Welding Guide

Manual stick electrodes
Solid wires and rods
Flux cored wires
Combinations of submerged arc wires and powders
Solders and fluxes
Metal powders

A product range for fabrication, repair and maintenance

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WELDING CONSUMABLES

UTP – five decades of experience in production development and the distribution of welding consumables.

The production programme that specialises in application techniques contains special electrodes in the corresponding special and standard alloys.

In modern industrial society innovative ideas are translated into action only through the development of new materials. In close collaboration with well-known steel manufacturers and with the most up-to-date technology UTP develops suitable weld filler materials.

A further essential factor of success is, the existing company philosophy, which has always been the same: Welding solutions are developed in close collaboration with the customer and therefore reach a maximum amount of individuality in relation to applicability.

UTP products are applied in every branch of industry. A well-organized, technical support service is available to our customers worldwide.

UTP was the first European manufacturer of coated welding electrodes and the first welding industry supplier of high nickel containing, stainless steel qualities and shielding gas qualities to receive the ASME certificate (American Society of Mechanical Engineering) "Quality System Certificate (Materials)". UTP is also classified according to KTA 1408 and other individual certificates of diverse international classification companies.

With the establishment of the quality system and the environmental management system according to **DIN EN ISO 9001** and **DIN EN ISO 14001**, UTP documents its responsibility for environmental protection and the quality requirements of the market. Our highest goal is to protect the existing resources and to reduce as much as possible environmental damages during the manufacture of our products.

For these reasons the three letters U - T - P stand for welding specialist and the design of a programme. In short, UTP spells success.

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Product Index numerical

Product Index numerical

Product Index numerical

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without addition		: UTP stick electrodes, UTP solders and brazing alloys

Group I

Welding consumables for high nickel-containing materials

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Group I

Welding consumables for high nickel-containing materials

Group 1

Welding consumables for high nickel-containing materials

Stick electrodes for high corrosion applications

Solid wires and rods for high corrosion applications

Combinations of wires and fluxes for submerged-arc welding for high corrosion resistant applications

Stick electrodes for high temperature applications

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Solid rods and wires for high temperature applications

Combinations of wires and fluxes for submerged-arc welding for high temperature resistant applications

Stick electrodes for nickel alloys

Solid rods and wires for nickel alloys

Flux cored wires for nickel alloys

Combination of wires and fluxes for submerged-arc welding of nickel alloys

The welding of nickel alloys

Hereafter are listed the most important particulars :

— Cleanliness is a top priority. Weld edge and weld area must be free of any residues and in particular free of grease,oil and dust.

  Oxide skin must be removed approx. 10 mm on each side of the weld.

— The opening angle has to be wider than on C-steel, in general 60 – 70°. Tag welding must be done in short intervalls. The root opening has to be 2 – 3 mm wide and the root face should be approx. 2 mm high.

— Stick electrodes have to be re-dried prior to any welding.

— For most applications we recommend string bead technic. When weaving, the oscillation should be limited to 2,5 x the diameter of the stick electrode core wire. This does not apply to vertical up welding.

— The stick electrode should be welded with an angle of approx. 10 – 20° and the arc should be as short as possible.

— The end crater is to be filled, in the root to be grinded out. Ignition of a new stick electrode should be approx 10 mm before the last end crater, then the arc has to be taken back to the end crater where the actual welding starts. The ignition points are then over welded again.

— The interpass temperature should not exceed 150° C and heat input should be limited to approx. 8 – 12 KJ/cm.

— If multi layer welding has to be made, each layer has to be cleaned with a stainless wire brush to remove slag residues and oxide skins.

— Weld surfaces can be cleaned by grinding, brushing with a stainless steel wire brush or by pickling.

