	-	16	bal.	16	2.5	-	0.3	4.5	< 5	-	260 - 280 HB, 420 HB workhardened
DUROLOY SE 1/58	0.75	4.7	-	20	bal.	-	-	-	-	-	< 5	B: 3,2	58 - 62 HRC
DUROLOY SE 6/40	0.4	4.5	-	22	bal.	-	-	-	-	2	< 5	B: 1,4	41 - 43 HRC
DUROLOY SE 12/50	0.6	4.9	-	21	bal.	2.5	-	-	-	-	< 5	B: 2,8	48 - 52 HRC
DUROLOY SE 21/35	0.35	4.5	-	20	bal.	-	-	-	-	2	< 4	B: 0,7	34 - 36 HRC
DUROLOY SE 56	0.65	4.6	0.2	21	bal.	2.5	-	-	-	-	-	B: 2,9	55 - 58 HRC

DUROLOY 520W

DIN EN 14700: T Ni2-40-CKPTZ / DIN 8555: MF 23-40-CKPTZ

CrCoMoTiAlW-alloyed nickel based weld metal. Hardenable alloy with an exceptional combination of high temperature mechanical property, forgeability and corrosion resistance. Crack-free.

DUROLOY 521

DIN EN 14700: T Ni2-40-CKPTZ / DIN 8555: MF 23-40-CKPTZ

High-temperature hardness and heat resistance. Good corrosion resistance and wear resistance. Application: armour of hammer saddles

DUROLOY 625

Ni Cr 20 Mo 9 Nb / E Ni Cr Mo 3

High resistance against many corrosive mediums, pittings, tension cracking and gap corrosion, high scaling resistance and heat hardening treatment. Application: chemical industry, furnace parts. Also suitable in freezing temperatures as well as cold hardened metals.

DUROLOY Co

DIN EN 14700: T Ni2-250-CKNPT / DIN 8555: MF 23-250-CKNPTZ

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 even at elevated temperature. Application: hard-facing on forging dies and other hot working tools.

DUROLOY SE 1/58

IN EN 14700: T Ni1-60CGTZ / DIN 8555: MF 22-60-CGTZ

Nickel based alloy deposit with properties like those of its Stellite* counterpart with good hardness, heat resistance, temperature shock resistance, corrosion and wear resistance.

DUROLOY SE 6/40

DIN EN 14700: T Ni1-40CGTZ / DIN 8555: MF 22-40-CGTZ

Flux-Cored Wire for oxy-acetylene, WIG or MIG welding. Hot hardness, temperature shock resistance and corrosion and wear resistance.

DUROLOY SE 12/50

DIN EN 14700: Ti Ni1-50ZGTC / DIN 8555: MF 22-50-CGTZ

High hot hardness, corrosion resistance, heat resistance, wear resistance and thermal shock constancy. Application: chemical industry, nuclear technology field, etc.

DUROLOY SE 21/35

DUROLOY SE 21/35

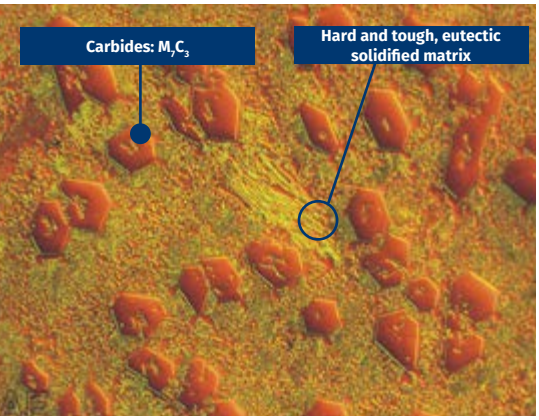
High hot hardness, corrosion resistance, heat resistance, wear resistance and thermal shock constancy. Application: chemical, automobile and food industries, nuclear technology.

DUROLOY SE 56

DIN EN 14700: T Ni 1-55CGTZ / DIN 8555: MF 22-55-CGTZ

High hot hardness, corrosion resistance, heat resistance, wear resistance and thermal shock constancy. Application: oil press screws, chemical industry.

DURMAT® CP WEAR PLATES



Fe-hard alloy Fe14 according to DIN EN 14700 (group 10 former DIN 8555)

The fabrication of the DURMAT® CP Plates are carried out by use of a Flux-Cored 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 accordance to the DIN EN 14700 (group 10 former DIN 8555).

The characteristic, hyper-eutectic weld metal of the FeCrC hard-facing alloy consists of large, primary deposited carbides of the type M_7C_3, 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 DURMAT® FD 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.

Wear Protection influencing factors:

- Amount of hard particles;
- Character of hard particles;
- Size of hard particles;
- Composition of the matrix;
- Bonding to the matrix;
- Line spacing.

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.

BASE MATERIAL (mm)	COATING (mm)	TOTAL (mm)	WEIGHT (kg/m²)
3	3	6	46
5	3	8	62
6	4	10	78
6	5	11	85
8	5	13	100
8	8	16	125
10	8	18	140
12	12	24	186

other dimensions available on request

DURMAT® CP 960

FeCrC - Wear Plate

General characteristics:

DURMAT® CP 960 is a composite hard-facing plate consisting of a weldable steel plate and a wear resistant coating composed of the core wire DURMAT® FD 56. The hard-faced coating of FeCrC-alloy is related to the alloy group Fe14 acc. to EN 14700 (group 10 former DIN 8555). The high content of Chromium carbides in combination with borides produces an adamantine and wear resistant coating.

Applications:

These coatings are useful in the ceramics industry, mineral crushing, mining industry, fan and other applications that have high demands for wear resistance.

Technical data*:

Plate dimensions:	2,850 x 1,300 mm
Coated area:	3.70 m²
Base material:	S235, S355, S690

Typical weld metal analysis, 1st Layer (wt.-%):

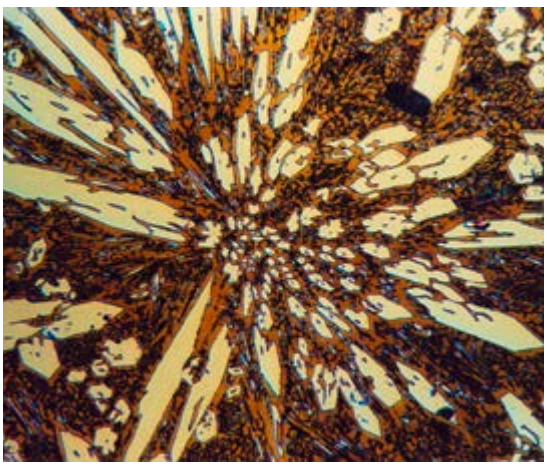
C	Cr	Fe	CARBIDE CONTENT
4.85	28.8	Bal.	60 %

Hardness of the all weld material:

58 - 60 HRC

Maximum working temperature:

≈ 350 °C



Advantages of DURMAT® CP 960:

- highly wear-resistant;
- hardness: 58 - 60 HRC;
- high content of Chromium carbide;
- sensitive to impact impinging loads;
- easy weldable base material;
- working temperature: ≈ 350 °C.

**) further plate dimensions are availableon request*

DURMAT® CP 1000

FeCrNbC - Wear Plate

General characteristics:

DURMAT® CP 1000 is a composite hard-facing plate consisting of a weldable steel plate and a wear resistant coating composed of a core wire coating DURMAT® FD 60. The hardface coating of C-Cr-alloy with additional incorporated complex carbides related to the alloy group Fe15 according to DIN EN 14700 (group 10 former DIN 8555). Chromium and Niobium carbides in combination with borides produce an adamantine and wear resistant coating applied for components exposed to energizing wear. In addition, the Niobium monocarbides act as a nucleating agent. This is not suitable for impact and impinging loads.

Applications:

This is useful for cement and concrete pumps, coatings for the ceramics industry, mineral rushing, mining industry, fan and recycling industries.

Technical data*:

Plate dimensions:	2,850 x 1,300 mm
Coated area:	3.70 m²
Base material:	S235, S355, S690 (others on request)

Typical weld metal analysis, 1st Layer (wt.-%):

C	Cr	Nb	Fe	CARBIDE CONTENT
4.7	19.8	4.3	Bal.	min. 58 %

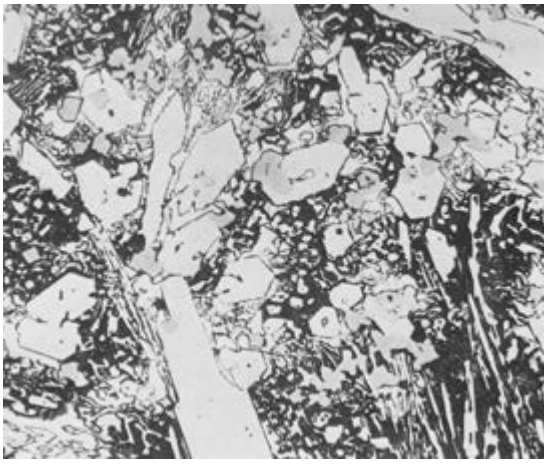
Hardness of the all weld material:

61 - 63 HRC

Maximum working temperature:
≈ 350 °C

Advantages of DURMAT® CP 1000:

- high content of Chromium carbide;
- fine carbide distribution due to Nb-monocarbides as a nucleating agent;
- sensitive to impact impinging loads;
- easy weldable base material;
- working temperature: ≈ 350 °C.



**) further plate dimensions are availableon request*

DURMAT® CP 1100

FeCrC - Complex Carbide Wear Plate

General characteristics:

DURMAT® CP 1100 is a composite hard-facing plate consisting of a weldable steel plate and a wear resistant coating, which offers high wear protection against abrasion and moderate impact and impinging load. The coatings are qualified for corrosion protection. The coating of a FeCrC-alloy with additional incorporated complex carbides of the type CrC, NbC, VC, WC and MoC is related to the alloy group Fe16 according to DIN EN 14700 (group 10 former DIN 8555). The addition of Tungsten and Molybdenum cause an increase in wear resistance and an increase of the heat resistance. So temperatures up to 650 °C can be realized.

Applications:

Steel fabrication, fans in the hot gas area, foundries.

Technical data*:

Plate dimensions:	2,850 x 1,300 mm
Coated area:	3.70 m²
Base material:	S235, S355, S690 (others on request)

Typical weld metal analysis, 1st Layer (wt.-%):

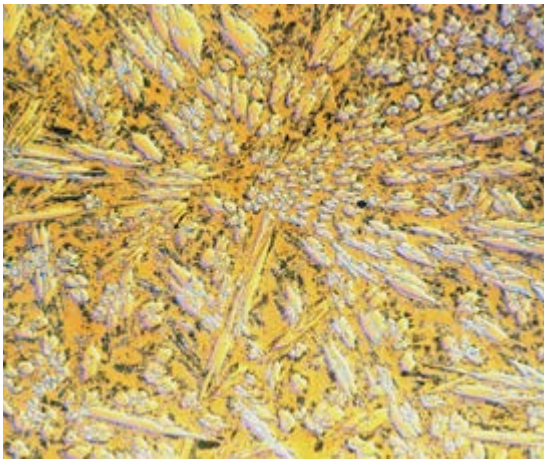
C	Cr	Nb	Mo	W+V	Fe	CARBIDE CONTENT
4.7	18.9	4.7	4.8	2.5	Bal.	60 %

Hardness of the all weld material:

63 - 65 HRC

Maximum working temperature:

≈ 650 °C

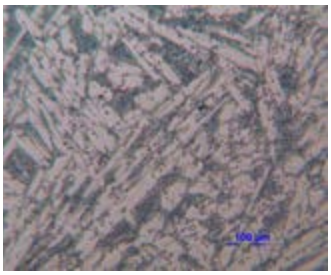


Advantages of DURMAT® CP 1100:

- highly wear-resistant;
- hardness: 63 - 65 HRC;
- Cr-, Nb- and V-carbides cause a very high wear resistance;
- good heat resistance because of high addition of Molybdenum and Tungsten;
- complex carbides in the form of CrC, NbC, VC, WC and MoC;
- qualified corrosion resistance;
- sensitive to impact impinging loads;
- max. working temperature: ≈ 800 °C.

**) further plate dimensions are availableon request*

DURMAT® CP WEAR PLATES



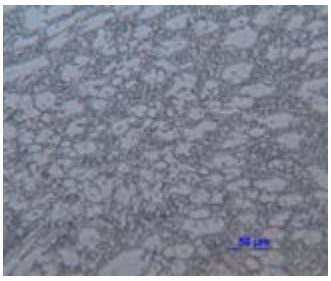
DURMAT® CP 990 *Application in accordance with DURMAT® FD 62*

hardness: 60 - 63 HRC

- high content of Chromium carbide;
- fine carbide distribution due to Nb-monocarbides as a nucleating agent;
- sensitive to impact impinging loads;
- easy weldable base material;
- working temperature: ≈ 350 °C.

Applications:

Useful for cement and concrete pumps, coatings for the ceramics industry, mineral rushing, mining industry, fan and recycling industries.

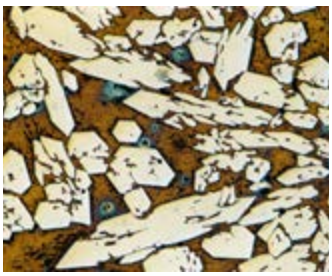


DURMAT® CP 1050 *Application in accordance with DURMAT® FD 79*

- extremely wear-resistant;
- hardness: 64 - 68 HRC;
- high content of Cr-, Nb- and VC;
- high carbide content in combination with borides increases the wear resistance;
- excellent weldability;
- sensitive to impact impinging loads;
- easy weldable base material;
- working temperature: ≈ 350 °C.

Applications:

Useful for cement and concrete pumps, coatings for the ceramics industry, mineral rushing, mining industry, fan and recycling industries.

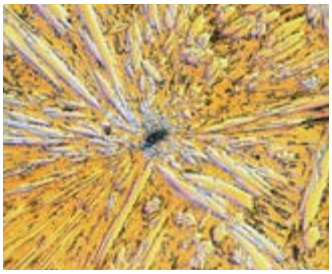


DURMAT® CP 1168 *Application in accordance with DURMAT® FD 68*

- highly wear-resistant;
- hardness: 66 - 68 HRC;
- very high content of Chromium carbides;
- high carbide content in combination with borides increases wear resistance;
- very good heat resistance;
- max. 2 layers;
- sensitive to impact impinging loads;
- max. working temperature: ≈ 800 °C.

Applications:

Steel fabrication, fans in the hot gas area, foundries, mining, and parts subject to high temperature in steel work application.



DURMAT® CP 1175 *Application in accordance with DURMAT® FD 75*

- highly wear-resistant;
- hardness: 62 - 64 HRC;
- high content of carbides: CrC, NbC, VC, WC and MoC;
- sensitive to impact impinging loads;
- max. working temperature approx. 700 °C.

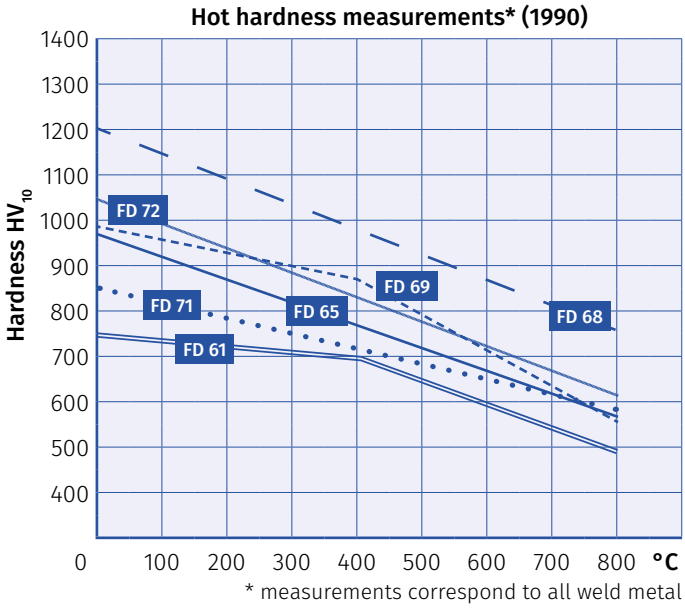
Applications:

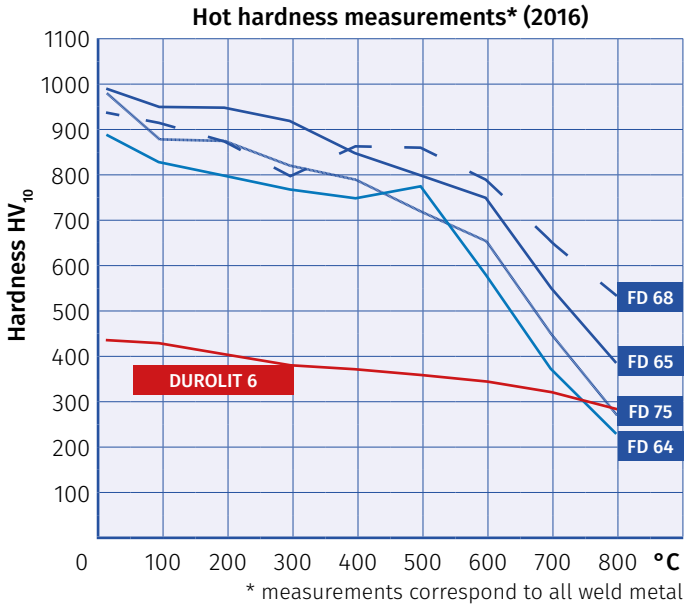
Low coefficient to friction without lubrication for metal-to-metal action. Improved impact resistances compared to other hard-faced wear plates.