Welding consumables for nickel alloys

Base materials				Welding consumables	
Alloy	Material-No.	DIN designation	Trade name	Stick electrode	MIG wire TIG rod
COPPER–NICKEL	2.0872 2.0882	CuNi10Fe CuNi30Fe	Cunifer 10 Cunifer 30	UTP 389 UTP 387	UTP A 389 UTP A 387
NICKEL	2.4060 2.4061 2.4066 2.4068	Ni99,6 LC-Ni99,6 Ni99,2 LC-Ni99	Nickel 99,6 LC-Nickel99,6 Nickel 200, Nickel 99,2 Nickel 201, LC-Nickel 99,2	UTP 80 Ni	UTP A 80 Ni
NICKEL–COPPER	2.4360 2.4375	NiCu30Fe NiCu30Al	Monel® 400, Nicorros Monel® K-500, Nicorros AL	UTP 80 M	UTP A 80 M
FERRO–NICKEL–CHROMIUM	1.4558 1.4862 1.4876 1.4877	X 2 NiCrAlTi 32 20 X 8 NiCrSi 38 18 X 10 NiCrAlTi 32 20 X 5 NiCrNbCe 32 27	Nicrofer 3220 LC, Incoloy 800 Nicrofer 3718, Incoloy® DS Nicrofer 3220, Incoloy® 800 Nicrofer 3228 NbCe, AC 66	UTP 068 HH / UTP 7015 Mo UTP 6222 Mo	UTP A 068 HH UTP A 6222 Mo
	1.4958 1.4959	X 5 NiCrAlTi 31 20 X 8 NiCrAlTi 32 21	Nicrofer 3220 H, Incoloy® 800 H Nicrofer 3220 HT, Incoloy® 800 HT	UTP 2133 Mn	UTP A 2133 Mn
FERRO–CHROMIUM–NICKEL–MOLYBDENIUM	1.4529	X 1 NiCrMoCuN 25 20 6	Cronifer 1925 hMo Avesta 254 S Mo	UTP 759 Kb	UTP A 759
	1.4563	X 1 NiCrMoCu 31 27 4	Sanicro 28, Nicrofer 3127 LC	UTP 3127 LC	UTP A 3127 LC
	2.4816 2.4817	NiCr15Fe LC-NiCr15Fe	Inconel® 600, Nicrofer 7216 (H) Inconel® 600 L, Nicrofer 7216LC	UTP 7015 Mo UTP 7015 / UTP 068 HH	UTP A 068 HH
	2.4851 2.4633	NiCr23Fe NiCr25FeAlY	Inconel® 601, Nicrofer 6023 Nicrofer 6025HT	UTP 6225 Al	UTP A 6225 Al
	2.4951 2.4952	NiCr20Ti NiCr20TiAl	Nimonic® 75, Nicrofer, Nicrofer 7520 Nimonic® 80 A, Nicrofer 7520 Ti	UTP 068 HH	UTP A 068 HH

Welding consumables for nickel alloys

Base materials				Welding consumables	
Alloy	Material-No.	DIN designation	Trade name	Stick electrode	MIG wire TIG rod
NICKEL– CHROMIUM– MOLYBDENIUM	2.4602	NiCr21Mo14W	Hastelloy ® C–22	UTP 722 Kb	UTP A 722
	2.4605	NiCr23Mo16Al	Nicrofer 5923hMo	UTP 759 Kb	UTP A 759
	2.4608	NiCr26MoW	Nicrofer 4626 Mo W	UTP 6170 Co	UTP A 6170 Co
	2.4610	NiMo16Cr16Ti	Hastelloy ® C–4, Nicrofer 6616h Mo	UTP 704 Kb	UTP A 704
	2.4617	NiMo28	Hastelloy B–2, Nimofer 6928	UTP 703 Kb	UTP A 703
	2.4618	NiCr22Mo6Cu	Hastelloy ® G, Nicrofer 4520h Mo		
	2.4619	NiCr22Mo7Cu	Hastelloy ® G–3, Nicrofer 4823 Mo	UTP 4225	UTP A 4225
	2.4641	NiCr21Mo6Cu	Nicrofer 4221h Mo	UTP 6222 Mo	UTP A 6222 Mo
	2.4660	NiCr20CuMo	Nicrofer 3620 Nb, 20 Cb 3		
	2.4663	NiCr23Co12Mo	Inconel ® 617, Nicrofer 5520 Co	UTP 6170 Co	UTP A 6170 Co
	2.4668	NiCr19NbMo	Inconel ® 718, Nicrofer 5219 Nb		UTP A 5521 Nb
	2.4819	NiMo16Cr15 W	Hastelloy ® C–276, Nicrofer 5716h MoW	UTP 776 Kb	UTP A 776
	2.4856	NiCr22Mo9Nb	Inconel ® 625, Nicrofer 6020h Mo	UTP 6222 Mo	UTP A 6222 Mo
	2.4858	NiCr21Mo	Incoloy ® 825, Nicrofer 4221	UTP 4225	UTP A 4225
NICKEL– STEELS	1.5637	10Ni14		UTP 7013 Mo	
	1.5662	X8Ni9		UTP 7017 Mo	UTP A 068 HH
	1.5680	12Ni19		UTP 7015 Mo	UTP A 6222 Mo
				UTP 6222 Mo	

If you have additional questions regarding further UTP alloys, feel free to contact us.

UTP 3127 LC

Low-carbon, fully austenitic stick electrode with high nickel content. Corrosion resistant

Standards :

Material-No.	:	~1.4563
DIN EN 1600	:	E 27 31 4 Cu LR
AWS A5.4	:	E 383-16

Application field

UTP 3127 LC is suited for joining and surfacing of base materials of the same and of similar nature.

Mat. No.	DIN		Mat.-No.	DIN
1.4500	G-X7 NiCrMoCuNb	25 20	1.4539	X2 NiCrMoCu 25 20 5
1.4505	X5 NiCrMoCuNb	20 18	1.14563	X1 NiCrMoCu 31 27
1.4506	X5 NiCrMoCuTi	20 18		

Properties of the weld metal

Like the base material 1.4563 this alloy distinguishes itself by high resistance against phosphoric acid and organic acids. Due to the addition of Cu besides Mo it shows extremely low corrosion rates, particularly when used in sulphuric acid. Due to the high Mo-content of more than 3,0 % in combination with approx. 27 % Cr, the stick electrode **UTP 3127 LC** distinguishes itself by resistance against stress corrosion crakking, crevice corrosion and pitting in media containing chloride ions.

Welding properties

The stick electrode can be welded in all positions except vertical-down. It has a stable arc. Easy and thorough slag removal. The seam has a finely rippled, smooth and regular structure.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 350	> 600	> 30	> 50

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Cu	Fe
< 0,03	< 0,9	1,5	27,0	3,5	31,0	1,3	balance

Welding instructions

Usual weld seam preparation. The welding zone must be free from residues, such as grease, paint or metal dust. String beads are welded, max. weaving width 2,5 x diameter of the electrode core wire. Use smallest possible stick electrode diameter. Dry the stick electrodes for 2 hours at 120 - 200° C before use.

Current type DC (+) / AC

Welding positions


PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350
Amperage	A	50 – 70	70 – 100

Approvals

TÜV (No. 09466)

UTP 4225

Basic coated stick electrode for joining and surfacing

Standards :

Material-No.	:	2.4652
EN ISO 14172	:	E Ni 8165 (NiCr25Fe30Mo)

Application field

UTP 4225 is suitable for joining and surfacing of alloys of similar nature, such as e. g. NiCr21Mo, furthermore for welding of CrNiMoCu-alloyed austenitic steels used for high quality tank and apparatus construction in the chemical industry, corrosion resistance in media of sulphuric- and phosphoric acid.

Welding properties and special properties of the weld metal

The stick electrode can be welded in all positions except vertical-down. Stable arc, easy slag removal. The seam is finely rippled and notch-free. The weld metal **UTP 4225** is resistant against pitting and stress corrosion cracking in media containing chloride ions. High resistance against reducing acids due to the combination of nickel, molybdenum and copper. Resistant in oxidising acids. **UTP 4225** results in a fully austenitic weld metal.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strenth K_v Joule
> 350	> 550	> 30	> 80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Cu	Fe
< 0,03	0,4	2,5	26,0	6	40,0	1,8	balance

Welding instructions

The welding zone must be free from residues. Opening angle of the prepared seam 70 - 80°, root gap approx. 2 mm. Weld stick electrode with a slight tilt and with short arc. String beads are welded, if necessary, with little weaving, max. weaving width 2,5 x diameter of the stick electrode core wire. Weldable with very low current adjustment. The end crater should be filled thoroughly and the arc must be drawn away to the side. Re-dry the stick electrodes for 2 - 3 hours at 250 - 300° C before use and weld them out of a warm electrode carrier.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 350
Amperage	A	70 – 100	90 – 120

Approval

TÜV (No. 06680)

UTP 6222 Mo

Basic coated NiCrMo-stick electrode for corrosion and heat resistant materials

Standards :

Material-No.	:	2.4621
EN ISO 14172	:	E Ni 6625 (NiCr22Mo9Nb)
AWS A5.11	:	E NiCrMo-3

Application field

UTP 6222 Mo is particularly suited for joining and surfacing on nickel alloys, austenitic steels, low temperature nickel steels, austenitic-ferritic-joints and claddings of the same or similar nature, like 2.4856 (NiCr 22Mo 9 Nb), 1.4876 (X30 NiCrAlTi 32 20), 1.4529 (X2 NiCrMoCu 25 20 5).

Properties of the weld metal

The weld metal is heat resistant and suitable for operating temperatures up to 1000° C. It must be noted that a slight decrease in ductility will occur if prolonged heat treatment is given within the temperature range 600 - 800° C. Scale-resisting in low-sulphur atmosphere up to 1100° C. High creep strength.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength Kv Joule +20° C	–196° C
> 450	> 760	> 30	> 75	45

Approximate weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Nb	Fe
0,03	0,4	0,6	22,0	9,0	balance	3,3	1,5

Welding instruction

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld stick electrode with slight tilt and short arc. String beads are welded. The interpass temperature of 150° C and a max. weaving width 2,5 x diameter of the stick electrode core wire should not be exceeded. Re-dry the stick electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm electrode carrier.

Current type DC (+)

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 300	4,0 x 350	5,0 x 400
Amperage	A	50 – 70	70 – 95	90 – 120	120 – 160

Approvals

TÜV (No. 03610), DNV, ABS, GL, BV

Standards :

Material-No..	:	2.4612
EN ISO 14172	:	E Ni 6455 (NiCr16Mo15Ti)
AWS A5.11	:	E NiCrMo-7

UTP 704 Kb

Basic coated stick electrode for highly corrosion resistant NiCrMo-alloys (C 4)

Application field

The basic coated stick electrode **UTP 704 Kb** is suited for joint welding of matching base materials, as Material-No. 2.4610 NiMo16Cr16Ti and for surfacing on low-alloyed steels. It is employed primarily for welding components in plants for chemical processes with highly corrosive media, but also for surfacing press tools, punches etc. operating at high temperatures.