Typical Chemical Composition of All Weld Metal (wt.-%)

DURMAT®	C	Si	Mn	Cr	B	Mo	Nb	V	W	Fe	HARDNESS	MAX. WORKING TEMPERATURE
CP 960	5.4	~1	< 0.5	32	+	-	-	-	-	rest	≈ 58 - 60 HRC	≈ 350 °C
CP 990	5.4	~1	< 0.5	29	+	-	3	-	-	rest	≈ 60 - 63 HRC	≈ 350 °C
CP 1000	5.2	~1	< 0.5	22	+	-	7	-	-	rest	≈ 61 - 63 HRC	≈ 350 °C
CP 1050	5	~1	< 0.5	21	1.3	-	6	2.5	-	rest	≈ 64 - 68 HRC	≈ 350 °C
CP 1100	5.2	~1	< 0.5	21	+	7	7	1	2	rest	≈ 63 - 65 HRC	≈ 800 °C
CP 1168	5	~1	< 0.5	38	2	-	-	-	-	rest	≈ 66 - 68 HRC	≈ 800 °C
CP 1175	5.2	~1	< 0.5	22	+	4.5	6.4	0.8	1.4	rest	≈ 62 - 64 HRC	≈ 700 °C

ADDITIONAL INFORMATION





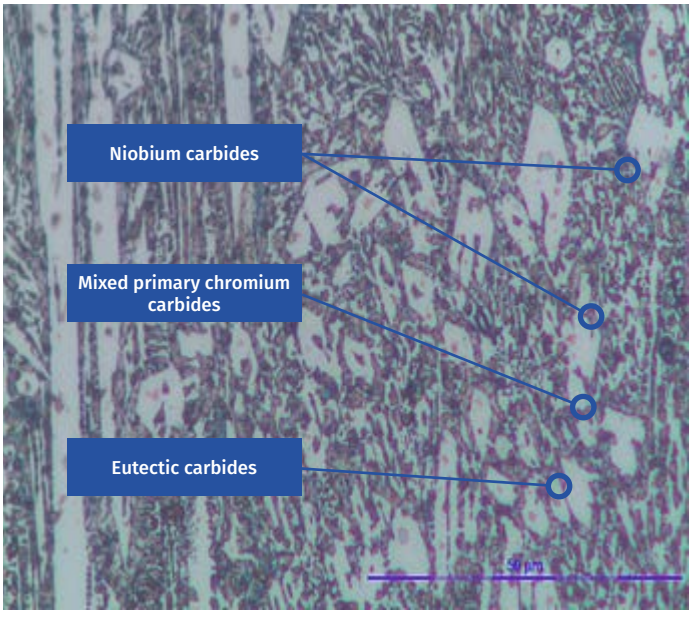
Product	Hardness	Hardness reduction at			
		200 °C	400 °C	600 °C	800 °C
DURMAT® FD 61	62 - 65 HRC	6 %	11 %	24 %	36 %
DURMAT® FD 65	63 - 65 HRC	12 %	21 %	32 %	43 %
DURMAT® FD 68	66 - 68 HRC	9 %	21 %	30 %	38 %
DURMAT® FD 69	64 - 67 HRC	6 %	12 %	29 %	46 %
DURMAT® FD 71	66 HRC	7 %	16 %	26 %	35 %
DURMAT® FD 72	60 - 63 HRC	8 %	18 %	30 %	42 %

Product	Hard phase content
DURMAT® FD 64	62 - 66 %
DURMAT® FD 65	64 - 66 %
DURMAT® FD 68	82 - 85 %
DURMAT® FD 75	55 - 65 %

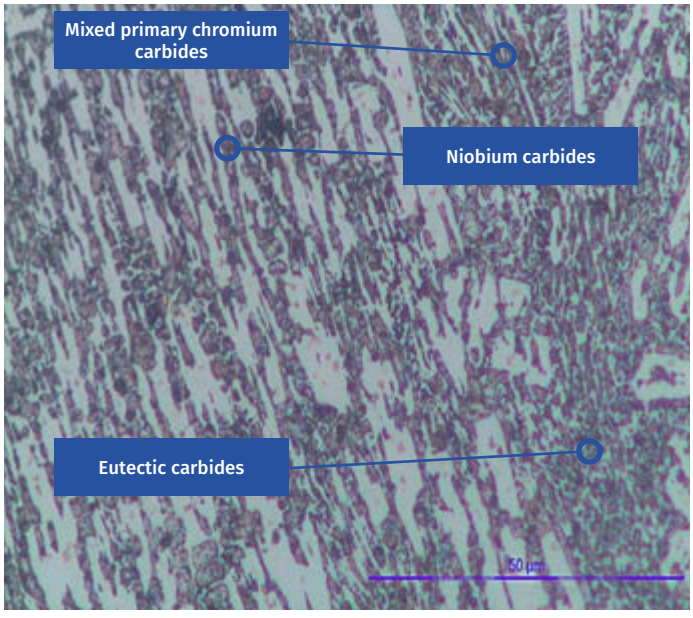
At high temperatures, hot hardness correlates with the hard phase content!

Wear Plate **DURMAT® CP 1100** (DURMAT® FD 65)

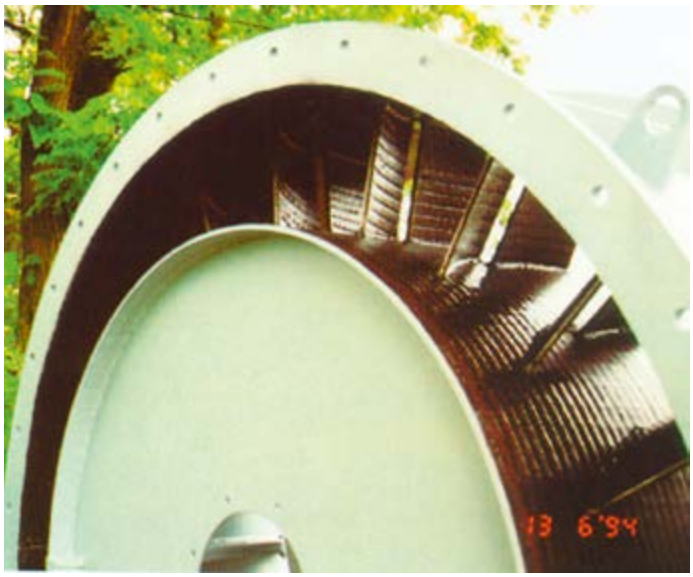
Microstructure in the 1st layer

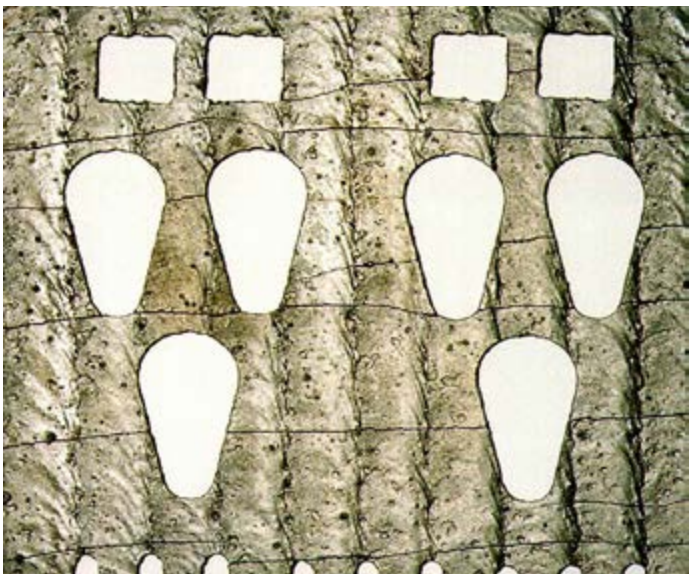


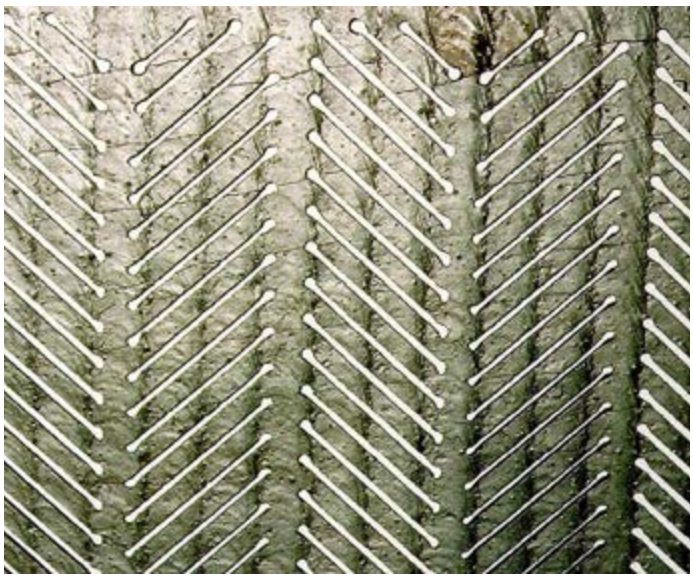
Microstructure in the 2nd layer



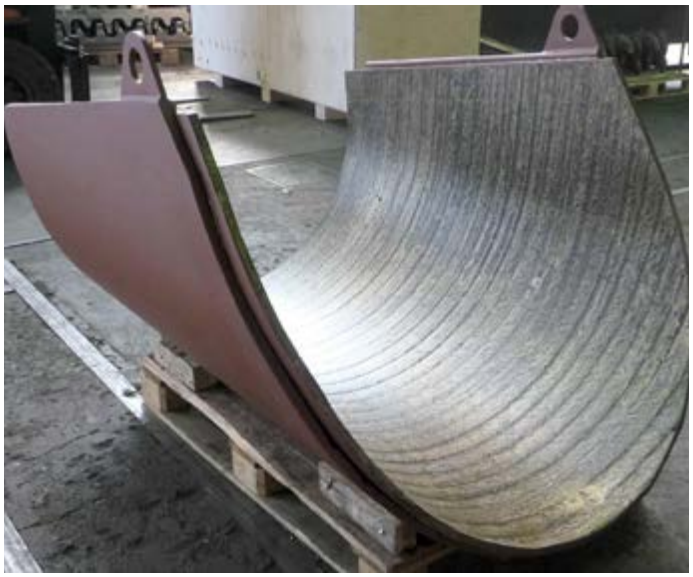
TYPICAL APPLICATIONS OF WEAR PLATES







TYPICAL APPLICATIONS OF WEAR PLATES



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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.

Base material [mm]	Coating [mm]	Total [mm]
3	2	5
5	3	8
6	4	10
6	5	11
8	5	13
8	8	16
10	8	18

Other types according to customers specifications e.g. stainless, heat resisting, high strength, etc.

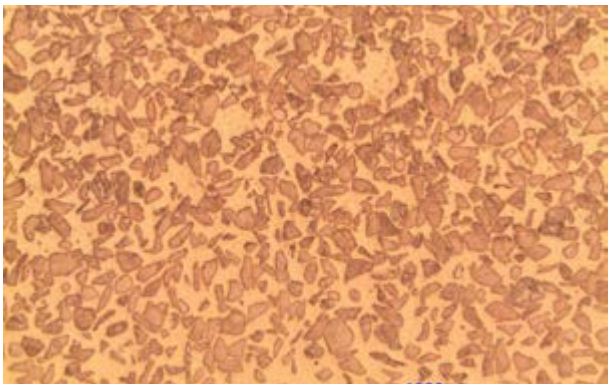
Typical carbides:

TiC; VC; NbC; Cr_7C_3; FTC; SFTC; WC; WC/Co; WC/Ni

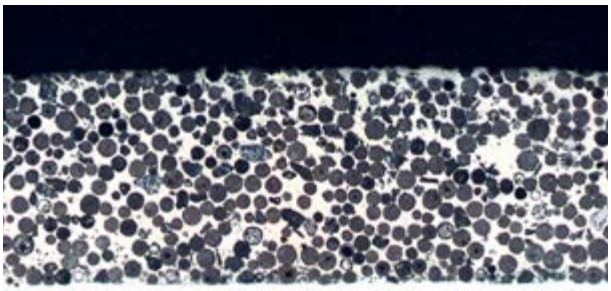
Carbide content and distribution related to different physical properties such as density and melting point are widely controllable. This is mainly because of the application and development for the components of the plasma torch, the powder feeder as well as the development of the welding parameters based on the internal Know-How of DURUM VERSCHLEISS-SCHUTZ GMBH.

Applications:

Fan components, conveyor and separator tubes, coal mills, silo coatings, cement fabrication, concrete mixer, grit blasting components, exhaust filters and cyclones, crusher and mill coatings, combustion components, power plants and others.



DURMAT® 1061 WP



DURMAT® 1062 WP

Delivery form:

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

DURMAT® 1061 WP

PTA Wear Plate

General characteristics:

DURMAT® 1061 WP is a composite hard-facing plate consisting of a weldable steel plate and a wear resistant coating. The hard-facing layer consists of a Ni-B-Si-matrix alloy with embedded Fused Tungsten Carbide (FTC). The Chromium free alloy enables higher hardness compared to the M_7C_3 type and comprises higher matrix hardness. The incorporated FTC offers a specific hardness larger than 2,360 HV. The low melting point of the matrix alloy, as well as the plasma processing of the composite material, enables a metallurgical bonding to the base material and a minimized dilution.

Applications:

To be applied to sliding, grooving, rolling impact wear; superior properties for temperatures up to 500 °C.

Technical data*:

PLATE THICKNESS	PLATE DIMENSIONS	COATED AREA	MIN. COATING THICKNESS	BASE MATERIAL
2 - 8 mm	2,000 x 1,000 mm	1,800 x 800 mm	2 mm ± 0.5 mm	S235, S355, S690, 1.4304, 1.4824
4, 5, 6, 8 mm	2,500 x 1,250 mm	2,300 x 1,100 mm	2 mm ± 0.5 mm	S235, S355, S690, 1.4304, 1.4824

Hardness of the weld material:

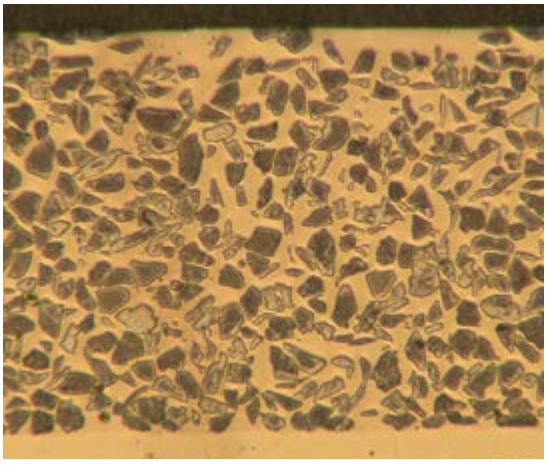
50 - 55 HRC

Hardness of the DURMAT® FTC:

> 2,360 HV

Advantages of DURMAT® 1061 WP:

- Chromium free Ni-B-Si-matrix;
- Embedded Fused Tungsten Carbide (60 wt.-% FTC);
- Highly wear resistant;
- Limited corrosion resistance;
- Low grade of dilution with the base material (approx. 5 %);
- Dense surface, low coefficient of friction;
- Low weight, enables high rotation speed of fans;
- High formability, the plates can be cut via plasma;
- Easy weldable base material.



**) further plate dimensions are availableon request*

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DURMAT® 1062 WP

PTA Wear Plate

General characteristics:

DURMAT® 1062 WP is a composite hard-facing plate consisting of a weldable steel plate and a wear resistant coating similar to the 1061 WP. Contrary to the 1061 WP Spherical Fused Tungsten Carbides (DURMAT® SFTC) are embedded into a Ni-B-Si matrix to achieve a high performance wear resistance coating. SFTC is known as one of the hardest and most wear resistant materials and achieves hardness values over 3,000 HV. The low melting point of the matrix alloy, as well as the plasma processing of the composite material enables a metallurgical bonding to the base material and a minimized dilution.

Applications:

To be applied to sliding, grooving, rolling impact wear; superior properties for temperatures up to 500 °C.

Technical data*:

PLATE THICKNESS	PLATE DIMENSIONS	COATED AREA	MIN. COATING THICKNESS	BASE MATERIAL
2 - 8 mm	2,000 x 1,000 mm	1,800 x 800 mm	2 mm ± 0.5 mm	S235, S355, S690, 1.4304, 1.4824
4, 5, 6, 8 mm	2,500 x 1,250 mm	2,300 x 1,100 mm	2 mm ± 0.5 mm	S235, S355, S690, 1.4304, 1.4824

Hardness of the weld material:

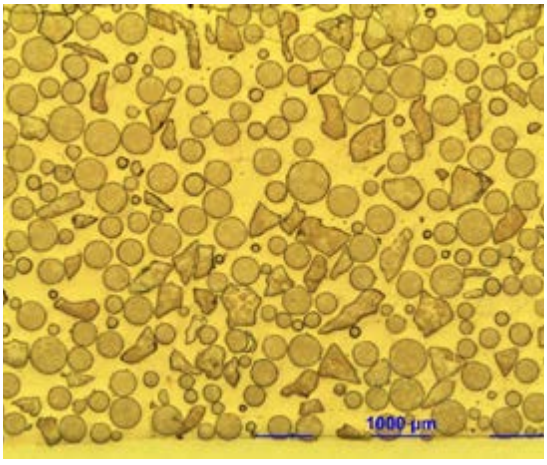
50 - 55 HRC

Hardness of the DURMAT® SFTC:

> 3,000 HV

Advantages of DURMAT® 1062 WP:

- Chromium free Ni-B-Si-matrix;
- Embedded Spherical Fused Tungsten Carbide (60 wt.-% SFTC);
- Extremely wear resistant;
- Limited corrosion resistance;
- Low grade of dilution with the base material (approx. 5 %);
- Dense surface, low coefficient of friction;
- Low weight, enables high rotation speed of fans;
- High formability, the plates can be cut via plasma;
- Easy weldable base material.



**) further plate dimensions are availableon request*

DURMAT® 1401 WP

PTA Wear Plate

General characteristics:

DURMAT® 1401 WP is a composite hard-facing plate consisting of a weldable ferritic or austenitic steel plate and a combined wear and corrosion resistant coating. The hardface coating consists of corrosion resistant NiCrMo-alloy reinforced with FTC. The Mo- and Cr matrix alloy allows the application even under corrosion loads up to working temperatures of 600 °C. The reinforcing FTC reveals hardness larger than 2,360 HV. By the use of the unique PTA system, a metallurgical bonding to the base material and a minimized dilution is achieved.

Applications:

To be applied to sliding, grooving, rolling impact wear; superior properties for temperatures up to 600 °C, good corrosion resistance.

Technical data*:

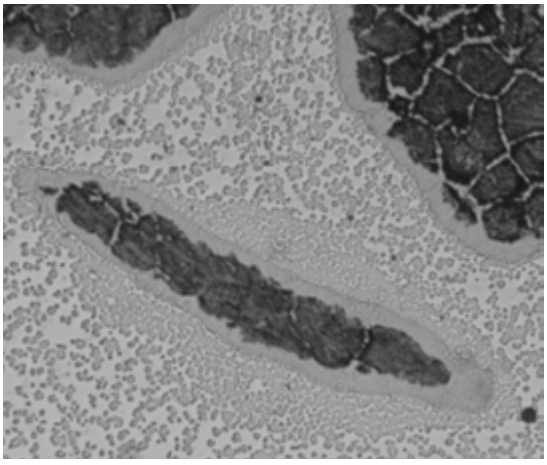
PLATE THICKNESS	PLATE DIMENSIONS	COATED AREA	MIN. COATING THICKNESS	BASE MATERIAL
2 - 8 mm	2,000 x 1,000 mm	1,800 x 800 mm	2 mm ± 0.5 mm	S235, S355, S690, 1.4304, 1.4824
4, 5, 6, 8 mm	2,500 x 1,250 mm	2,300 x 1,100 mm	2 mm ± 0.5 mm	S235, S355, S690, 1.4304, 1.4824

Hardness of the weld material:

55 - 60 HRC

Hardness of the DURMAT® FTC:

> 2.360 HV



Structure:

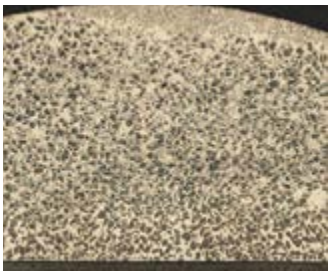
NiCrMo-Matrix + Fused Tungsten Carbides

Advantages of DURMAT® 1401 WP:

- NiCrMo-matrix;
- Embedded Fused Tungsten Carbide (60 wt.-% FTC);
- Highly wear resistant;
- Working temperature up to 600 °C;
- Corrosion resistant.
- Low grade of dilution with the base material (approx. 5 %);
- Dense surface, low coefficient of friction;
- Easy weldable base material.