Properties of the weld metal

Exceptional resistance to contaminated mineral acids, chlorine contaminated media, dry chlorine, sea-water and brine solutions.

Welding properties

UTP 704 Kb can be welded in all positions except vertical-down. Stable arc, easy slag removal.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 720	> 30	> 70

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
< 0,015	< 0,2	0,7	17,0	15,5	balance	1,0

Welding instructions

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld stick electrode with slight tilt and with a short arc. String beads are welded. The interpass temperature of 150° C and a max. weaving width 2,5 x diameter of the electrode core wire should not be exceeded. Re-dry the stick electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm electrode carrier.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 350	4,0 x 350
Amperage	A	50 – 70	70 – 100	90 – 130

Approvals

TÜV (No. 04998)

UTP 776 Kb

Basic coated stick electrode for high corrosion resistant NiCrMo alloys (C-276)

Standards :

Material-No.	:	2.4887
EN ISO 14172	:	E Ni 6276 (NiCr15Mo15Fe6W4)
AWS A5.11	:	E NiCrMo-4

Application field

Joint welding of matching base materials, as Material-No. 2.4819 (NiMo16Cr15W) and surfacing on low-alloyed steels. It is employed primarily for welding components in plants for chemical processes with highly corrosive media, but also for surfacing press tools, punches etc. which operate at high temperatures.

Properties of the weld metal

In addition to its exceptional resistance to contaminated mineral acids, chlorine-contaminated media, and chloride containing media, it resists strong oxidisers such as ferric and cupric chlorides and is one of the few materials which will resist wet chlorine gas.

Welding properties

The stick electrode can be welded in all positions except vertical-down. Stable arc, easy slag removal.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 720	> 30	> 70

Approximate weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	W	Fe
< 0,02	< 0,2	0,6	16,5	16,5	balance	4,0	5,0

Welding instructions

For avoidance of intermetallic precipitation the stick electrode should be welded with lowest possible heat input and minimum interpass temperature. Beam width of the prepared seam approx. 70°, root gap approx. 2 mm. Weld stick electrode with slight tilt and with a short arc. String beads are welded. The interpass temperature of 150° C and a max. weaving width 2,5 x diameter of the stick electrode core wire should not be exceeded. Re-dry the stick electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm stick electrode carrier.

Current type DC (+)

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 300	4,0 x 350
Amperage	A	50 – 70	70 – 100	90 – 130

Approvals

TÜV (No. 05257)

UTP 722 Kb

Basic coated stick electrode for highly corrosion resistant NiCrMo alloys (C 22)

Standards :

Material-No.	:	2.4638
EN ISO 14172	:	E Ni 6022 (NiCr21Mo13W3)
AWS A5.11	:	E NiCrMo-10

Application field
The stick electrode **UTP 722 Kb** is suited for joining materials of the same nature, e. g. Material-No. 2.4602 NiCr21Mo14W and these materials with low alloyed steels such as for surfacing on low alloyed steels. For welding components in plants for chemical processes with highly corrosive media.

Special properties of the weld metal
Good corrosion resistance against acetic acid and acetic hydride, hot contaminated sulphuric and phosphoric acids and other contaminated oxidising mineral acids.

Welding properties
UTP 722 Kb can be welded in all positions except vertical-down. A stable arc and very easy slag removal.

Mechanical properties of the pure weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 720	> 30	> 70

Approximate weld metal analysis in % :

C	Si	Mn	Cr	Mo	Ni	W	Fe
< 0,02	< 0,2	0,8	21,0	13,5	balance	3,0	3,0

Welding instructions
Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld stick electrode with slight tilt and with a short arc. String beads are welded. The interpass temperature of 150° C and a max. weaving width 2,5 x diameter of the stick electrode core wire should not be exceeded. Re-dry the stick electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm stick electrode carrier.

Current type DC (+)

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 250
Amperage	A	50 – 70	70 – 110

UTP 759 Kb

Basic coated NiCrMo stick electrode for highest corrosion requirements

Standards :

Material-No.	:	2.4609
EN ISO 14172	:	E Ni 6059 (NiCr23Mo16)
AWS A5.11	:	E NiCrMo-13

Application field

UTP 759 Kb is employed primarily for welding components in environmental plants and plants for chemical processes with highly corrosive media. Joint welding of matching base materials as Material-No. 2.4605 or similar matching materials as material No 2.4602 NiCr21Mo14W. Joint welding of these materials with low-alloyed steels. Cladding on low-alloyed steels.

Properties of the weld metal

In addition to its good resistance to contaminated oxidating mineral acids, acetic acids and acetic anhydrides, hot contaminated sulphuric - and phosphoric acid, **UTP 759 Kb** has an excellent resistance against pitting and crevice corrosion. The special composition of the coating extensively prevents the precipitation of intermetallic phases.

Welding properties

UTP 759 Kb can be welded in all positions except vertical down. Stable arc, easy slag removal.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 720	> 30	> 75

Approximate weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
< 0,02	< 0,2	0,5	22,5	15,5	balance	1,0

Welding instruction

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld stick electrode with slight tilt and with a short arc. String beads are welded. The interpass temperature of 150° C and a max. weaving width 2,5 x diameter of the stick electrode core wire should not be exceeded. Re-dry the stick electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm stick electrode carrier.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 300	4,0 x 350
Amperage	A	50 – 70	70 – 100	90 – 130

Approvals

TÜV (No. 06687)

UTP 703 Kb

Basic coated NiMo stick electrode for highest corrosion requirements

Standards :

Material-No.	:	2.4616
EN ISO 14172	:	ENi 1066 (NiMo28)
AWS A5.11	:	ENiMo-7

Application field

The basic coated stick electrode **UTP 703 Kb** is suited for welding of matching base materials, such as alloy B-2, material No 2.4617 NiMo28, and surfacing of low-alloyed steels.
Chemical process industry, especially for processes involving sulphuric-, hydrochloric- and phosphoric acids.

Properties of the weld metal

It shows good resistance against hydrogen chloride gas, sulphuric-, acetic- and phosphoric acids.

Welding properties

UTP 703 Kb can be welded in all positions except vertical-down. Stable arc, good slag removal.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 480	> 760	> 30	> 100

Weld metal analysis in %

C	Si	Mn	Mo	Ni	Fe
< 0,02	< 0,2	0,5	27,0	balance	1,0

Welding instructions

Grind and clean base material on each side of the weld. Weld with the lowest possible heat input and minimum interpass temperature. String beads are welded. Quick cooling is advisable to reduce intermetallic precipitation in the heat affected zone. Re-dry the stick electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm stick electrode carrier.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 300
Amperage	A	70 – 100

UTP 6202 Mo

Basic coated NiMo stick electrode for highest corrosion requirements

Standards :

EN ISO 14172	:	E Ni 1069 (NiMo28Fe4Cr)
AWS A5.11	:	E NiMo-11

Application field

UTP 6202 Mo is suited for joining materials of the same nature, e. g. alloy B 3 (UNS 10629, NiMo29Cr, material-No. 2.4600), alloy B 2 (NiMo28, Material-No. 2.4617) or other NiMo-alloys with similar chemical composition such as for surfacing on low alloyed steels.

UTP 6202 Mo is used in the chemical process industry, especially for processes involving sulphuric-, hydrochloric- and phosphoric acid.

Properties of the weld metal

Good resistance against hydrogen chloride, sulphuric -, acetic - and phosphoric acids. Intermetallic precipitation will be largely avoided.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 700	> 30	> 80

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Mo	Ni	Nb	Co	Al	Fe
0,01	0,2	0,5	0,015	0,015	1,0	27,5	balance	< 0,5	< 0,5	< 0,5	3,0

Welding instructions

Grind and clean base material on each side of the weld. Weld with the lowest possible heat input and minimum interpass temperature. String beads are welded. Quick cooling is advisable to reduce intermetallic precipitation in the heat affected zone. Re-dry the stick electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm electrode carrier.

Current type DC (+)

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 300	4,0 x 350
Amperage	A	50 – 70	70 – 90	90 – 120

Standards :
EN ISO 14172 : E Ni 1062 (NiMo24Cr8Fe6)

UTP 6208 Mo

Basic coated NiMo-stick electrode for highest corrosion requirements

Application field

UTP 6208 Mo is suited for joining materials of the same nature, e. g. NiMo23Cr8Fe (Nimofer 6224) Alloy B 10 UNS 10624 or other NiMo-alloys with similar chemical composition such as for surfacing on low alloyed steels.

UTP 6208 Mo is used in the chemical process industry, especially for processes involving sulphuric-, hydrochloric- and phosphoric acid.

Properties of the weld metal

Good resistance against hydrogen chloride, sulphuric -, acetic - and phosphoric acids. Intermetallic precipitation will be largely avoided

UTP 6208 Mo can be welded in all positions except vertical-down. It has a stable arc and easy slag removal. The seam is finely rippled and notch-free.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 700	> 30	> 80

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Mo	Ni	Nb	Co	Al	Fe
0,01	0,2	0,5	0,015	0,015	7,0	24,0	balance	< 0,5	< 0,5	< 0,5	5,5

Welding instructions

Grind and clean base material on each side of the weld. Weld with the lowest possible heat input and minimum interpass temperature. String beads are welded. Quick cooling is advisable to reduce intermetallic precipitation in the heat affected zone. Re-dry the stick electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm electrode carrier.