**) further plate dimensions are availableon request*

DURMAT® PLATINUM WEAR PLATES

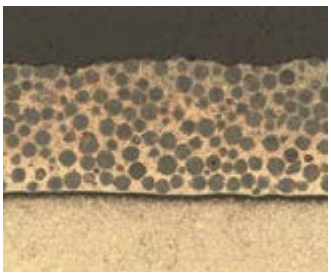


DURMAT® 1071 WP *PTA Wear Plate*

- NiFe-matrix;
- embedded Fused Tungsten Carbide (60 wt.-% FTC);
- highly wear resistant;
- working temperature up to 500 °C.

Applications:

To be applied to sliding, grooving, rolling impact wear; superior properties for temperatures up to 500 °C.

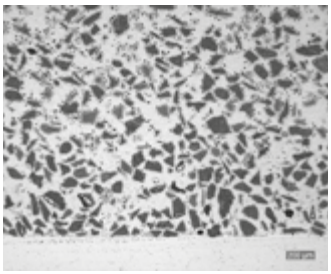


DURMAT® 1072 WP *PTA Wear Plate*

- NiFe-matrix;
- embedded Spherical Fused Tungsten Carbide (60 wt.-% SFTC);
- extremely wear resistant;
- working temperature up to 500 °C.

Applications:

To be applied to sliding, grooving, rolling impact wear; superior properties for temperatures up to 500 °C.

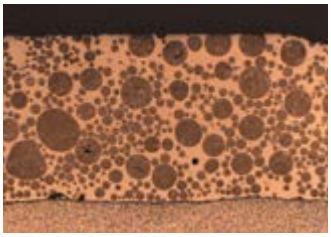


DURMAT® 1073 WP *PTA Wear Plate*

- NiFe-matrix;
- embedded Monocrystalline Tungsten Carbide (60 wt.-% MTC);
- extremely wear resistant;
- working temperature up to 500 °C.

Applications:

To be applied to sliding, grooving, rolling impact wear; superior properties for temperatures up to 500 °C.

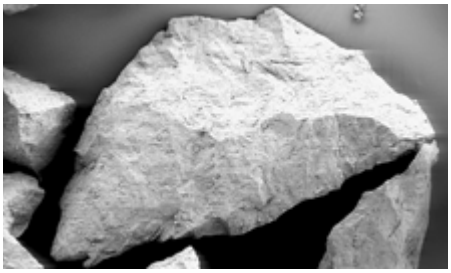


DURMAT® 1074 WP *PTA Wear Plate*

- NiFe-matrix;
- embedded Fused Tungsten Carbide (50 wt.-% FTC);
- embedded special carbides (< 10 wt.-%);
- extremely wear resistant;
- very good combination of temperature and abrasion resistance.

Applications:

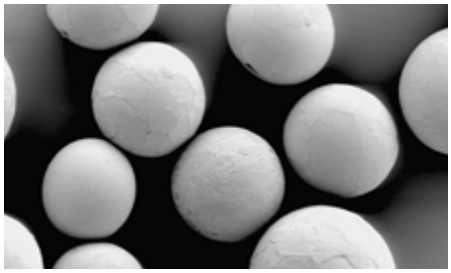
Especially designed for applications such as mining-, ceramic-, as well as austenitic and ferritic parts.



DURMAT® FTC

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

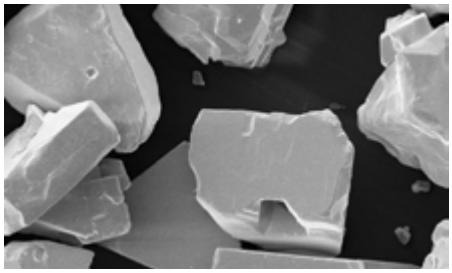
Hardness: > 2,360 HV.



DURMAT® SFTC

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

Hardness: > 3,000 HV.

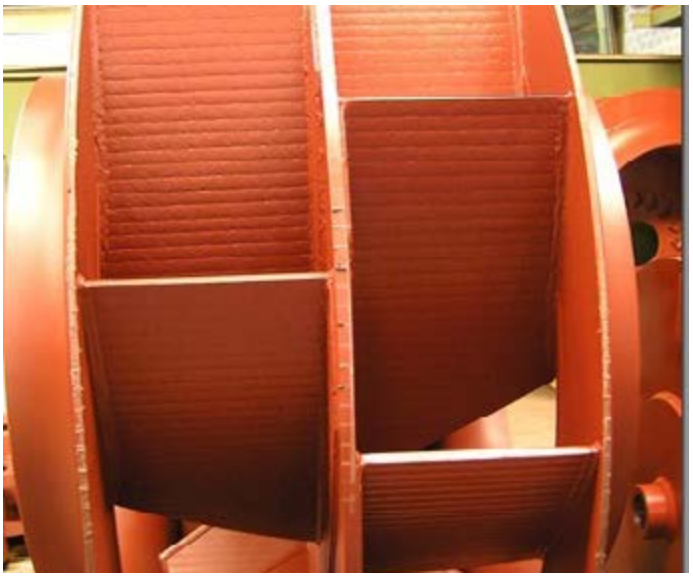


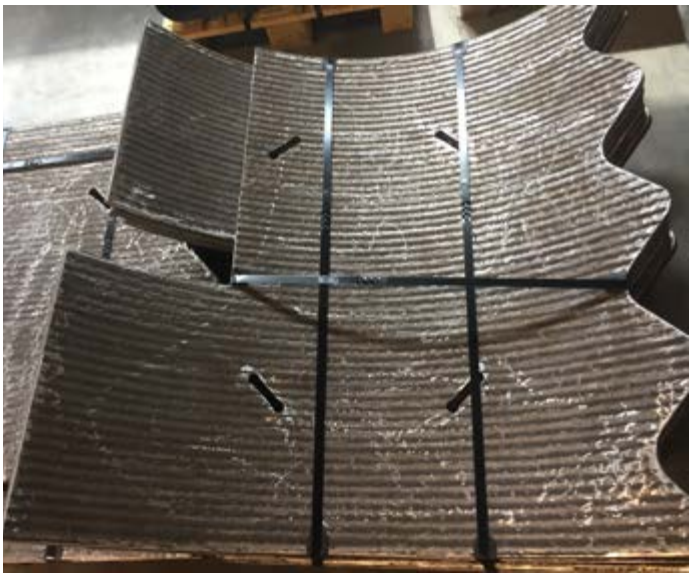
DURMAT® MCWC

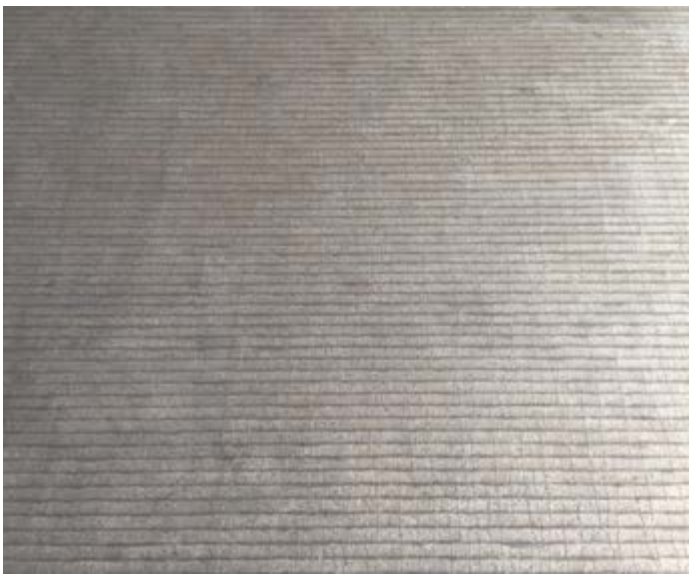
Monocrystalline tungsten carbides have good compatibility with nickel, making them very suitable for use as a hard phase component in the PTA process.

Hardness: 1,700 - 2,000 HV.

TYPICAL APPLICATIONS







Please observe all appropriate safety regulations in force. The technical information given in this data sheet reflects the present state of knowledge. They do not form part of any sales contract as guaranteed properties of the delivered materials. The given values are typical values which can vary due to different processes and process parameters. Our delivery and sales conditions apply to all contracts included.

TYPICAL APPLICATIONS

PTA EQUIPMENT AND ACCESSORIES

As a result of customer requests we have introduced new durable, reliable, and affordable mobile PTA machines DURWELD 250T-M PTA, DURWELD 300T-M PTA, DURWELD 400T-M PTA und DURWELD 800T-M PTA into the market. The systems are designed for ease of automation into heavy-duty industrial environments. Developed and manufactured by DURUM in Germany. This mobile and cost-efficient plasma powder welding systems are PLC-controlled, equipped with a HMI-interface and a separate water cooling unit. Gas flows are controlled by manual or electrical gas flow meters. The main inverter power source is primary-switched and generates a very stable arc that ensures consistent and repeatable coatings.

DURWELD 250T-M PTA

DURWELD 300T-M PTA
DURWELD 400T-M PTA
DURWELD 800T-M PTA

	DURWELD 250T-M PTA	DURWELD 300T-M PTA	DURWELD 400T-M PTA	DURWELD 800T-M PTA
Pilot arc current:	2 - 100 A (2 - 20 A at 100 % DC)		2 - 100 A (2 - 20 A at 100 % DC)	2 - 100 A (2 - 20 A at 100 % DC)
Main arc current:	5 - 280 A*, ** (180 A at 100 % DC)		3 - 400 A*, ** (3 - 250 A at 100 % DC)	5 - 800 A*, ** (5 - 500 A at 100 % DC)
Voltage supply:	3 x 400 V* + N ±10 %		3 x 400 V* + N ±10 %	3 x 400 V* + N ±10 %
Supply frequency:	50 / 60 Hz*		50 / 60 Hz*	50 / 60 Hz*
Supply fuse:	32 A* / 64 A*		32 A* / 64 A*	32 A* / 64 A*
Degree of protection:	IP 23		IP 23	IP 23
Gas adjustment:	Manual gas flow meters	Electrical gas flow meters	Electrical gas flow meters	Electrical gas flow meters
Plasma gas adjustment:	0,2 - 15 l/min		0,2 - 15 l/min	0,2 - 15 l/min
Shielding gas adjustment:	0,2 - 15 l/min		0,2 - 15 l/min	0,2 - 15 l/min
Transport gas adjustment:	0,2 - 15 l/min		0,2 - 15 l/min	0,2 - 15 l/min
Chiller Unit:	3,9 kW		3,9 kW	3,9 kW

* Depending on the user country electric data can differ!, ** at 20 % Duty Cycle!

PTA EQUIPMENT AND ACCESSORIES

PLC-controlled:

The use of a modern PLC system provides reliable operation and allows the easy integration in automatic production lines or robot cells.

Job Control:

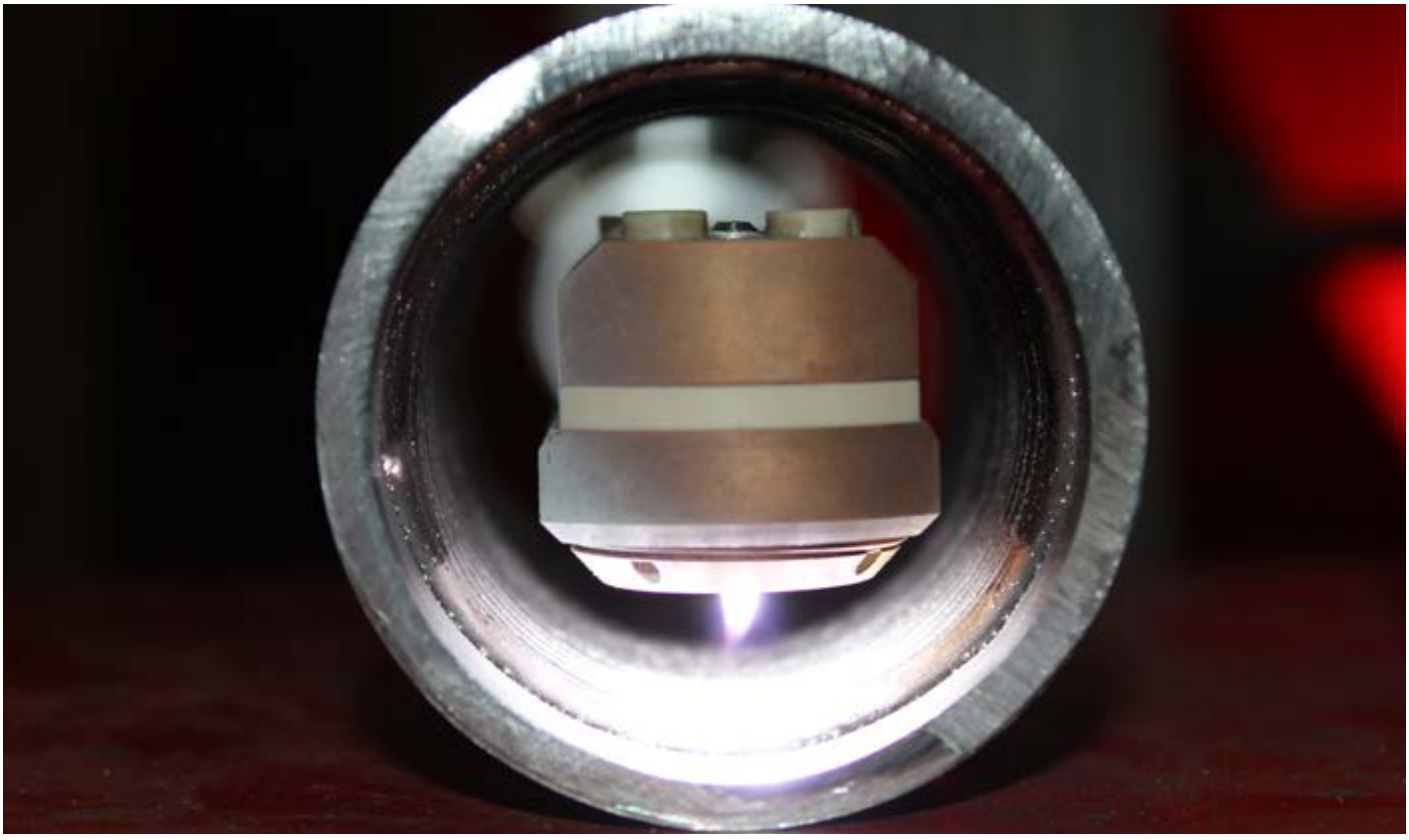
Automation setup and control is handled by user friendly, industrial strength touch screen panel. The main screen gives access to all relevant welding parameters. The integrated job management provides, apart from recipe storage, the possibility to fix all critical parameters in the jobs. This way you can create your specific recipes tailored to your welding jobs. An optional automation interface is available.

HMI-Interface:

The intuitive menu structure and the combination of a touch screen with haptic controls provides easy operation. The HMI-interface is also available as a mobile version which is ideal for remote operation and monitoring tasks.

Advantages:

- Active cooling of power sources
- Built-in cooling unit
- Modular system construction
- Mobile control unit
- HMI-Interface and Job Control
- Modern PLC technology



DURMAT® PT 300M

The plasma-powder-welding torch DURMAT® PT 300M is designed for manual hard-facing with higher deposition rate up to 3 kg/h. The torch is strong and handy and shows excellent properties with high lifespan under rough industrial working conditions. The shielding gas nozzle is made from ceramic, so short circuits can be avoided. The non melting electrodes are generally tungsten electrodes with oxide additions. The standard length of the tube package is 4 m. Longer tube package are available on request. Optional a foot pedal is available to adjust welding current.

Construction:	Manual hand held torch
Max current:	300 A
Powder flow rate:	max. 50 g/min*
Description:	Water cooled hand-held torch

* depending on powder density

DURMAT® PT 300AUT

The plasma-powder-welding torch DURMAT® PT 300AUT has the same construction like the hand-held torch PT 300M, but is designed for semi-automatic or automatic welding with welding manipulators or robots. The powder filler material is fed by one feeding hose to the plasma nozzle (4 holes). The non melting electrodes are generally tungsten electrodes with oxide additions. The tungsten electrode diameter being 4 mm. The standard length of the tube package is 4 m. Longer tube packages are available on request.

Construction:	Machine torch, vertical
Max current:	280 A
Powder flow rate:	max. 75 g/min*
Description:	Water cooled machine torch for high duty applications

* depending on powder density

DURMAT® PT 200S AUT

The plasma-powder-welding torch DURMAT® PT 200S AUT is designed to use special anodes, which allow hard-facing in poorly accessible welding areas, e.g. glass moulds. The non melting electrodes are generally tungsten electrodes with oxide additions. The tungsten electrode diameter being 2.4 or 4 mm. Depending on application and torch construction, the torches can be positioned by automats (AUT torches) or by robots (ROB torches). The standard length of the tube package is 4 m. Longer tube packages are available on request.

Construction:	Machine torch, vertical
Max current:	200 A
Powder flow rate:	max. 60 g/min*
Description:	Water cooled special machine torch

* depending on powder density

DURMAT® PT 400ROB

The plasma-powder-welding torch DURMAT® PT 400 ROB is specially designed for continuous PTA hard-facing with high deposition rate. Based on the integrated fast coupling system the torch must be dismantled or changed for maintenance fast and easily. Depending on application and torch construction, the torches can be positioned by automats (AUT torches) or by robots (robot torches).

The torch must be connected ONLY to special robot tube package which is not included.

Construction:	Robot / machine torch
Max current:	150 A
Powder flow rate:	5 - 100 g/min*
Description:	Water cooled torch

* depending on powder density

Quick coupling for PTA torches

DURMAT® SK-ROB

The quick coupling system SK-ROB and the torch holder PTH 45 were developed for the PTA torches DURMAT® PT-series. It can be used for all automatic or semi-automatic welding systems.

Water cooling and welding gases (plasma gas, shielding gas) are lead to the welding head via the central coupling plug. The plug for the powder feeding and the pilot current are outside of the central coupling. The whole PTA welding torch combined with the quick coupling system SK-ROB and the torch holder PTH 45 can be exchanged or removed from the machine for maintenance easily without disassembling the hose package.