Current type DC (+) **Welding positions**

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 300	4,0 x 350
Amperage	A	50 – 70	70 – 90	90 – 120

UTP A 3127 LC

Fully austenitic rods and wires for corrosion resistant steels

Standards :

Material-No..	:	1.4563
EN ISO 14343-A	:	W/G 27 31 4 Cu L
AWS A5.9	:	ER 383

Application field

UTP A 3127 LC is suited for joining and surfacing base materials of the same and similar natures, e. g.

1.4500	G- X 7	NiCrMoCuNb	25 20
1.4505	X 5	NiCrMoCuNb	20 18
1.4506	X 5	NiCrMoCuTi	20 18
1.4539	X 2	NiCrMoCu	25 20 5
1.4563	X 1	NiCrMoCu	31 37
2.4858		NiCr21Mo	

Properties of the weld metal

UTP A 3127 LC distinguishes itself by its high resistance against phosphoric acid and organic acids. Due to its Mo- and Cu-content it shows extremely low corrosion rates, particularly when used in sulphuric acid.

Resistant against stress corrosion cracking, crevice corrosion and pitting in media containing chloride ions.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 350	> 540	> 30	> 80

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Cu	Fe
< 0,02	< 0,2	1,5	27,0	31,0	3,5	1,0	balance

Welding instruction

The welding area has to be free from inpurities (oil, paint, markings). Minimize heat input. The interpass temperature should not exceed 150 °C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
1,2	DC (+)		x	x	
2,0	DC (-)	x			x
2,4	DC (-)	x			x

Approvals

TÜV (No. 06609)

Standards :

Material-No.	:	1.4562
EN ISO 14343-A	:	W/GZ 28327 CuL

UTP A 3128 Mo

Rods for high corrosion resistant Ni-FeCrMo-alloys

Application field

UTP A 3128 Mo is suitable for welding of NiFeCrMo-alloys for construction of phosphoric - and sulphuric acid plants.

1.4562	X 1 NiCrMoCu 32 28 7
1.4563	X 1 NiCrMoCu 31 27 4

Properties of the weld metal

The weld metal has a good resistance to pitting, crevice corrosion, intercrystalline corrosion and stress corrosion cracking in oxidizing media containing chloride ions.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 700	> 35	> 120

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Mo	Ni	N	Cu	Fe
0,01	0,1	1,6	< 0,015	< 0,01	27,0	6,5	32,0	0,2	1,2	balance

Welding instruction

The welding area has to be free from inpurities (oil, paint, markings). Minimize heat input. The interpass temperature should not exceed 120 °C. Linear energy input < 8 $\frac{kJ}{cm}$

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability
			Rods
		I 1	L (mm)
2,0	DC (-)	x	1000
2,4	DC (-)	x	1000

Approvals

TÜV (No. 06999)

UTP A 3133 LC

Rods and wires with high Cr-content for highly corrosive applications

Standards :

Material-No.	:	1.4591
EN ISO 14343-A	:	W/GZ 32 311 L

Application field

UTP A 3133 LC is suitable for joining and surfacing of high corrosion resistant materials of the same and of similar nature in chemical construction plants, where good resistance to general corrosion, pitting, crevice corrosion and stress corrosion cracking in media containing chloride ions is required.

1.4591 X 1 CrNiMoCuN 33 32 1 (Nicrofer 3033, alloy 33)

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 400	> 750	> 35	> 90

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Cu	N	Fe
< 0,015	< 0,4	< 2,0	33,0	31,0	1,5	0,8	0,4	balance

Welding instruction

Grind welding area to metallic bright and clean thoroughly. Keep heat input as low as possible. The interpass temperature of 150° C should not be exceeded.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
1,2	DC (+)		x	x	
2,0	DC (-)	x			x
2,4	DC (-)	x			x

Approvals

TÜV (No. 07747)

Standards :

Material-No. : 2.4655
EN ISO 18274 : S Ni 8125 (NiFe26Cr25Mo)

UTP A 4225

High nickel containing and corrosion resistant rods and wires

Application field

UTP A 4225 is suitable for joining and surfacing alloys with similar nature and for welding CrNiMoCu-alloyed austenitic steels used for the high quality tank and apparatus construction in the chemical industry, corrosion resistance in media of sulphuric- and phosphoric acid.