Main current:	10-300 A
Pilot current:	10-20 A
Tube package:	up to 10m

Powder Feeder DURMAT® PFU 4

The powder feeder PFU 4 is available with one or two powder feeding outlets. The maximum feeding rate is 200 g/min*. Two powder feeders 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, e.g. matrix and carbides.

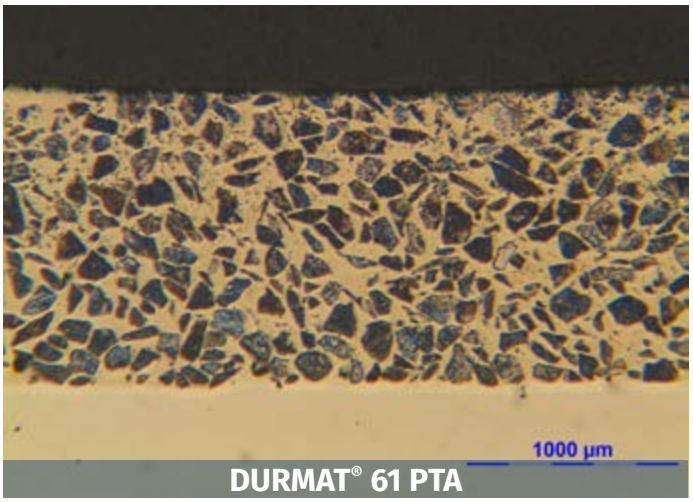
Carrier gas:	Ar, Ar-He, ArH_2
Carrier gas flow rate:	0 - 6 l/min
Powder reservoir:	2,3 l
Dimensions (L x W x H):	310 x 170 x 470 mm
Powder feed rate:	2-200 g/min*
Container size:	12 kg max.
Gas pressure:	max. 1 bar
Weight:	7,5 kg

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

PTA POWDERS

DURMAT®	TYPICAL CHEMICAL COMPOSITION OF MATRIX (in Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	Nb	V	W	Fe	+	
33 PTA	-	4.1	-	6	1	bal.	-	-	-	-	-	1.5	-	NiSF-Alloy. Gas atomized. Special powder for glass industry. Hardness NiSF: 33 HRC.
38 PTA	<0.1	2.5-3.5	-	6	1.8-2.4	bal.	-	-	-	-	-	<0.5	-	NiSF-Carbide. Blend. Heat, corrosion and abrasion resistant. Hardness NiSF: 40 HRC. **Mix: 70 % Matrix + 30 % FTC.**
52 PTA	0.05-0.15	0.3-0.4	2.7-3.3	12.5-13.5	-	bal.	-	-	2.2-2.7	-	-	0.8-1.2	-	NiSF-Alloy. Gas atomized. Abrasion and friction resistant. Corrosion resistant.
54 PTA	0.5-0.7	3.5-4.5	-	15-17	3-4	bal.	2-4	-	-	-	-	<3	Cu: 2-3	NiSF-Alloy. Gas atomized. Heat, corrosion and abrasion resistant. Hardness: 56 - 61 HRC.
55 PTA	0.4-0.6	3.5-4.5	-	12-14	2.5-3.5	bal.	-	-	-	-	-	3.5-4	-	NiSF-Alloy. Gas atomized. Heat, corrosion and abrasion resistant. Hardness: 50 - 55 HRC.
56 PTA	0.25	3.2	-	7.5	1.8	bal.	-	-	-	-	-	<2.5	-	NiSF-Alloy. Gas atomized. Heat, corrosion and abrasion resistan. Low friction. Hardness: 40 HRC.
57 PTA	0.9-1.1	4	-	15-17	3.2	bal.	-	-	-	-	-	3.4	-	NiSF-Alloy. Gas atomized. Heat, corrosion and abrasion resistant. Low friction. Hardness: 58 - 60 HRC.
58 PTA	0.75	4.3	-	15	3.1	bal.	-	-	-	-	-	3.5	-	NiSF-Alloy. Gas atomized. Heat, corrosion and abrasion resistant, low friction. Hardness: 50 - 52 HRC
59 PTA	0.02	3	-	-	3	bal.	-	-	-	-	-	<2	-	NiSF-Alloy. Gas atomized. Heat, corrosion and abrasion resistant. Hardness: 50-52 HRC
61 PTA	0.02	3	-	-	3	bal.	-	-	-	-	-	<2	-	NiSF-Carbide. Blend. **DURMAT® 59 PTA: 40 % + FTC: 60 %.** Heat, corrosion and abrasion resistant.
62 PTA	0.02	3	-	-	3	bal.	-	-	-	-	-	<2	-	NiSF-Carbide. Blend. **DURMAT® 59 PTA: 40 % + SFTC: 60 %.** Heat, corrosion and abrasion resistant.
63 PTA	0.25	3.2	-	7.5	1.8	bal.	-	-	-	-	-	<2.5	-	NiSF-Carbide. Blend. **DURMAT® 56 PTA: 40 % + SFTC: 60 %.** Heat, corrosion and abrasion resistant.

FTC - Fused Tungsten Carbide, SFTC - Spherical Fused Tungsten Carbide, SC - Special Carbide, MCWC - Macro-Crystalline Tungsten Carbide



DURMAT® 61 PTA


DURMAT® Laser-Like PTA

PTA POWDERS

DURMAT®	TYPICAL CHEMICAL COMPOSITION OF MATRIX (in Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	Nb	V	W	Fe	+	
65 PTA	0.75	4.3	-	15	3.1	bal.	-	-	-	-	-	3.5	-	NiSF-Carbide. Blend. Heat, corrosion and abrasion resistant. **DURMAT® 58 PTA: 40 % + FTC: 60 %.**
66 PTA	0.4	5-5.5	-	22 - 25	1.7-2	bal.	-	-	-	-	-	-	-	NiSF-Carbide. Blend. Heat, corrosion and abrasion resistant. Hardness Matrix: 50 HRC. **Special Carbides: 10 - 15 %.**
67 PTA	0.02	3	-	-	3	bal.	-	-	-	-	-	<2	-	NiSF-Carbide. Blend. Heat, corrosion and abrasion resistant. **DURMAT® 59 PTA: 35 - 40 %. FTC: 55 - 60 %, < 8 % Special Carbides.**
68 PTA	0.02	3	-	-	3	bal.	-	-	-	-	-	<2	-	NiSF-Carbide. Blend. Heat, corrosion and abrasion resistant. **DURMAT® 59 PTA: 35 - 40 %. SFTC: 56 - 60 %. < 8 % Special Carbides.**
71 PTA	0.05	3	-	-	3	bal.	-	-	-	-	-	<30	-	Heat and corrosion resistant. High abrasion resistance. **DURMAT® 77 PTA: 40 % + FTC: 60 %.**
72 PTA	0.05	3	-	-	3	bal.	-	-	-	-	-	<30	-	NiSF-Carbide. Blend. Heat and corrosion resistant. High abrasion resistance. **DURMAT® 77 PTA: 40 % + SFTC: 60 %.**
73 PTA	0.05	3	-	-	3	bal.	-	-	-	-	-	<30	-	NiSF-Carbide. Blend. Heat and corrosion resistant. High abrasion resistance. **DURMAT® 77 PTA: 40 % + MCWC: 60 %.**
74 PTA	20-24	<0.1	-	-	3.5	bal.	-	-	-	-	-	<5	-	NiSF-Carbide. Blend. Heat, corrosion and abrasion resistant. **NiSF-Matrix: 40%. FTC: 50 %, < 10 % Special Carbides.**
77 PTA	0.05	3	-	-	3	bal.	-	-	-	-	-	<30	-	Ni-Alloy. Gas atomized. Heat and corrosion resistant. High abrasion resistance. Hardness: 50 - 55 HRC.
79 PTA	0.9-1.1	4	-	15-17	3.2	bal.	-	-	-	-	-	3.4	-	NiSF-Carbide . Blend. Heat and corrosion resistant. High abrasion resistance. **DURMAT® 57 PTA: 40 % + FTC: 60 %.**
84 PTA	-	4.1	-	6	1	bal.	-	-	-	-	-	1.5	-	NiSF-Carbide. Blend. Heat and corrosion resistant. High abrasion resistance. **DURMAT® 33 PTA: 40 % + MCWC: 60 %.**
85 PTA	0.75	4.3	-	15	3.1	bal.	-	-	-	-	-	3.5	-	NiSF-Carbide. Blend. Heat and corrosion resistant. High abrasion resistance. **DURMAT® 58 PTA: 40 % + MCWC: 60 %.**
93 PTA	0.02	3	-	-	3	bal.	-	-	-	-	-	<2	-	NiSF-Carbide. Blend. Heat, corrosion and abrasion resistant. **DURMAT® 59 PTA: 40 % . Special Carbides (SC): 60 %.**
108 PTA	0.4	-	15-16	14-15	-	1.2	-	-	-	-	-	bal.	-	FeCr-Carbide. Blend. High abrasion and friction resistance. Hardness Matrix : 250HB. **40 % Matrix + 60 % Granulat WC-Co 94-6.**
109 PTA	<0.1		6-7	18-19	-	9	-	-	-	-	-	bal.	-	FeCr-Carbide. Blend. High abrasion and friction resistance. Hardness Matrix : 170 HB. **40 % Matrix + 60 % Granulat WC-Co 94-6.**
110 PTA	0.25	3.2	-	7.5	1.8	bal.	-	-	-	-	-	<2.5	-	NiSF-Carbide. Blend. High abrasion and friction resistance. Hardness Matrix : 40 HRC. **40 % Matrix + 60 % Granulat WC-Co 94-6.**
401 PTA	<0.1	-	-	20-24	-	bal.	8-9	<4	3.5	<5	-	<5	-	Ni-Carbide. Blend. High heat, corrosion, abrasion resistance. **50 % Matrix + 50 % Carbide (FTC / SC).**
411 PTA	<0.1	-	-	20-24	-	bal.	8-9	<4	3.5	<5	-	<5	-	Ni-Carbide. Blend. High heat, corrosion, abrasion resistance. **50 % Matrix + 50 % Carbide (FTC / SC).**

FTC - Fused Tungsten Carbide, SFTC - Spherical Fused Tungsten Carbide, SC - Special Carbide, MCWC - Macro-Crystalline Tungsten Carbide

PTA POWDERS

DURMAT®	TYPICAL CHEMICAL COMPOSITION OF MATRIX (in Wt.-%)													TYPICAL PROPERTIES
	C	Si	Mn	Cr	B	Ni	Mo	Co	Nb	V	W	Fe	+	
470 PTA	-	2.75	-	4	1	-	-	-	-	-	-	-	5	Ni-Carbide. Blend. Heat and corrosion resistant. Hardness: 33 HRC.
505 PTA	2.5-2.8	-	-	<7	-	-	1-1.25	-	-	-	-	bal.	-	Fe- Alloy. Gas Atomized. Heavy impact and abrasion resistant. Hardness: 55 - 60 HRC. **Fine Special Carbides (10 - 12 %).**
506 PTA	3.1	-	-	<9	-	-	1.5-1.8	-	-	-	-	bal.	-	Fe- Alloy. Blend. Heavy impact and abrasion resistant. Hardness: 60 - 62 HRC. **Fine Special Carbides (18 %).**
507 PTA	3.1	-	-	<9	-	-	1.3-1.8	-	-	-	-	bal.	-	Fe- Alloy. Blend. Heavy impact and abrasion resistant. Hardness: 60 - 65 HRC. **Fine Special Carbides (20 %).**
516 PTA	0.03	-	-	18	-	13	3	-	-	-	-	bal.	-	Fe-Alloy. Gas Atomized. Austenitic metal. Pitting corrosion and intercrystalline corrosion resistant. T_{MAX} = 400 °C.
520 PTA	<0.1	-	6-7	18-19	-	9	-	-		-	-	bal.	-	Fe-Alloy. Gas Atomized. Austenitic weld metal. Corrosion resistant.
525 PTA	0.4	-	15-16	14-15	-	1.2	-	-	-	-	-	bal.	-	Fe-Alloy. Gas Atomized. Austenitic weld metal. Corrosion resistant. Thermal shock resistant up to 850 °C.
530 PTA	0.3	0.4	-	12	-	-	1.3	1.5	-	1	-	bal.	-	Fe-Alloy. Gas Atomized. Corrosion resistant. Abrasion resistant. Hardness: 47 - 52 HRC.
531 PTA	0.03	0.7	1.2	22	-	5.5	3.3	-	-	-	-	bal.	-	Fe-Alloy. Gas Atomized. Weld metal with low carbon. Corrosion resistant.
536 PTA	1	-	-	4.2	-	-	5	-	-	2	6.4	bal.	-	Fe-Alloy. Gas Atomized. Corrosion and abrasion resistant. Fine carbide micro-structure. Hardness: 58 HRC.
541 PTA	2.6	1	1	25	-	0.4	-	-	-	-	-	bal.	-	Fe-Alloy. Gas Atomized. Corrosion and abrasion resistant. Fine carbide micro-structure. Hardness: 52 - 55 HRC.
559 PTA	4	1.5	-	32	1	-	-	-	-	-	-	bal.	-	Fe-Alloy. Gas Atomized. Corrosion and abrasion resistant. CrC micro-structure. Hardness: 59 - 62 HRC.
560 PTA	0.7	2	-	8	-	-	-	-	-	-	-	bal.	-	Fe-Alloy. Gas Atomized. Medium abrasion and corrosion resistant. Suitable for impact wear. Hardness: 53 - 55 HRC.
564 PTA	3.8	-	-	22	1	-	-	-	-	0.8	0.8	bal.	-	Fe-Alloy. Gas Atomized. Abrasion resistant. Hardness: 62 - 64 HRC.
601 PTA	0.2-0.6	-	-	4.0-6.0	-	-	1-1.6	-		0.5-1.5	-	bal.	-	Fe-Alloy. Gas Atomized. Crack and tempering resistant. Suitable for impact wear conditions. Hardness: 58 HRC.
625 PTA	0.05	-	-	21	-	bal.	9.2	-	3.5	-	-	3	-	Ni-Alloy. Gas Atomized. High corrosion resistance (in acids with chloride content and sea water). Hardness: 210 HV.
4370 PTA	0.1	0.9	7	19	-	9	-	-	-	-	-	bal.	-	Fe-Alloy. Gas Atomized. Corrosion resistant. T_{MAX} = 850 °C. Hardness: 350 HV.
4462 PTA	1	-	-	4.5	-	-	5	-	-	2	6.5	bal.	-	Fe-Alloy. Gas Atomized. DSS weld metal with low carbon. Corrosion resistant.

FTC - Fused Tungsten Carbide, SFTC - Spherical Fused Tungsten Carbide, SC - Special Carbide, MCWC - Macro-Crystalline Tungsten Carbide

STELLITE* (Cobalt Base) Alloys

DURMAT®	Typical chemical Composition of Matrix (in Wt.-%)													Typical Properties
	C	Si	Mn	Cr	B	Ni	Mo	Co	Nb	V	W	Fe	+	
S1 PTA	2.5	1.1	-	30	-	-	-	bal.	-	-	12	-	-	Co-Alloy. Gas Atomized. Abrasion, corrosion, friction resistant. T_{MAX} = 750 °C. Hardness: 55 HRC.
S6 PTA	1	1.2	-	28	-	-	-	bal.	-	-	4.2	-	-	Co-Alloy. Gas Atomized. Abrasion, corrosion, friction resistant. T_{MAX} = 750 °C. Hardness: 42 HRC.
S12 PTA	1.4	1.2	-	27	-	<1	-	bal.	-	-	8	<1	-	Co-Alloy. Gas Atomized. Abrasion, corrosion, friction resistant. T_{MAX} = 750 °C. Hardness: 46 HRC.
S21 PTA	-	0.5	-	26	-	1-3	5.2	bal.	-	-	-	-	-	Co-Alloy. Gas Atomized. Friction and temperature resistant. Buffer layer for thick Stellite coatings. Hardness: 23 HRC.
S190 PTA	3-3.5	1	1	24-28	-	3	-	bal.	-	-	12-16	5	-	Co-Alloy. Gas Atomized. Heat and corrosion resistant. Friction and temperature resistant. Hardness: 54 - 58 HRC.

** Stellite is a registered trademark of Kennametal Stellite*

ARC SPRAY SYSTEM FOR FLUX-CORED WIRES

Developed and manufactured by DURUM in Germany, the mobile electric wire arc spray system DURSPRAY 450 belongs to the latest generation of fully automatable spray systems. It features state of the art power source-, valve- and PLC-technology. The system can be used manually or in combination with industrial manipulators or robots in automated production cells.

Current range:	50 - 450 A	**Degree of protection:**	IP 23
Voltage range:	20 - 38 V	**Atomizing gas:**	Compressed air, Nitrogen, Argon
Duty cycle:	100 %	**Pressure range:**	2 - 8 bar
Open circuit voltage Inverter:	90 V	**Pressure max.:**	10 bar
Voltage supply:	3x 400 V+N	**Cooling:**	air cooled
Supply frequency:	50/60 Hz	**Dimensions:**	100 x 60 x 120 cm
Supply fuse:	63 A	**Weight:**	146 kg

PLC-controlled

The use of a modern PLC system provides reliable operation and allows the easy integration of bus systems in automatic production lines or robot cells.

HMI-Interface

The intuitive menu structure and the combination of a touch screen with haptic controls provides easy operation. The HMI-interface is also available as a mobile version which is ideal for remote operation and monitoring tasks.

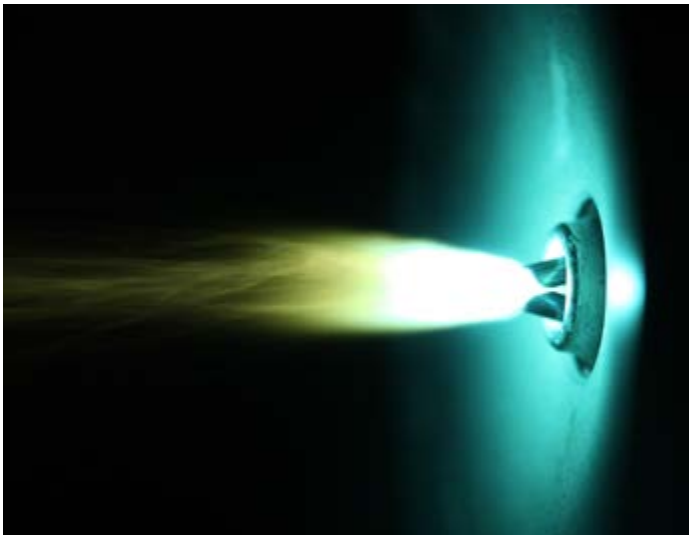
ARC SPRAY SYSTEM FOR FLUX-CORED WIRES

T-Spray ArcJetOne

The spray gun ArcJetOne was optimized by computational fluid dynamics (CFD) and features a small design. The gun has a narrow spray pattern and allows the usage of wires up to 2.5 mm diameter. Additionally it is available as a machine mounted- or handheld-version and has easily replaceable contact tips.

Inverter Technology

The inverter power source is primary-switched and generates a very stable arc that ensures consistent and repeatable coatings



High-end Drive Solution

The wire feed unit is powered by a brushless DC motor with built-in electronic speed control. In combination with four driven wheels, Flux-Cored Wires can be sprayed reliably.

Job Control

The integrated job management provides, apart from recipe storage, the possibility to fix all critical parameters in the jobs. This way you can create your specific recipes tailored to your spray jobs.

Closed-loop Pressure Control

The atomizing air is controlled by a closed-loop proportional valve which constantly provides a consistent air output and monitors the pressure level. Additionally only components with minimal pressure drop were used to ensure an economical process.

Modular Design

The used module technology allows easy upgrade or replacement of critical components and makes the system very low maintenance.

Optimized for Flux-cored Wires

The entire system DURSPRAY 450 was especially designed for the use of Flux-Cored Wires. Key components such as power source, wire feeder and arc spray gun have been precisely optimized for this application.

Iron-based Flux-Cored Wires

26
Fe
55.84

Iron-based Flux-Cored Wires are the "work horse" of thermal spray materials. While combining very good functional properties with high productivity they provide an excellent price-performance ratio. Combined with arc-spraying they often offer the best solution for a variety of applications.

Coatings can provide superior erosion/abrasion resistance even up to high temperatures and are readily used in several different industrial sectors.

Advantages[1]:

- High alloyed materials
- Outstanding wear resistance
- Good high-temperature resistance
- Excellent cost-benefit ratio

Nickel-based Flux-Cored Wires

28
Ni
58.69

Nickel-based Flux-Cored Wires are available for a broad range of applications. Coatings show a dense structural integrity and can provide very good resistance against corrosive attack. Most coatings tolerate elevated temperatures and are able to withstand oxidizing conditions.

Applications vary from bond-coats for following top coatings, over self-fluxing coatings for combined abrasion and corrosion resistance to highly corrosion resistant alloys for the chemical or energy industry.

Advantages[1]:

- High alloyed materials
- Outstanding wear and/or corrosion resistance
- Good high-temperature resistance

Cobalt-based Flux-Cored-Wires

27
Co
58.93

Cobalt-based Flux-Cored Wires provide unique properties for selected applications where abrasion resistance, temperature resistance and structural integrity are of upmost importance. They are used for abrasion/erosion protection and can also be applied on parts exposed to sliding wear.

Coatings can provide very good performance under high-temperature conditions.

Advantages[1]:

- Outstanding wear and sliding wear resistance
- Good high-temperature resistance

DURMAT® AS 812

General characteristics:

DURMAT® AS 812 is an advanced chrome and boride rich iron-based Flux-Cored Wire for abrasion and erosion protection which is specifically designed for arc-spraying. It contains hard, amorphous boride phases, which precipitate significantly finer than in conventionally used coatings. Protective layers have an improved resistance to abrasive wear and increased resistance to erosion as the hard phases are finely dispersed. Coatings can be used at elevated service conditions up to 920 °C. Wear resistance even increases in high temperature conditions due to the transformation from amorphous phases to nano-crystalline phases. DURMAT® AS 812 offers excellent wear protection in several different industrial sectors where structural components need superior wear resistance against fine abrasives like additives in the pulp and paper production or fly ash in coal fired power plants. Ease of application is provided by low residual stress levels. Surfaces can be polished.

Typical chemical composition (in wt-%):

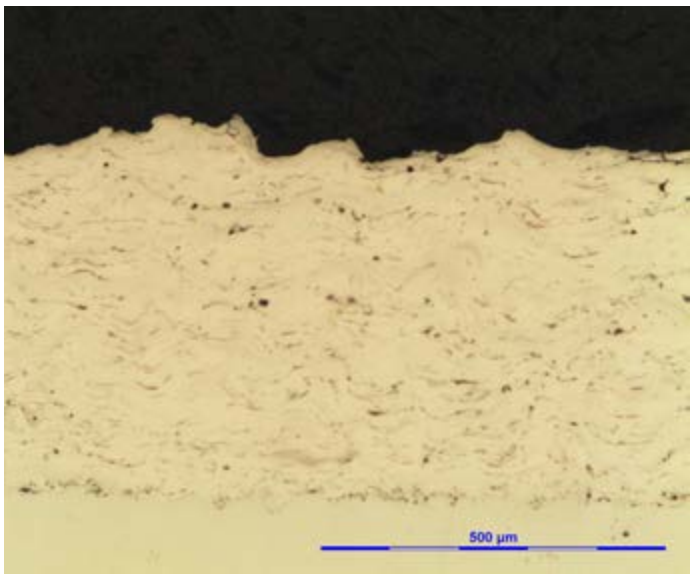
C	Si	Mn	Cr	B	Fe
< 0.1	1.6	1.0	29	3.7	bal.

Typical applications:

- Paper rolls / Yankee Dryers
- Boiler walls
- Economizer tubes
- Industrial fans

Typical physical characteristics:

Specific wire weight:	11.6 g/m
Micro-Hardness:	1,000 - 1,150 $HV_{0.3}$
Deposition efficiency:	60 - 75 %
Spray rate:	3.7 kg/h / 100 A
Residual stress level:	very low



DURMAT® AS 871

General characteristics:

DURMAT® AS 871 is an advanced chrome and boride rich iron-based Flux-Cored Wire for abrasion and erosion protection. It contains hard, amorphous boride phases, combined with complex molybdenum and tungsten carbides. Protective layers have an improved resistance to abrasive wear and increased resistance to erosion as the hard phases are finely dispersed. Coatings can be used in elevated service conditions. High amounts of chromium and molybdenum increase the high temperature corrosion resistance. DURMAT® AS 871 offers excellent wear protection in several different industrial sectors. Primary use is the erosion protection of boiler walls and economizers tubes in conventional coal-fired power plants where fine particle erosion is predominant. The superior wear resistance against fine particle erosion can also be used to prolong the service life time of low-impact agricultural parts and parts exposed to particle loaded high-velocity air streams.

Typical chemical composition (in wt-%):

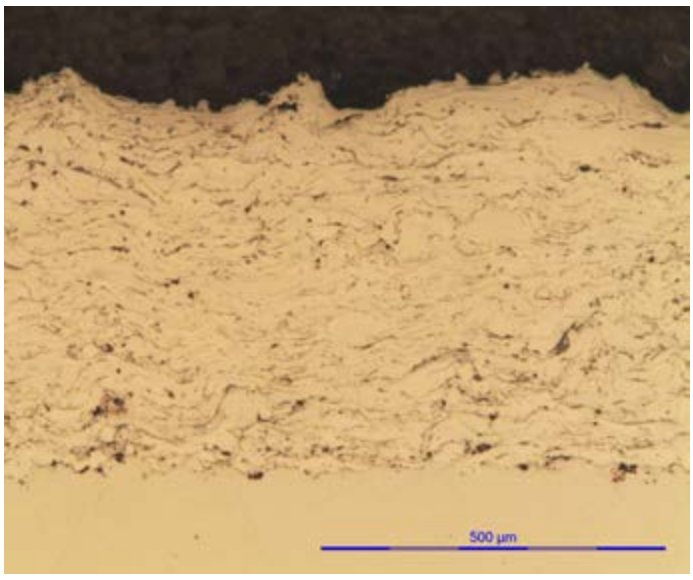
C	Si	Mn	Cr	Mo	W	B	Fe
1	1.4	0.9	22.5	1.4	1.4	4.2	bal.

Typical applications:

- Boiler walls
- Economizer tubes
- Agricultural parts
- Air baffles

Typical physical characteristics:

Specific wire weight:	11.4 g/m
Micro-Hardness:	900 - 1,050 $HV_{0.3}$
Deposition efficiency:	60 - 75 %
Spray rate:	4.0 kg/h / 100 A
Residual stress level:	low



IRON-BASED FLUX-CORED WIRES

Wear Resistant Alloys

DURMAT® AS 802
DURMAT® AS 802 is a chrome and boride rich iron-based Flux-Cored Wire for abrasion and erosion protection. While having similar properties compared to AS 812 it is slightly higher alloyed and provides improved wear resistance. Coatings are heat resistant up to 920 °C.

DURMAT® AS 839
DURMAT® AS 839 is an iron-based Flux-Cored Wire for abrasion and erosion protection. The high amount of complex carbide- and boride-phases increase the hardness and wear resistance in comparison to conventional arc spray alloys.

DURMAT® AS 850
DURMAT® AS 850 is an iron-based Flux-Cored Wire with a very high content of Fused Tungsten Carbide (FTC) and was developed exclusively for arc-spraying. It provides excellent abrasion and erosion resistance up to 540 °C.

DURMAT® AS 868
DURMAT AS 868 is an iron-based Flux-Cored Wire for abrasion and erosion protection. High amounts of chromium and chromium carbides provide good wear and oxidation protection.

DURMAT® AS 888
DURMAT® AS 888 is a chrome and boride rich iron-based Flux-Cored Wire for abrasion and erosion protection. While having similar properties compared to AS 812 it is slightly lower alloyed and provides improved ductility and impact resistance. Coatings are heat resistant up to 920 °C.

DURMAT® AS 897
DURMAT® AS 897 is an iron-based Flux-Cored Wire for abrasion and erosion protection. Coatings have a very high content of tungsten- and titanium-carbides with additional iron- and chromium-borides. Applications are thin erosion protection coatings and anti-sliding surfaces.

Corrosion Resistant Alloys

DURMAT® AS 813
DURMAT® AS 813 is an austenitic CrNiMo-stainless steel grade similar to Type 316. Coatings offer good resistance against organic and non-oxidizing acids and can be used for marine environments. Coatings have good machining properties.

DURMAT® AS 814
DURMAT® AS 814 is an low-shrinkage austenitic CrMnNi-stainless steel. Coatings offer good resistance against general corrosion and can be used for functional coatings and repairs. Coatings have good machining properties.

DURMAT® AS 820
DURMAT® AS 820 provides oxidation stability up to 870 °C due to a combination of high chromium and aluminum content and is resistant to high temperature atmospheres containing Vanadium and Sulphur gases. Coating are dense and have a good bond strength.

DURMAT® AS 852
DURMAT® AS 852 is a martensitic Cr-steel. Coatings offer good wear resistance and protection against mild corrosion with no chloride attack. Coatings have good machining properties and can be used for repairs.

Special Alloys

DURMAT® AS 836
DURMAT® AS 836 is iron-based Fux-Cored Wire with a defined Ni-content of 36 %. Coatings are easily machined and offer a very low thermal expansion coefficient.

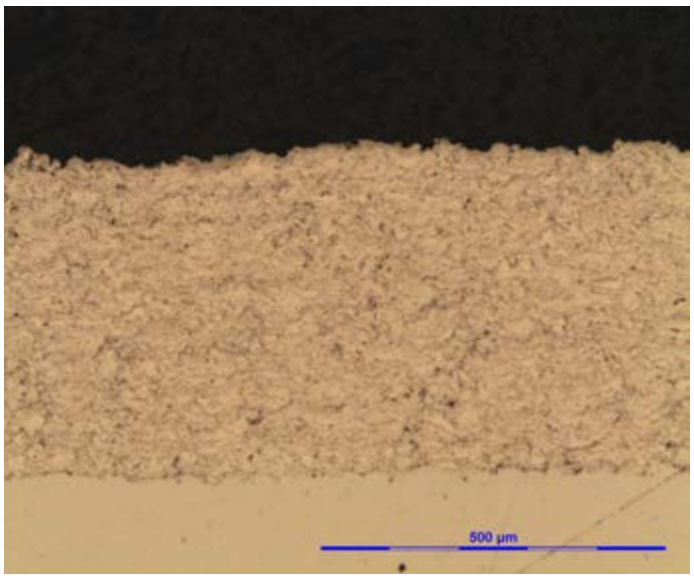
DURMAT® AS 895
DURMAT® AS 895 is an austenitic Mn-, Cr- and Co-alloyed iron-based Flux-Cored Wire for cavitation protection in turbines or pumps. This alloy has good energy absorption properties due to a low stacking fault energy.

Typical Chemical Composition (Wt.-%)

DURMAT®	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	+*
AS 802	-	1.6	1	30	4.5	-	-	-	-	-	bal.	-
AS 805	2.6	-	-	7	-	-	1.3	-	-	-	bal.	-
AS 810	-	0.5	-	26	-	-	-	-	-	-	bal.	Al: 6
AS 811	0.2	0.3	1.3	-	-	-	-	-	-	-	bal.	-
AS 812	-	1.6	1	30	3.7	-	-	-	-	-	bal.	-
AS 813	0.15	1	1.8	17	-	12	2.5	-	-	-	bal.	-
AS 814	0.15	1	8	18	-	5	-	-	-	-	bal.	-
AS 815	4.8	1.4	-	28	-	-	-	-	-	-	bal.	-
AS 816	5.1	1.7	-	22	-	-	-	-	-	-	bal.	Nb: 4
AS 820	-	0.8	-	22	-	-	-	-	-	-	bal.	Al: 4.5
AS 821	0.3	1.1	1	13	-	1	-	-	-	-	bal.	-
AS 827	0.5	0.4	16	14	-	1.2	0.5	-	0.2	-	bal.	-
AS 829	0.5	-	-	9	-	-	1.3	-	-	-	bal.	SC: 16
AS 836	< 0.1	0.6	1	-	-	36	-	-	-	-	bal.	-
AS 839	1	-	-	< 25	< 6	-	< 5	-	-	< 10	bal.	Nb: < 5
AS 842	0.02	0.5	1.5	23	-	8.5	3	-	-	-	bal.	N: 0.15
AS 850	2	-	0.4	-	-	-	-	-	-	-	bal.	FTC: 50
AS 852	0.3	0.5	0.3	13	-	0.5	-	-	-	-	bal.	P: 0.02, S: 0.02
AS 864	4.5	1	1.6	24	1	-	-	-	0.8	0.8	bal.	-
AS 865	5.2	1	0.4	21	-	-	7	-	1	2	bal.	Nb: 7
AS 868	5	0.8	0.4	38	2	-	-	-	-	-	bal.	-
AS 871	1	1.4	0.9	22.5	4.2	-	1.4	-	-	1.4	bal.	-
AS 880	0.6	1.5	1	20	1	-	-	-	-	-	bal.	Ti: 3.5
AS 888	0.1	1.3	1	30	3	-	-	-	-	-	bal.	-
AS 890	-	-	-	25	2	10	4	-	-	-	bal.	Cu: 2
AS 895	0.3	2.8	10	19	-	-	-	10	-	-	bal.	-
AS 896	0.2	1.1	1.2	21	2.2	8	3.2	-	-	-	bal.	Cu: 1.9
AS 897	-	1.3	0.6	14	2	4.5	-	-	-	-	bal.	WC: 26; Ti_2C_3: 6
AS 898	1.7	1.6	1.6	26	-	3	0.8	-	-	-	bal.	-

**) FTC - Fused Tungsten Carbide / SC - Special Carbide*

DURMAT® AS 726



General characteristics:

DURMAT® AS 726 is a highly alloyed NiCrMoW nickel-based Flux-Cored Wire made exclusively for arc spraying. Coatings feature a dense and well-bonded structure and provide excellent corrosion resistance in oxidizing and reducing conditions. High amounts of chromium and molybdenum increase the pitting and crevice corrosion resistance. Coatings provide good resistance against chloride attack and sulfuric acids. Typical applications are functional coatings on parts in the offshore and oil & gas industry. Coatings of DURMAT® AS 726 provide only limited abrasion and erosion protection, but can be used as a corrosion resistant bond coat for more wear resistant top layer coatings.

Typical chemical composition (in wt-%):

C	Si	Mn	Cr	Mo	W	Ti	Ni
< 0.1	< 1	< 0.5	22	16.5	4	0.15	bal.

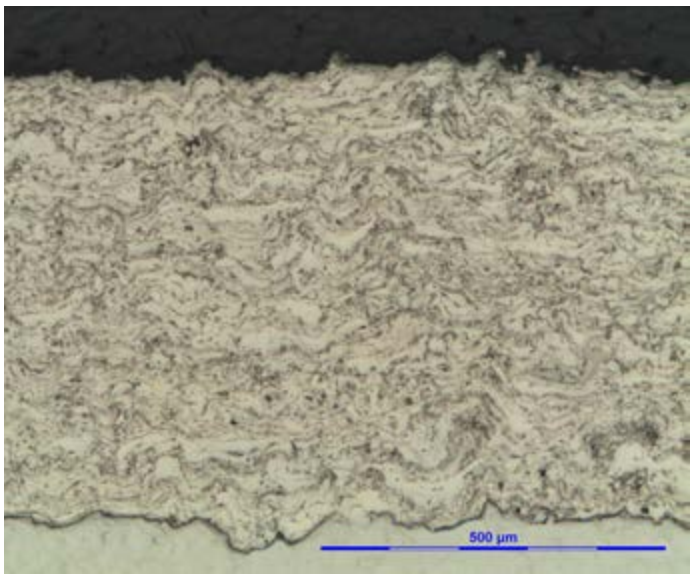
Typical applications:

- Offshore industry
- Oil & Gas industry
- Chemical industry

Typical physical characteristics:

Specific wire weight:	14.0 g/m
Micro-Hardness:	250 - 400 $HV_{0.3}$
Deposition efficiency:	60 - 75 %
Spray rate:	4.5 kg/h / 100 A
Residual stress level:	medium

DURMAT® AS 778



General characteristics:

DURMAT® AS 778 is an advanced nickel-based Flux-Cored Wire with high levels of chromium and molybdenum and is made exclusively for arc spraying. Coatings are corrosion resistant at elevated temperature conditions up to 980 °C. High amounts of chromium provide excellent resistance in oxidizing and in sulfur and vanadium-rich hot gas conditions. Additional corrosion resistance in reducing environments is added by a fine distribution of molybdenum-rich phases. Coatings are dense and finely structured and have a good bonding behavior. Primary use is the high-temperature corrosion resistance in mixed-fired incineration power plants. Coatings offer basic erosion protection, but are mainly used for their corrosion protection properties.

Typical chemical composition (in wt-%):

C	Si	Mn	Cr	Mo
< 0.1	< 1	< 0.5	44	3.0

Typical applications:

- Waste-to-Energy power plants
- Biomass power plants
- Boiler walls
- Economizer tubes

Typical physical characteristics:

Specific wire weight:	12.6 g/m
Micro-Hardness:	300 - 450 $HV_{0.3}$
Deposition efficiency:	60 - 75 %
Spray rate:	4.2 kg/h / 100 A
Residual stress level:	medium-high

NICKEL-BASED FLUX-CORED WIRES

Wear Resistant Alloys

DURMAT® AS 751

DURMAT® AS 751 is a nickel-based Flux-Cored Wire with a very high content of Fused Tungsten Carbide (FTC) and was developed exclusively for arc-spraying. It provides excellent abrasion and erosion resistance up to 540 °C.