1.4500	G- X 7	NiCrMoCuNb	25 20	
1.4529	X 1	NiCrMoCuN	25 20 6	UNS N 08926
1.4539	X 1	NiCrMoCuN	25 20 5	UNS N 08904
1.4563	X 1	NiCrMoCuN	31 27 4	UNS N 08028
2.4619		NiCr22Mo7Cu		UNS N 06985
2.4858		NiCr21Mo		UNS N 08825

Properties of the weld metal

Fully austenitic weld metal with high resistance to stress corrosion cracking and pitting in media containing chloride ions. Good corrosion resistance against reducing acids due to the combination of Ni, Mo and Cu. Sufficient resistance against oxidizing acids. The weld metal is corrosion resistant in seawater.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 360	> 560	> 30	> 100

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Cu	Fe
< 0,02	< 0,3	2,5	25,5	5,0	41,0	2,0	balance

Welding instruction

The welding area has to be free from inpurities (oil, paint, markings). Minimize heat input. The interpass temperature should not exceed 120 °C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
1,2	DC (+)		x	x	
2,4	DC (-)	x			x

Approvals

TÜV (No. 06681; 06682)

Standards :

Material-No.	:	2.4831
EN ISO 18274	:	S Ni 6625 (NiCr22Mo9Nb)
AWS A5.14	:	ER NiCrMo-3

UTP A 6222 Mo

Rods and wires for high corrosion resistant NiCrMo-alloys

Application field

UTP A 6222 Mo has a high nickel content and is suitable for welding high-strength and high-corrosion resistant nickel-base alloys, e. g.

X1 NiCrMoCuN25206	1.4529	UNS N08926
X1 NiCrMoCuN25205	1.4539	UNS N08904
NiCr21Mo	2.4858	UNS N08825
NiCr22Mo9Nb	2.4856	UNS N06625

It can be used for joining ferritic steel to austenitic steel as well as for surfacing on steel. It is also possible to weld 9 % nickel steels using this wire due to its high yield strength.
Its wide range of uses is of particular signifiance in aviation, in chemical industry and in applications involving seawater.

Special properties of the weld metal

The special features of the weld metal of **UTP A 6222 Mo** include a good creep rupture strength, corrosion resistance, resistance to stress and hot cracking. It is highly resistant and tough from cryogenic temperatures up to 1100° C. It has an extremely good fatigue resistance due to the alloying elements Mo and Nb in the NiCr-matrix. The weld metal is highly resistant to oxidation and is almost immune to stress corrosion cracking. It resists intergranular penetration without having been heat-treated.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 460	> 740	> 30	20° C > 100 –196° C > 85

Weld metal analysis in %

C	Si	Cr	Mo	Ni	Nb	Fe
< 0,02	< 0,2	22,0	9,0	balance	3,5	1,0

Welding instruction

The welding area has to be free from inpurities (oil, paint, markings). Minimize heat input. The interpass temperature should not exceed 150 °C. Linear energy input < 12 $\frac{kJ}{cm}$

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		R 1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
0,8 *	DC (+)		x	x	
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2 *	DC (-)	x			x

* available on request

Approvals TÜV (No. 03460; 03461), GL, DNV, ABS

UTP A 704

Rods and wires for high corrosion resistant NiCrMo alloys

Standards :

Material-No.	:	2.4611
EN ISO 18274	:	S Ni 6455 (NiCr16Mo16Ti)
AWS A5.14	:	ER NiCrMo-7

Application field

UTP A 704 is suitable for joint weldings in the chemical industry on alloys of the type materials

2.4610	NiMo16Cr16Ti	UNS N06455
2.4819	NiMo16Cr15W	UNS N10276

as well as for joining these materials with high and low alloyed steels and for surface weldings.

Properties of the weld metal

High corrosion resistance in reducing and oxidizing media. Is used for especially critical processes in the chemical industry. Keep heat input as low as possible.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 400	> 700	> 30	> 90

Weld metal analysis %

C	Si	Cr	Mo	Ni	Fe
< 0,01	< 0,1	16,0	16,0	balance	< 1,5

Welding instruction

The welding area has to be free from inpurities (oil, paint, markings). Minimize heat input. The interpass temperature should not exceed 150 °C. Linear energy input < 12 $\frac{kJ}{cm}$

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		R1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
1,2 *	DC (+)		x	x	
2,0	DC (-)	x			x
2,4	DC (-)	x			x

* available on request

Approvals

TÜV (No. 04590; 04591)

UTP A 776

Rods and wires for high corrosion resistant NiCrMo alloys

Standards :

Material-No.	:	2.4886
EN ISO 18274	:	S Ni 6276 (NiCr15Mo16Fe6W4)
AWS A5.14	:	ER NiCrMo-4

Application field

UTP A 776 is suitable for joint welding of matching base materials, as

2.4819 NiMo16Cr15W UNS N10276

and surface weldings on low-alloyed steels.

UTP A 776 is employed primarily for welding components in plants for chemical processes with highly corrosive media, but also for surfacing press tools, punches, etc. which operate at high temperature.