(Patent No.: DE 40 08 091)

DURMAT® AS 760

DURMAT® AS 760 is a nickel-based Flux-Cored Wire with a high content of special carbides which are embedded in a NiCrBSi matrix which offers good abrasion resistance. Coatings can be fused in a two-step process.

(Patent No.: DE 40 08 091)

Corrosion Resistant Alloys

DURMAT® AS 755

DURMAT® AS 755 is a nickel-based Flux-Cored Wire with high chromium, molybdenum and niobium content and is similar to alloy 625. Coatings offer good corrosion protection while also providing basic abrasion and erosion protection.

DURMAT® AS 777

DURMAT® AS 777 is a nickel-based NiCrAlY Flux-Cored Wire with very good resistance against oxidation and corrosive gases at high temperatures up to 980 °C. Coatings can be used as an oxygen-barrier under ceramic coatings.

Wear and Corrosion Resistant Alloys

DURMAT® AS 711

DURMAT® AS 711 is a nickel-based Flux-Cored Wire with high chromium, molybdenum, niobium and boron content. Coatings offer a high hardness and a combination of good abrasion/erosion and corrosion protection up to 450 °C.

DURMAT® AS 752

DURMAT® AS 752 is a NiCrBSi Flux-Cored Wire. Coatings offer a high hardness and a combination of good abrasion/erosion and corrosion protection Coatings can be fused in a two-step process to further densify the coating structure.

DURMAT® AS 761

DURMAT® AS 761 is a nickel-based Flux-Cored Wire with a very high content of Fused Tungsten Carbide (FTC), a high chromium content and is similar to DURMAT® AS 751. It provides excellent abrasion and erosion resistance up to 540 °C and moderate corrosion protection.

(Patent No.: DE 40 08 091)

DURMAT® AS 762

DURMAT® AS 762 is a NiCrMoAl Flux-Cored Wire. Coatings offer a high corrosion resistance and protection against particle erosion. Coatings are dense, have excellent machining characteristics and can be used for repairs.

Special Alloys

DURMAT AS 757

DURMAT® AS 757 is a nickel-based Flux-Cored Wire for bond coats and high temperature oxidation protection. Coatings have a high bond strength, are machinable and resistant to chloride attack.

DURMAT® AS 765

DURMAT® AS 765 is a nickel-based Flux-Cored Wire for bond coats and high temperature oxidation protection. Coatings have a very high bond strength.

Typical Chemical Composition (Wt.-%)

DURMAT®	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	+*
AS 711	-	4	-	20	4	bal.	6	-	-	-	< 2	Nb: 3.5
AS 726	< 0.1	< 0.1	0.7	22	-	bal.	16.5	-	-	4	-	Ti: 0.15
AS 741	-	-	-	16	-	bal.	-	-	-	-	3	Al: 4.5
AS 745	< 0.1	-	< 1	< 1	-	bal.	28	< 1	-	-	0.5	-
AS 746	-	-	-	30	-	bal.	-	-	-	-	-	-
AS 748	< 0.1	-	0.5	22	-	bal.	13	< 2.5	0.35	3	3	-
AS 751	0.4	-	-	-	1	bal.	-	-	-	-	-	FTC: 50
AS 752	0.7	4.8	-	21	3	bal.	-	-	-	-	-	-
AS 753	0.4	5	-	22	2.7	bal.	-	-	-	-	-	-
AS 754	< 0.1	-	-	16	-	bal.	17	2	-	-	< 3	Ti: < 0.7
AS 755	0.05	-	-	22	-	bal.	9	-	-	-	-	Nb: 3.5
AS 756	-	-	-	-	-	bal.	-	-	-	-	-	Al: 5
AS 757	-	-	-	20	-	bal.	-	-	-	-	-	-
AS 758	< 0.1	< 0.1	< 0.1	16	-	bal.	16	1.5	< 0.3	3.5	4	-
AS 760	0.4	3.7	-	21	3	bal.	-	-	-	-	-	SC: 10
AS 761	0.4	-	-	10	2	bal.	-	-	-	-	-	FTC: 50
AS 762	-	-	-	9	-	bal.	5	-	-	-	< 1	Al: 7
AS 763	-	-	-	50	-	bal.	-	-	-	-	-	-
AS 765	-	-	-	-	-	bal.	-	-	-	-	-	Al: 20
AS 767	-	-	-	-	-	bal.	6	-	-	-	-	Al: 5
AS 768	-	-	-	50	-	bal.	-	-	-	-	-	Ti: 1
AS 775	-	-	-	-	-	bal.	-	-	-	-	-	Al: 10
AS 776	-	-	-	-	-	bal.	-	-	-	-	-	Al: 15
AS 777	-	-	-	22	-	bal.	-	-	-	-	-	Al: 10, Y: 1 other: < 3
AS 778	< 0.1	< 1	< 0.5	44	-	bal.	3.0	-	-	-	< 3	Ti: < 3
AS 780	0.4	-	-	-	1	bal.	-	-	-	-	-	WC-Co 88/12: 50
AS 781	0.4	-	-	-	2	bal.	-	-	-	-	-	WC-Co 88/12: 30
AS 786	0.4	1	< 1	-	1	bal.	-	-	-	-	-	CrC: 35

**) FTC - Fused Tungsten Carbide / SC - Special Carbide*

DURMAT® AS 906

General characteristics:

DURMAT® AS 906 is a high-performance cobalt-based Flux-Cored Wire. Coatings are resistant to wear and corrosion and retain these properties at high temperatures. A beneficial combination of wear resistance against abrasion, erosion, cavitation, impact or sliding wear in combination with mechanical and chemical stability makes this alloy an industry standard for general wear problems. The structure is dense and exhibits dispersed hard chromium and tungsten carbides within a CoCr-Matrix. Coatings remain their properties over a wide temperature range and can be used up to 750 °C. Coatings can be machined and grinded.

Typical chemical composition (in wt-%):

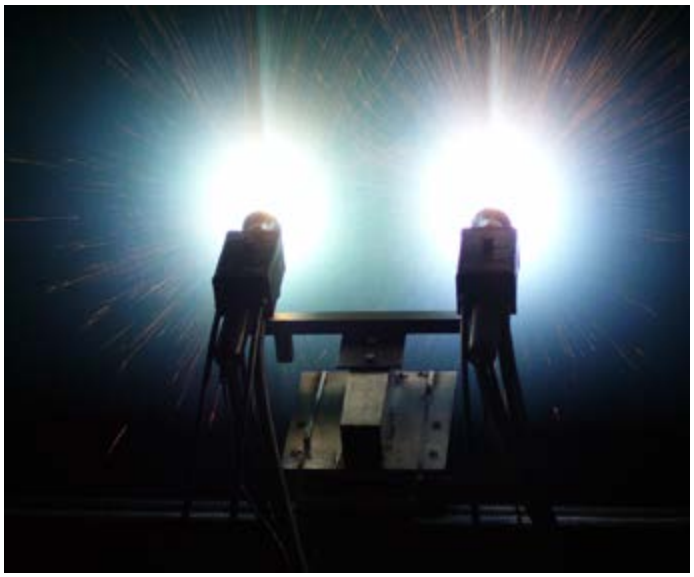
C	Si	Mn	Cr	W	Fe	Co
1.1	1.0	0.6	28	4.5	< 4.5	bal.

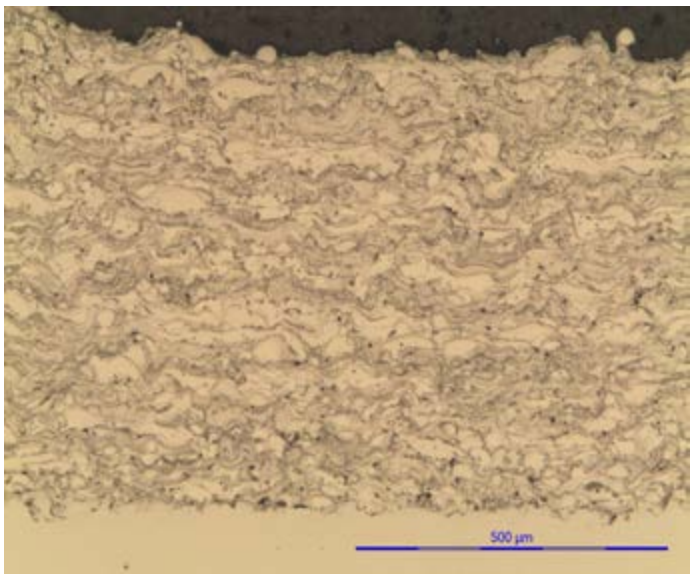
Typical applications:

- Abrasion protection
- Erosion protection
- Corrosive environments
- High temperature conditions

Typical physical characteristics:

Specific wire weight:	11.5 g/m
Micro-Hardness:	400 - 750 $HV_{0.3}$
Deposition efficiency:	60 - 75 %
Spray rate:	3.8 kg / h / 100 A
Residual stress level:	medium-high





Typical Chemical Composition (Wt.-%)

DURMAT®	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	+
AS 901	2.4	0.7	0.4	29	-	-	-	bal.	-	11	< 4.5	-
AS 906	1.1	1	0.6	28	-	-	-	bal.	-	4.5	< 4.5	-
AS 912	1.4	0.8	0.6	29	-	-	-	bal.	-	8	< 4.5	-
AS 921	0.25	0.8	0.8	27	-	2.5	5.5	bal.	-	-	< 4.5	-
AS 931	0.5	1	1	26	-	-	-	bal.	-	7.5	< 4.5	-
AS 936	1	-	-	25	-	10	-	bal.	-	8	< 4.5	-
AS 951	-	1.25	-	14	1	-	-	bal.	-	-	< 4.5	WC-12Co: 50

Abrasion and Heat Resistant Alloys

DURMAT® AS 901

DURMAT® AS 901 is a cobalt-based Flux-Cored Wire for abrasion and erosion protection. While having similar properties compared to DURMAT® AS 906 it is higher alloyed and provides improved wear resistance. Coatings are heat resistant up to 760 °C.

DURMAT® AS 912

DURMAT® AS 912 is a cobalt-based Flux-Cored Wire for abrasion and erosion protection. While having similar properties compared to DURMAT® AS 906 it is higher alloyed and provides improved wear resistance. Coatings are heat resistant up to 700 °C.

DURMAT® AS 951

DURMAT® AS 951 is a cobalt-based Flux-Cored Wire for abrasion and erosion protection with a very high content of WC-Co tungsten carbide particles. Coatings are heat resistant up to 500 °C.

DURMAT® AS 936

DURMAT® AS 936 is a cobalt-based Flux-Cored Wire for abrasion and erosion protection. While having similar properties compared to DURMAT® AS 906 it provides higher ductility and impact resistance.

Abrasion and Impact Resistant Alloys

DURMAT® AS 921

DURMAT® AS 921 is a cobalt-based Flux-Cored Wire for cavitation, galling and metal-to-metal sliding wear protection. Coatings are work-hardening and provide resistance to thermal and mechanical shock.

1) Datasheets are available on request. 2) FTC - Fused Tungsten Carbide / SC - Special Carbide

SPRAY AND FUSE POWDERS

PRODUCT	Grain Size µm	TYPICAL CHEMICAL COMPOSITION (Wt.-%) C	Si	B	Cr	Ni	W	HARDNESS
DURMAT® 40 - A	-106/+22	0.35	3.8	1.6	9 - 10	bal.	-	35 - 39 HRC
DURMAT® 60 - A	-106/+22	0.8 - 1	3.8	3.3	16 - 17	bal.	-	56 HRC

Resistant to corrosion, abrasion and heat. High wear and heat resistant up to 550 °C. Rust and acid resistant.

Application:

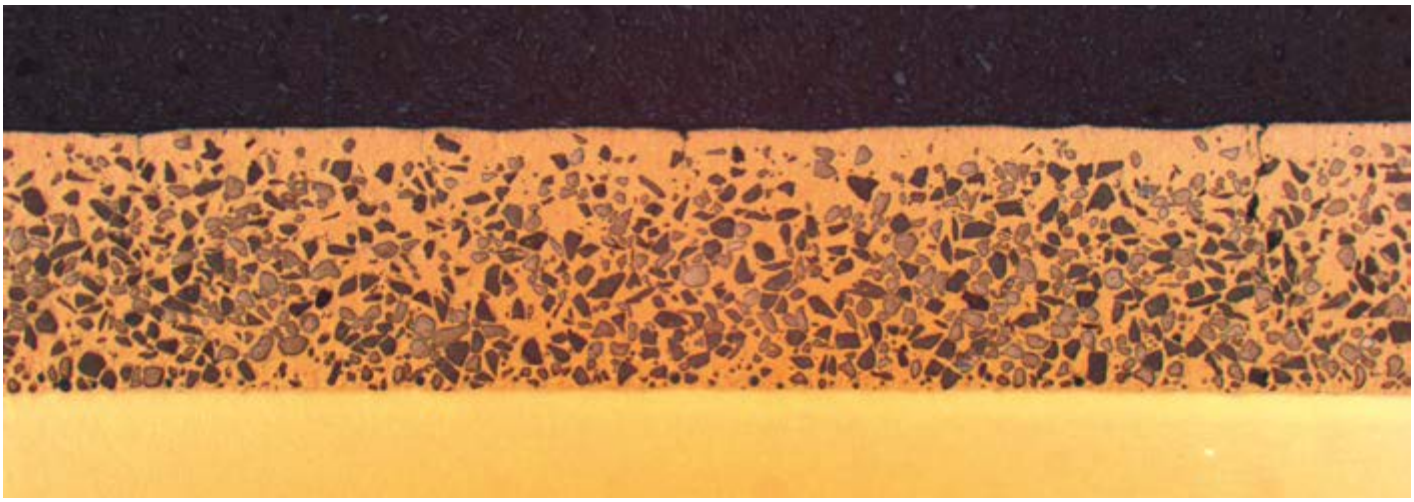
Small areas or die edges, mold castings in the glass industry, fittings, pistons and guides, buffer layers in addition to DURMAT® B hard-facings.

PRODUCT	GRAIN SIZE µm	MIX	TYPICAL CHEMICAL COMPOSITION (Wt.-%) C	Si	B	Cr	Ni	W	HARDNESS FTC	DURMAT® 60-A
DURMAT® 40 - FTC	-106/+22	**Matrix 60**	0.8 - 1	3.8	3.3	16 - 17	-	0.8 - 1	2,360 HV	≈ 56 HRC
		FTC 40	3.8 - 4.1	-	-	-	-	bal.		
DURMAT® 50 - FTC	-106/+22	**Matrix 50**	0.8 - 1	3.8	3.3	16 - 17	-	0.8 - 1	2,360 HV	≈ 56 HRC
		FTC 50	3.8 - 4.1	-	-	-	-	bal.		
DURMAT® 60 - FTC	-106/+22	**Matrix 40**	0.8 - 1	3.8	3.3	16 - 17	-	0.8 - 1	2,360 HV	≈ 56 HRC
		FTC 60	3.8 - 4.1	-	-	-	-	bal.		
DURMAT® 75 - FTC	-106/+22	**Matrix 25**	0.8 - 1	3.8	3.3	16 - 17	-	0.8 - 1	2,360 HV	≈ 56 HRC
		FTC 75	3.8 - 4.1	-	-	-	-	bal.		
DURMAT® 80 - FTC	-106/+22	**Matrix 20**	0.8 - 1	3.8	3.3	16 - 17	-	0.8 - 1	2,360 HV	≈ 56 HRC
		FTC 80	3.8 - 4.1	-	-	-	-	bal.		

Resistant to corrosion, abrasion and heat. Excellent gliding on high tensile strength steels and plastics. High wear and heat resistant up to 550 °C.

Application:

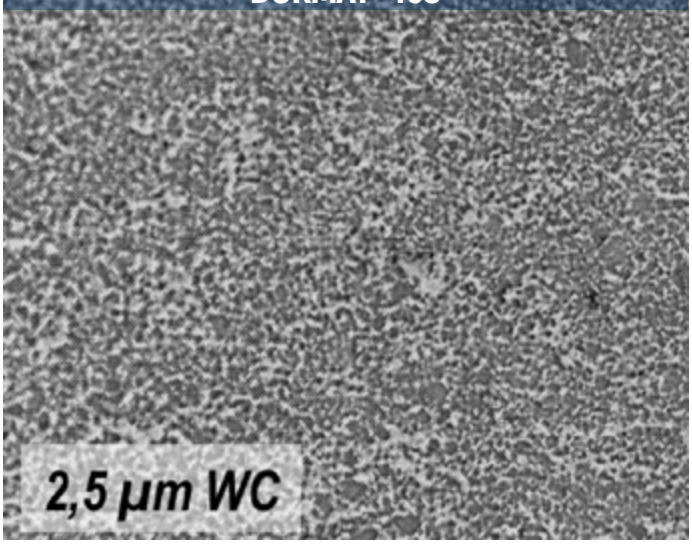
Mechanical engineering, pump and mill construction, the manufacturing of petrochemical apparatus, deep drilling tools, wear plates in agriculture



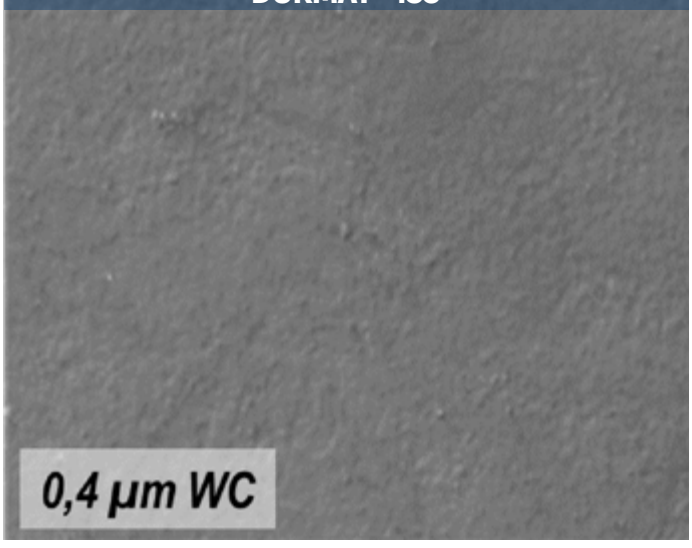
Tungsten Carbide HVOF Powders

PRODUCT	TYPICAL CHEMICAL COMPOSITION (Wt.-%) C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	TYPICAL PROPERTIES AND APPLICATIONS
WC-Co 88-12														Abrasion and erosion resistant. Max. operating temperature 500°C. Spherical. Used for rolls and steel industry.
DURMAT® 101	Agglomerated. Sintered.													
DURMAT® 111	Fine 1.3 µm Primary Carbide. Agglomerated. Sintered.													Similar to DURMAT® 101. Improved deposition efficiency. High abrasive wear resistance. Less coating roughness.
DURMAT® 121	Finest 0.7 µm Primary Carbide. Agglomerated. Sintered.													
DURMAT® 131	UltraFine 0.4 µm Primary Carbide. 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	Agglomerated. Sintered.													
DURMAT® 112	Fine 1.3 µm Primary Carbide. 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	Agglomerated. Sintered.													
DURMAT® 115	Fine 1.3 µm Primary Carbide. Agglomerated. Sintered.													Improved deposition efficiency / abrasion and corrosion resistance.
DURMAT® 125	Submicron 0.7 µm Primary Carbide. Agglomerated. Sintered.													Improved deposition efficiency, less coating roughness. High abrasive wear and corrosion resistance.
DURMAT® 135	Ultrafine 0.4 µm Primary Carbide. Agglomerated. Sintered.													
	-	-	-	4	-	-	-	10	-	-	-	86	-	

DURMAT® 105



DURMAT® 135



Please observe all appropriate safety regulations in force. The technical information given in this data sheet reflects the present state of knowledge. They do not form part of any sales contract as guaranteed properties of the delivered materials. The given values are typical values which can vary due to different processes and process parameters. Our delivery and sales conditions apply to all contracts included.

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® 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.	-	-	C_{free} <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.	-	-	-	
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.	-	

Self-Fluxing Tungsten Carbide Flame Spray Powders

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			Moderate corrosion resistance. Erosion and abrasion resistant.
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														
DURMAT® 354	50% Matrix + 50% DURMAT® 101 / NiSF-Carbie. Blend.										-125+45 / -106+22			Moderate corrosion resistance. High erosion and abrasion resistance. Hardness NiSF: 56 HRC.
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	-	
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. 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. 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. Hardness NiSF: 56 HRC.
NiCrBSi	<0.3	3-4	-	7-9	1.5-1.8	bal.	-	-	-	-	-	-	-	
SFTC	3.9-4.1	-	-	-	-	-	-	-	-	bal.	-	-	-	

THERMAL SPRAY POWDERS

Flame Spray Powders

PRODUCT	TYPICAL CHEMICAL COMPOSITION (Wt.-%)													TYPICAL PROPERTIES AND APPLICATIONS
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
DURMAT® 444	NiCrBCuMo / Ni-Alloy. Gas atomized.										-125+45 / -106+22			Corrosion resistant. Heat and abrasion resistant. 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. 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	

Self-Fluxing Flame Spray Powders

PRODUCT	TYPICAL CHEMICAL COMPOSITION (Wt.-%)													TYPICAL PROPERTIES AND APPLICATIONS
	C	Si	Mn	Cr	B	Ni	Mo	Co	V	W	Fe	WC	+	
DURMAT® 453	NiCrBSi / 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 / 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 / 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 / Gas atomized.										-125+45 / -106+22			Special powder for glass industry. Hardness NiSF: 34 HRC.
	-	2.7	-	4	1	bal.	-	-	-	-	-	-	5	
DURMAT® 477	NiCrBSi / Gas atomized.										-125+45 / -106+22			Special powder for glass industry. Hardness NiSF: 22 HRC.
	-	2.7	-	2	1	bal.	-	-	-	-	-	-	-	
DURMAT® 478	NiBSi / Gas atomized.										-125+45 / -106+22			Special powder for glass industry. Hardness NiSF: 30 HRC.
	-	3.6	-	-	1	bal.	-	-	-	-	-	-	-	
DURMAT® 491	NiCrBSiMoCu / Gas atomized.										-125+45 / -106+22			Good corrosion resistance. Abrasion and erosion resistant.
	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 / 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 / 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 / Gas atomized.										-125+45 / -106+22			Special powder for glass industry. Hardness NiSF: 45-50 HRC.
	0.65	3.75	-	11.5	2.45	-	-	-	-	-	4.35	-	-	

Electrodes for Hard-facing

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL													HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	B	+	
DUR Mn	0.8	0.5	14	-	3	-	-	-	-	-	bal.	-	-	550 HB[WH]
DUR MnCr	0.6	0.5	17	14	-	-	-	-	-	-	bal.	-	-	55 HRC[WH]
DUR 300	0.1	-	1	1.2	-	-	-	-	-	-	bal.	-	-	280 - 320 HB
DUR 600 AC	0.6	1.7	1.2	9	-	-	-	-	-	-	bal.	-	-	57 - 60 HRC
DUR 600 B	0.6	-	-	9	-	0.5	-	-	1.4	-	bal.	-	-	58 - 60 HRC
DUR 42	1.8	-	-	29	3	1	-	-	-	-	bal.	-	-	42 - 44 HRC
DUR 59	3.8	-	-	33	-	-	-	-	-	-	bal.	-	2	57 - 60 HRC
DUR 61	5.2	2.2	-	29	-	-	-	6.8	-	-	bal.	1.1	2.5	63 - 65 HRC
DUR 63	5.2	-	-	34	-	-	-	-	-	-	bal.	-	2	62 - 64 HRC
DUR 65	4.5	-	-	24	-	6	-	6.2	1	2	bal.	-	-	63 - 65 HRC
DUR 67	5	1.5	-	23	-	-	-	-	10	-	bal.	-	-	63 - 66 HRC
DUR 68	5.5	-	-	36	-	-	-	-	-	-	bal.	-	3-4	68 - 70 HRC
DUR 68 T	4.5	-	-	28	-	-	-	-	-	-	bal.	-	3-4	68 - 70 HRC
DUR 405 T	5.5	-	1.5	40	-	-	-	-	-	-	bal.	-	2	62 - 65 HRC

WH = after work hardening

DURMAT® DUR Mn

AWS: E FeMn-A / DIN EN 14700: E Fe 9-250-KNP

Suitable for hard-facing on parts which are subject to extrem impact stress and cavitation. A considerable increase in wear resistance through stain hardening can be achieved by cold-hammering.

DURMAT® DUR MnCr

AWS: E FeMn-B / DIN EN 14700: E Fe 9-250-KNP

Electrode with recovery of 140 % designed for hard-facing and buffering layers. Good ductility is obtained where extreme heavy impact conditions apply.

DURMAT® DUR 300

DIN EN 14700: E Fe 1-300-P

For moderate wear and impact. Deposits are machinable. Rolling mills, rails, frogs, points, wheels, tractor rollers and bearing journals. Also for building up layers prior to depositing harder weld metal.

DURMAT® DUR 600 AC

DIN EN 14700: E Fe 8-60-P

For abrasion and impact with soft running characteristics. Deposits are not machinable. Earth moving, steel works and foundry equipment; items such as cast steel cog wheels, brake shoes, rail points and crusher jaws.

DURMAT® DUR 600 B

DIN EN 14700: E Fe 8-60-P

The electrode has the same applications as DURMAT® DUR 600 AC and is recommended for cutting edge work because of the special microstructure of the deposit. The electrode is good for welding in constrained positions.

DURMAT® DUR 42

DIN EN 14700: E Fe 14-45-CGR

For rebuilding and hard-facing of parts subject to combined wear from corrosion and abrasion. The work hardening condition, that comes from machining after the welding process, is an added advantage. The electrode ist typically used for extruders in the chemical, foodstuff and meat processing industries.

DURMAT® DUR 59

AWS: E FeCr-A1 / DIN EN 14700: E Fe 14-60-GR

For extreme abrasion and light impact with soft running characteristics. The welding deposit is also corrosion resistant. Crushing mills, buckets, dredgers, screw conveyors and mixer parts.

DURMAT® DUR 61

DIN EN 14700: E Fe 15-65-GTRZ

For extreme abrasive wear and moderate impact. This soft running heavy coated electrode deposits austenitic carbide weld metal with included special primary, niobium carbides. The electrode has a recovery of 240 %.

DURMAT® DUR 63

DIN EN 14700: E Fe 15-65-GTR

Heavy coated high efficiency hard-facing electrode with 170% recovery. Suitable for applications subject to strong abrasive wear by minerals, combined with moderate impact, medium shocks and compression as humidity or wetness.

DURMAT® DUR 65

EN: E Fe 16-65-GTZ

Heavy coated high efficiency hard-facing electrode with 240 % recovery can be used for hard-facing on parts subject to strong abrasive wear and friction at high temperatures. It provides extremely high resistance to abrasion at temperatures up to 600 °C.

DURMAT® DUR 67

EN: E Fe 16-65-GTRZ

Heavy coated high efficiency hard-facing electrode with 170 % recovery. Highly resistant to abrasion combined with impact stress. Special chemical composition ensures good wear resistance in various temperature ranges. The fine grained structure of the weld metal provides a solid matrix which retains the vanadium carbides, also when subject to strong abrasion and ensures high crack-resistance.

DURMAT® DUR 68

AWS: E FeCr-A1 / EN: E Fe 15-70-GTZ

Heavy coated high efficiency hard-facing electrode with 240 % recovery is mainly used for applications, where parts are subject to strong abrasive wear, since the deposited alloy is highly resistant to abrasion, also when exposed to high temperatures.

DURMAT® DUR 68 T

EN: E Fe 14-70-GTRZ

Heavy coated high efficiency hard-facing electrode with 210 % recovery. Alloy contains carbide forming elements of different kinds. Mainly used for applications, where parts are subject to strong abrasive wear.

DURMAT® DUR 405 T

EN: E/T Fe 15-65-GTZ

Tubular electrode filled with chromium carbide powder, suitable for hard-facings on parts, which are mainly subject to abrasive wear and impact stress. High amount of Cr carbides in a austenitic matrix.

Cobalt-based Electrodes

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	
DUR S1	2.2	1.2	1	30	-	-	bal.	-	-	12.5	3	-	52 - 55 HRC
DUR S6 / SK6	1	0.9	1	28	-	-	bal.	-	-	4.5	3	-	40 - 43 HRC
DUR S12	1.4	0.9	1	28	-	-	bal.	-	-	8.5	3	-	45 - 48 HRC
DUR S21 / SK21	0.3	0.9	1	28	3	5.5	bal.	-	-	-	3	-	≈ 320 HB, 45 HRC^{WH}
DUR S25	0.3	0.5	0.1	20	10	-	bal.	-	-	15	3	-	≈ 300 HB, 45 HRC^{WH}

WH = after work hardening

DURMAT® DUR S1

AWS: E CoCr-C / DIN EN 14700: E Co3-55CGTZ

DURMAT® DUR S1 deposits a cobalt-base alloy with an austenitic-ledeburitic structure. This is the hardest of the standard cobalt-base alloys. It has a high resistance to corrosion, especially to reducing acids, impact, extreme wear and temperature shocks. The alloy is only machinable by grinding. Best used on wear pads, rotary seal rings, pump sleeves etc.

DURMAT® DUR S6 / SK 6

DIN EN 14700: E Co 2-45-CTZ

Cobalt-base alloys with an austenitic-ledeburitic structure bearing chrome and tungsten carbides. These alloys are resistant against high corrosion and abrasion, high impact stress and extreme temperature shocks. The deposit is machinable by hard metal tools. Best used on steam and chemical valves and on equipment handling hot steel, such as tong bits, shear blades, etc.

DURMAT® DUR S12

DIN EN 14700: E Co 2-50-CTZ

Cobalt-base alloy with high resistance against abrasion, temperature shocks and corrosion. This alloy is suitable for hard-facing cutting edges of long knives and other tools used in the wood, plastic, paper, carpet and chemical industrie.

DURMAT® DUR S21

DIN EN 14700: E Co 1-350-CKTZ

This cobalt base-alloy is the toughest, with highest corrosion and thermal resistance of all cobalt-base alloys. The weld deposit is machinable and is used on components that are exposed to high temperatures, corrosion and impact stress, such as valve seats as well as components in the chemical industry.

TOOL STEELS

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	
DUR WZ 50 AC/B	0.3	-	-	2.2	-	-	-	-	0.6	4.2	bal.	-	≈ 47 HRC
DUR WZ 54 AC	0.4	0.45	1.4	7.5	-	2.5	-	-	-	-	bal.	-	52 - 57 HRC
DUR WZ 59 AC/B	0.4	-	-	4.8	-	3.7	-	-	-	3.5	bal.	-	58 - 60 HRC
DUR WZ 60 AC	0.9	-	-	4.5	-	1	5	-	-	18	bal.	-	59 - 62 HRC

DURMAT® DUR WZ 50 AC/B

E Fe 3-50-T (Mat. No.: 1.2567)

High-quality electrode with approx. 120 % recovery. Used for repairing steels of same type, e.g. on hot working tools, and for overlaying edges or surfaces of tools made of low alloyed high density steels.

DURMAT® DUR WZ 54 AC

E Fe 3-55-T

For repair and build up of hot working tools such as slab-shears, hot forging dies, crushing equipment of similar or lower alloyed base metal. The pre-heat and interpass temperature should be held between 250 °C and 300 °C (depending on the base metal and it's heat abduction).

DURMAT® DUR WZ 59 AC/B

E Fe 4-60-ST

AC-weldable electrode with a recovery of 150 % for repairing of hot working tools made of steels of same or similar type. The deposited weld metal is highly resistant to extreme abrasive wear as well as medium shock and impact. The weld metal structure can still be improved by subsequent heat treatment.

DURMAT® DUR WZ 60 AC

E Fe 4-60-ST (Mat. No.: 1.3346)

For repair and rebuilding of high speed tool steels. Examples are cutting, piercing and shaving tools, hot working punches and dies, extrusion moulds and dies, shear-blades, milling and cutting tools, swagging hammers, wood cutting tools and cutting edges on stamping dies.

Electrodes for CAST IRON welding

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												HARDNESS
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	
DUR NI 2	0.7	-	1	-	bal.	-	-	-	-	-	2.5	Cu	≈ 160 HB
DUR CAST 1	0.7	0.6	-	-	bal.	-	-	-	-	-	5	Cu	≈ 180 HB
DUR NIFE 31	1.1	-	-	-	54	-	-	-	-	-	44	-	≈ 190 HB
DUR NIFE 60/40	1.1	-	-	-	54	-	-	-	-	-	43	-	≈ 170 HB

DURMAT® DUR NI 2

AWS: E Ni Cl / DIN EN 14700: E Ni-BG 11

For maximum machinability on grey cast iron and malleable iron. A general purpose pure nickel electrode for filling up holes and casting defects, for correcting defects from machining and for building up worn sections. Recommended for use on dirty, aged and burnt cast iron.

DURMAT® DUR NIFE 31

AWS: E NiFe-Cl / DIN EN 14700: E NiFe-1-BG 11

For high strength & toughness on ductile SG-iron including Meehanite and austenitic Ni-resist type irons. Also used for joining the above irons and cast-iron to steel. Excellent welding characteristics without any risk of overheating.

DURMAT® DUR NIFE 60/40

AWS: E NiFe-Cl / DIN EN 14700: E NiFe-Cl

Basic-graphite special coated electrode with a copper plated ferro-nickel core. Suitable for joining and repairing all types of grey cast iron with steel, but especially for nodular cast iron. This electrode excels by very high crack-resistance and high tensile-strength of the weld metal.

Nickel based Electrodes

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												TYPICAL PROPERTIES			
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	YS	TS	IV	E
DUR WELD 82 B	0.04	-	3.5	19	bal.	1	-	2	-	-	< 4	-	420	700	96[196 °C]	42
DUR WELD 182	0.04	-	4	16	bal.	1	-	2	-	-	< 6	-	380	650	80[120 °C]	35
DUR WELD 625	0.04	< 0.8	-	22	bal.	9	-	3.5	-	-	< 6	-	500	750	40[196 °C]	35
DUR ALLOY CO	0.06	-	-	16	bal.	16	2	-	-	4	5	-	500	680	N/A	> 10
DUR ALLOY 99	Hard Phase: 65 %, Nickel Matrix: 35 %												N/A	N/A	N/A	N/A

YS=Yield Strength (N/mm²), TS=Tensile Strength (N/mm²), IV= Impact Value (J), E=Elongation (%)

DURMAT® DUR WELD 82 B

E NiCrFe-2 mod. / EL-NiCr 19 Nb (Mat. No.: 2.4648)

Basic-coated electrode with an alloyed core wire. Suitable for joining and cladding low alloyed and alloyed steels, welding iron and nickel base alloys and for dissimilar joints.

DURMAT® DUR WELD 182

E NiCrFe-2 mod. / EL-NiCr 16 Fe Mn (Mat. No.: 2.4620)

Nickel base electrode with a recovery of 140% and excellent weldability on AC, even at low voltages. Suitable for joining and cladding stainless, heat resistant and cold tenacious steels as well as welding dissimilar materials for example low alloyed steels with Ni-base or alloys. Free of embrittlement at high and low temperatures, non scaling up to 1000 °C, cold tough down to 269 °C.

DURMAT® DUR WELD 625

E NiCrMo-3 / EL-NiCr20 Mo 9 Nb (Mat. No.: 2.4621)

Nickel base electrode with a recovery of 140 % and excellent weldability on AC even at low voltages. Suitable for joining and cladding stainless, heat resistant and cold tenacious steels as well as welding dissimilar materials for example low alloyed steels with Ni-base or Cu-base alloys. Non-scaling up to 1100 °C and cold tough down to 196 °C.

DURMAT® DUR ALLOY Co

E NiCrMo-5 / E 23-250-CKNPTZ (Mat. No.: 2.4883)

The DURMAT® DUR ALLOY Co type deposit has outstanding physical characteristics and is resistant to both, oxidation and reduction corrosion. It work hardens under impact and machining to approx. 400 HB even at high temperatures without deforming the deposit.

Welding of Dissimilar, Unknown or Problem Steels

DURMAT®	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	TYPICAL PROPERTIES YS	TS	IV	E
DUR 29/9 AC/MPR	0.1	-	0.7	29	9.5	-	-	-	-	-	-	-	580	800	30	20
DUR 4370 AC/B	0.1	-	6	18	8,5	-	-	-	-	-	-	-	400	600	70	> 32

YS=Yield Strength (N/mm²), TS=Tensile Strength (N/mm²), IV= Impact Value (J), E=Elongation (%)

DURMAT® DUR 29/9 AC/MPR

E 312-17 / EL-NiCr 16 Fe Mn (Mat. No.: 1.4337)

Electrode for welding dissimilar steels and for plating. It is scale-resistant up to 1000 °C. DUR 29/9 MPR has a recovery of 160 %.

DURMAT® DUR 4370 AC/B

E 18 8 Mn R 12 / E 18 8 Mn B 22

Electrode for welding of difficult-to-weld, crack-sensitive steels with carbon content of > 0.7 % and for joint welding of austenitic to ferritic steels. It can be used for welding of equalizing buffer layers prior to hard-facing and for repair welding of Mn-steels. Stainless, heat resistant weld metal, non-scaling up to 850 °C.

Electrodes for Welding of Stainless Steel

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												TYPICAL PROPERTIES			
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	YS	TS	IV	E
DUR 4316 AC	0.03	0.8	0.7	19	10	-	-	-	-	-	-	-	380	560	>32 120 °C	>35
DUR 4430 AC	0.03	0.8	0.6	19	12	2.8	-	-	-	-	-	-	400	600	53 60 °C	40
DUR 4576 AC	0.07	0.8	0.6	19	11	2.6	-	8x%C	-	-	-	-	400	590	37 120 °C	36

YS=Yield Strength (N/mm²), TS=Tensile Strength (N/mm²), IV= Impact Value (J), E=Elongation (%)

DURMAT® DUR 4316 AC

E 308L-17 / E 19 9 LR 12

Rutile coated electrode for welding corrosion-proof Cr-Ni steels with low carbon content. Operating temperature is 120 °C up to 350 °C.

DURMAT® DUR 4430 AC

E 316L-17 / E 19 12 3 LR 12

Cr-Ni-Mo alloyed electrode with low carbon content. Operating temperature: 120 °C up to 400 °C

DURMAT® DUR 4576 AC

E 318-17 / E 19 12 3 Nb R 12

Stabilized Cr-Ni-Mo alloyed electrode for working temperature up to 400 °C and down to 60 °C for cold tenacious steels.

Electrodes for SPECIAL APPLICATIONS

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												TYPICAL PROPERTIES			
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	YS	TS	IV	E
DUR 4015 MPR	0.11	-	0.7	16	-	1.2	-	-	-	-	-	-	N/A	N/A	N/A	N/A
DUR 4351 B/MPR	0.06	0.7	0.6	13	4.5	0.5	-	-	-	-	-	-	700	1100	>43	15
DUR 4462 AC	0.03	-	-	22.5	9	3	-	-	-	-	-	N	610	780	44 40 °C	30
DUR 4948 B	0.05	0.5	1.5	18.5	9.5	-	-	-	-	-	-	-	450	660	60	28
DUR 4850 B	0.15	0.6	1.6	21	33			1.2					380	600	45	25
DUR 4853 B	0.4	1	2	24.5	35	-	-	1.3	-	-	-	-	N/A	N/A	N/A	N/A

YS=Yield Strength (N/mm²), TS=Tensile Strength (N/mm²), IV= Impact Value (J), E=Elongation (%)

DURMAT® DUR 4015 MPR

E 430-16 / E 17 R 52

Rutile coated electrode with a recovery of 160% for corrosion and wear-proof plating on water, steam and gas valves, especially for sulphuric gases.

DURMAT® DUR 4351 B/MPR

E 410 NiMo-16 / E 13 4 R 53

Rutile coated electrode with a recovery of 150% with a cavitation and erosion resistant weld deposit. Applications: Bridge stores, deposition to thick areas of water, steam and gas fittings.

DURMAT® DUR 4462 AC

E 2209-17 / E 22 9 3 N LR 12

Electrode suitable for welding on compound steels of same or similar types. The weld deposit is resistant to pitting, stress corrosion, cracking and inter-crystalline corrosion at temperatures up to 250 °C.

DURMAT® DUR 4948 B

E 308H-15 / EZ 19 9 B 22

Basic-coated electrode, suitable for welding of austenitic CrNi steels and steel castings with carbon contents higher than 0,4 % as well as ACI conform castings. The alloy is high temperature resistant up to 700 °C and scale resistant up to 800 °C.

DURMAT® DUR 4850 B

EZ 22 33 Nb B 22

Basic coated electrode for joint welding corrosion- and heat-resistant high alloyed steels and cast steels. The deposit is heat-proof up to 1050 °C and resistant to carbonising, oxidising and reducing gases. Scale resistant up to 1050°C.

STICK-ELECTRODES

HEAT- and SCALE-Resistant steels

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL												TYPICAL PROPERTIES			
	C	Si	Mn	Cr	Ni	Mo	Co	Nb	V	W	Fe	+	YS	TS	IV	E
DUR 4332 AC	0.04	0.9	0.7	24	13	-	-	-	-	-	-	-	400	590	$32^{60\,°C}$	36
DUR 4459 AC	0.04	-	-	23	13	2.6	-	-	-	-	-	-	450	650	$48^{20\,°C}$	N/A
DUR 4842 AC/B	0.1	-	3	25	21	-	-	-	-	-	-	-	350	600	80	30

YS=Yield Strength (N/mm²), TS=Tensile Strength (N/mm²), IV= Impact Value (J), E=Elongation (%)

DURMAT® DUR 4332 AC

AWS: E 309L-17 / DIN EN 14700: E 23 12 LR 12

Rutile coated electrode suitable for joining difficult-to-weld steels and for corrosion-proof plating. Scale-resistant up to 1000 °C.

DURMAT® DUR 4459 AC

AWS: E 309MoL-17 / DIN EN 14700: E 23 12 2 LR 12

Rutile-coated electrode suitable for joining difficult-to-weld steels and for corrosion-proof claddings. The alloy is also suitable for welding buffer layers on plated metal sheets.

DURMAT® DUR 4842 AC/B

AWS: E 310-16 / DIN EN 14700: E 25 20 R 12

Rutile coated electrode for welding heat-proof steels. The weld deposit is scale-resistant up to 1200 °C. DUR 4842 B is a basic coated electrode.

Copper- and Aluminium Alloys

DURMAT®	TYPICAL CHEMICAL COMPOSITION (Wt.-%) OF WELD METAL						HARDNESS
	Mn	Ni	Al	Cu	Fe	Sn	
DUR TRODE Mn S	13.5	2.2	7	Bal.	2.5	-	200 - 230 HB
DUR ALBRO AC	0.5	-	8	Bal.	< 0.5	-	140 - 160 HB
DUR Cu B	2.5	-	-	Bal.	-	0.8	≈ 40 HB
DUR ZIBRO 6 AC	-	-	-	Bal.	-	7	N/A

DURMAT® DUR TRODE Mn S

2.1368

Lime coated universal electrode to be used for joining, surfacing and building up brass, bronze, copper and normal steels. The deposit is resistant to corrosion, cavitation, erosion, friction and seawater proof. Suitable for surfacing on slide faces, bearings, dies, ship propellers, valves, pump shafts, piping, evaporators, Francis-turbines and pelton-wheels.

DURMAT® DUR ALBRO AC

2.0926 / AWS: E Cu Al-A2 / EN: EL-CuAl9

DURMAT® DUR ALBRO AC is a basic graphite coated electrode for joining aluminium bronzes (up to 10 % Al) as well as wear-resisting and corrosion-proof surfacing on steel, cast steel and cast iron, especially on work-pieces, which are subject to erosive wear. This electrode can be used on shaped components and wearing parts as well as slide bearings and slide tracks.

DURMAT® DUR ZIBRO 6 AC

2.1025 / AWS: E CuSn-C / EN: EL-CuSn7

Basic-graphite special coated tin bronze electrode for repairing copper and copper tin bronzes (Cu-Sn 6 - 8 %), brasses and phosphor bronzes. Also for dissimilar joints. Recommended for surfacing on brasses, wrought bronzes (CuSn), mild steel. Good sliding and emergency running properties for bearings and contact surfaces of grey iron, type GG.

HELP INFORMATION

SALES UNITS	WIRE COIL	WIRE COIL	WOOD / STEEL COIL	DRUM	DRUM
Net Weight	15 kg	25 kg	250/300 kg	150 kg	250 kg
Ø outer	300 mm	435 mm	760 mm	550 mm	550 mm
Ø hole	51.5 mm	300 mm	41 mm	-	-
Width	103 mm	105 mm	290 mm	-	-
Height	-	-	-	400 mm	800
Standard	EN 759 - BS 300	EN 759 - B 435	EN 759 - S 760	-	-

ALLOY TYPES ACCORDING TO DIN EN 14700:2005											
SYMBOL[a]	SUIT-ABILITY	ALLOY RATIO OF THE PURE WELD METAL DEPOSIT [Wt.-%]									
		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	st	0.4 - 0.5	1 - 8	≤5	≤3	≤4.5	≤10	≤1.5	-	Co, Si	Fe
Fe4	st(p)	0.4 - 1.2	2 - 6	≤4	≤3	≤10	≤19	≤4	-	Co, Ti	Fe
Fe5	cpstw	≤0.5	≤0.1	17 - 22	≤1	3 - 5	-	-	-	Co, Al	Fe
Fe6	gps	≤2.5	≤10	-	≤3	≤3	-	-	≤10	Ti	Fe
Fe7	cpt	≤0.2	4 - 30	≤6	≤3	≤2	-	≤1	≤1	Si	Fe
Fe8	gpt	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	ck(n)pz	≤0.25	17 - 22	7 - 11	3 - 8	≤1.5	-	-	≤1.5	Si	Fe
Fe11	cnz	≤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	gz	4.5 - 7.5	10 - 40	-	≤3	≤9	≤8	≤10	≤10	B, Co	Fe
Fe20	cgtz	hard materials[b]	-	-	-	-	-	-	-	-	Fe
Ni1	cpt	≤1	15 - 30	bal.	0.3 - 1	≤6	≤2	≤1	-	Si, Fe, B	Ni
Ni2	ckptz	≤0.1	15 - 30	bal.	≤1.5	≤28	≤8	≤1	≤4	Co, Si, Ti	Ni
Ni3	cpt	≤0.1	1 - 15	bal.	0.3 - 1	≤6	≤2	≤1	-	Si, Fe, B	Ni
Ni4	ckptz	≤0.1	1 - 15	bal.	≤1.5	≤28	≤8	≤1	≤4	Co, Si, Ti	Ni
Ni20	cgtz	hard materials[b]	-	-	-	-	-	-	-	-	Ni
Co1	cktz	≤0.6	20 - 35	≤10	0.1 - 2	≤10	≤15	-	≤1	Fe	Co
Co2	tz(cs)	0.6 - 3	20 - 35	≤4	0.1 - 2	-	4 - 10	-	-	Fe	Co
Co3	tz(cs)	1 - 3	20 - 35	≤4	≤2	≤1	6 - 14	-	-	Fe	Co
Cu1	c(n)	-	-	≤6	≤15	-	-	-	-	Al, Fe, Sn	Cu
Al1	cn	-	-	10 - 35	≤0.5	-	-	-	-	Cu, Si	Al
Cr	gn	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

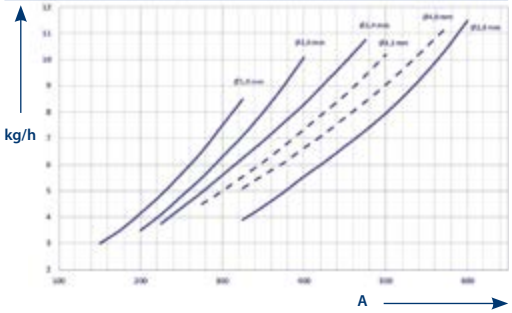
[b] Fused Tungsten Carbide crushed or spherical

HARDNESS CONVERSION					
HV	HB	HRC	HV	HB	HRC
200	200	12.6	460	434	45.7
205	205	13.4	465	438	46.0
210	210	14.2	470	442	46.4
215	215	15.0	475	447	46.8
220	220	16.0	480	452	47.2
225	225	17.0	485	457	47.6
230	230	18.0	490	462	47.9
235	235	19.0	500	469	48.5
240	240	20.0	510	477	49.1
245	245	21.0	520	485	49.7
250	250	22.0	530	493	50.3
255	255	22.8	540	501	50.9
260	260	23.6	550	509	51.5
265	265	24.4	560	517	52.1
270	270	25.2	570	525	52.7
275	275	26.0	580	533	53.3
280	280	26.8	590	540	53.9
285	285	27.6	600	546	54.5
290	290	28.3	610	555	55.0
300	300	29.7	620	563	55.5
305	305	30.4	630	571	56.0
310	310	31.1	640	579	56.5
315	315	31.8	650	588	57.0
320	320	32.4	660	596	57.5
325	324	33.0	670	-	58.0
330	328	33.6	680	-	58.5
335	332	34.2	690	-	59.0
340	336	34.8	700	-	59.5
345	340	35.4	710	-	60.0
350	345	36.0	720	-	60.5
355	349	36.5	730	-	61.0
360	353	37.0	740	-	61.4
365	357	37.5	750	-	61.8
370	360	38.0	760	-	62.2
375	365	38.5	770	-	62.6
380	369	39.0	780	-	63.0
385	373	39.5	790	-	63.4
390	377	40.0	800	-	63.8
395	381	40.5	810	-	64.2
400	385	40.9	820	-	64.6
405	389	41.3	830	-	65.0
410	394	41.7	840	-	65.4
415	398	42.1	850	-	65.7
420	402	42.5	860	-	66.0
425	406	42.9	870	-	66.4
430	410	43.3	880	-	66.7
440	418	44.1	890	-	67.0
455	430	45.3	900	-	67.3

HELP INFORMATION

DIMENSIONS, WELDING CURRENT (TYPICAL VALUES)						
PROCESS	Ø	CURRENT	VOLTAGE	WELDING SPEED	STICK OUT	POWER TYPE
Open Arc	1.6 mm 2.0 mm 2.4 mm 2.8 mm 3.2 mm	180 - 200 A 200 - 250 A 250 - 300 A 300 - 350 A 350 - 400 A	26 - 30 V 26 - 30 V 26 - 30 V 26 - 30 V 26 - 30 V	- - - - -	30 - 35 mm 35 - 40 mm 35 - 40 mm 35 - 40 mm 35 - 40 mm	Direct current (electrode to + pole)
SAW	3.2 mm 4.0 mm	325 - 450 A 400 - 500 A	28 - 30 V 28 - 30 V	35 - 45 cm/min 40 - 45 cm/min	30 - 35 mm 30 - 35 mm	Direct current (+)

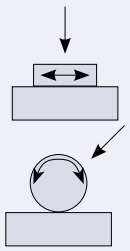
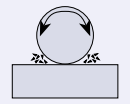
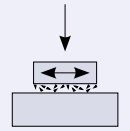
DEPOSITION RATE
(Typical values at 100 % ED - stick out approx. 35 mm)



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

SYSTEM STRUCTURE	WEAR CHARACTER	COMPONENT EXAMPLE	ALLOY ABBREVIATION*
Solid body - solid body Solid body - friction Dry friction Mixed friction 	Sliding wear	Guide way, slide bar	Fe1, Fe2, Fe3, Cu1
	Impingent wear Impact wear	Sledge hammer	Fe9, Fe10, Al1, Ni2, Ni4
		Rocker level, cams	Fe1, Fe2, Fe3
	Rolling wear Ball bearing wear	Tram rail	Fe9, Fe10
		Rotor	Fe1, Fe2, Fe3, Fe9
	Rolling impact wear Thermal shock	Casting guidance roller	Fe7
		Roller conveyor roll	Fe3, Fe6, Fe7, Fe8
		Driver unit roll, coiler	Fe3
		Blacksmith's swage	Fe3, Fe4, Fe6, Fe8, Co1-3, Ni2, Ni4
	Impact sliding wear, cold	Shear blade, cutting edge	Fe4, Fe5, Fe8, Co1-3
	Impact sliding wear, warm	Warm shear blade	Fe3, Fe4, Co2, Ni2, Ni4
		Hole bar	Fe3, Fe4, Co2, Ni2, Ni4
Solid body – solid body with particles 	Impact sliding wear	Milling jaw, milling hammer	Fe6, Fe8, Fe9, Fe14
		Bash bar	Fe6, Fe8, Fe9
		Spike breaker	Fe6, Fe8, Fe9, Fe13-15
		Bandage for cement milling braker	Fe13-15
		Coal-, ore ring	Fe8, Fe13-15
		Grid bar, grid beam	Fe13-15
Solid body – particles high surface pressure and impact	Impact sliding wear	Ploughshare, bucket knife	Fe15, Fe20, Ni20
		Dropping table, chute	Fe14, Fe15, Fe20, Ni20
		Wear plate	Fe14, Fe15, Ni1-4, Ni20
Solid body – solid body and particles high surface pressure 	Grooving wear	Extruder	Fe14, Fe15, Fe20, Ni1, Ni3, Ni20, Co1-3
		Decanter	Fe14, Fe15, Fe20, Ni1, Ni3, Ni20, Co2, Cr1
		Bucket knife	Fe15, Fe20, Ni20
		Pickup	Fe2, Fe6, Fe8
		Mixer parts	Fe6, Fe8 Fe14, Fe20, Ni1, Ni3, Ni20
		Brick pressing form	Fe6, Fe8, Fe14, Ni1, Ni3
		Milling segment, milling ring	Fe14
Solid body – particles and gas 	Particle based sliding wear (T>500°C)	Blast furnace -, converter gas valve	Fe6, Fe7, Fe8
		Blast furnace top	Fe6, Fe3, Fe8, (Fe16)
		Blast furnace feeding hopper	Fe15, Fe16
		Spike breaker, grate bar	Fe7, Co1, Co2
		Fan rotor, reinforcing bar	Fe10, Fe15, Fe16, Fe20, Ni1-4, Ni20
		Fan wheel, wear plate	Fe14, Fe15, Fe20, Ni1, Ni3, Ni20
Solid - fluid and particles 	Elutriation wear, fluid erosion	Steel tube, wear plate	Fe14, Fe15
		Sea shovel excavator guides	Fe6, Fe8
		Fluid pump	Fe6, Fe7, Fe8, Ni1, Ni3
		Mixer parts	Fe6, Fe7, Fe8
	Erosion corrosion	Marine propeller	Cu1
		Water turbine	Fe7, Cu1
Solid - fluid	Corrosion	Chemical device	Fe7, Fe11, Fe12
		Gadget valve seats	Fe7, Co1-3

* Alloy groups according to DIN EN 14700:2005*

DURUM USA

- Tungsten Carbide FCAW wires
- Tungsten Carbide Rods for Oxy-acetylene Welding
- Stellite* - Flux-Cored Wires
- Nickel-, and Iron-based Flux-Cored Wires
- Tungsten Carbides, Complex Carbides and Chromium Carbides for Manual Arc Welding (stick electrodes)
- PTA Welding Powders, Fe-Ni-Co based Powders and special blends
- PTA machines, torches and powder feeders
- Powders and Wires for Laser Cladding
- Powders for Oxy-acetylene Welding and Spraying
- Fused Crushed and Spherical Fused Tungsten Carbides
- Pre-manufactured replacement wear parts
- Tungsten Carbide Wear Plates
- Wear Plates with Chromium Carbides and Complex Carbides
- Thermal Spray Powders (conforming to DIN EN 1274)
- Thermal Spray Wires (conforming to DIN EN 14919)

* Stellite is a registered trademark of Kennametal Stellite

DURUM VERSCHLEISS-SCHUTZ GMBH

Carl-Friedrich-Benz-Str. 7
47877 Willich, Germany
Tel.: +49 (0) 2154 4837 0
Fax: +49 (0) 2154 4837 78

info@durum.de
www.durmat.com

DURUM USA

25702 Aldine Westfield Rd., Ste. 601,
Spring, Texas 77373 • USA
Tel.: +1 936 539 2630, +1 888 267 0387
Fax: +1 936 539 2470

sales@durumusa.com • www.durumusa.com