Special properties of the weld metal

Excellent resistance against sulphuric acids at high chloride concentrations.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 750	> 30	> 90

Weld metal analysis in %

C	Si	Cr	Mo	Ni	V	W	Fe
< 0,01	0,1	16,0	16,0	balance	0,2	3,5	6,0

Welding instruction

To avoid intermetallic precipitations, stick electrodes should be welded with lowest possible heat input and interpass temperature.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools	Availability Rods
		R 1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

Approvals

TÜV (No. 05586; 05587)

UTP A 722

Rods and wires for high corrosion resistant NiCrMo alloys

Standards :

Material-No.	:	2.4635
EN ISO 18274	:	S Ni 6022 (NiCr21Mo13Fe4W3)
AWS A5.14	:	ER NiCrMo-10

Application field

UTP A 722 is suitable for joining materials of the same nature, e. g. Material-No. 2.4602 NiCr21Mo14W (UNS N06022), special steels and these materials with low alloyed steels such as for surfacing on low alloyed steels.
For welding components in plants for chemical processes with highly corrosive media.

Properties of the weld metal

Good corrosion resistance against acetic acid and acetic hydride, hot contaminated sulphuric and phosphoric acids and other contaminated oxidising mineral acids.
Intermetallic precipitation will be largely avoided.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Impact strength Kv Joule
> 400	> 700	> 30	> 70

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Mo	Ni	V	W	Cu	Co	Fe
< 0,01	< 0,1	< 0,5	< 0,015	< 0,01	21,0	13,0	balance	< 0,2	3,0	< 0,2	< 2,5	3,0

Welding instruction

The welding area has to be free from inpurities (oil, paint, markings). Minimize heat input. The interpass temperature should not exceed 150 °C. Linear energy input < 12 $\frac{kJ}{cm}$

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		R 1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
1,2 *	DC (+)	x	x	x	
2,0	DC (-)	x			x
2,4	DC (-)	x			x

* available on request

UTP A 759

Rods and wires for high corrosion resistant NiCrMo alloys

Standard :

Material-No.	:	2.4607
EN ISO 18274	:	S Ni 6059 (NiCr23Mo16)
AWS A5.14	:	ER NiCrMo-13

Application field

UTP A 759 is suitable for welding components in plants for chemical processes with highly corrosive media.

For joining materials of the same or similar natures, e. g.

2.4602	NiCr21Mo14W	UNS N06022
2.4605	NiCr23Mo16Al	UNS N06059
2.4610	NiMo16Cr16Ti	UNS N06455
2.4819	NiMo16Cr15W	UNS N10276

and these materials with low alloyed steels such as for surfacing on low alloyed steels.

Properties of the weld metal

Good corrosion resistance against acetic acid and acetic hydride, hot contaminated sulphuric and phosphoric acids and other contaminated oxidising mineral acids. Intermetallic precipitation will be largely avoided.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 720	> 35	> 100

Weld metal analysis in %

C	Si	Cr	Mo	Ni	Fe
< 0,01	0,1	22,5	15,5	balance	< 1,0

Welding instruction

The welding area has to be free from inpurities (oil, paint, markings). Minimize heat input. The interpass temperature should not exceed 150 °C. Linear energy input < 12 $\frac{kJ}{cm}$

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		R 1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
0,8 *	DC (+)		x	x	
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6 *	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2 *	DC (-)	x			x

* available on request

Approvals

TÜV (No. 06065; 06068), GL

UTP A 703

Rods and wires for corrosion resistant NiMo alloys

Standards :

Material-No.	:	2.4615
EN ISO 18274	:	S Ni 1066 (NiMo28)
AWS A5.14	:	ER NiMo-7

Application field

UTP A 703 is suitable for joint-welding of similar materials, e.g. NiMo28, Material-No. 2.4617 UNS N 10665 and surfacing on low-alloyed steels.

Welding components of apparatus for chemical processes, especially in sulphuric-, chlorid- and phosphoric acid environments.

Properties of the weld metal

Good resistance to hydrochloride, sulphuric, acetic and phosphoric acid.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 480	> 760	> 30	> 80

Weld metal analysis in %

C	Si	Mo	Ni	Fe
< 0,01	< 0,1	28,0	balance	< 2,0

Welding instruction

Clean the weld area thoroughly. Low heat input. Max. interpass temperature 150°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability	
					Spools	Rods
		I 1	R 1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
0,8 *	DC (+)		x	x	x	
1,2 *	DC (+)			x	x	
1,6 *	DC (-)	x				x
2,0 *	DC (-)	x				x
2,4 *	DC (-)	x				x

* available on request

Approvals

TÜV (No. 09212; 09213)

UTP A 6202 Mo

Rods and wires for high corrosion resistant NiMo-alloys

Standards :

Material-No.	:	2.4701
EN ISO 18274	:	S Ni 1069 (NiMo28Fe4Cr)
AWS 5.14	:	ER NiMo-11

Application field

For joining materials of similar nature, as e. g. Alloy B 3 (UNS 10629, NiMo29Cr, Material-No. 2.4600), Alloy B 2 (UNS 10665, NiMo28, Material-No. 2.4617) or other NiMo-alloys with similar composition such as for surfacing on low-alloyed steels.
UTP A 6202 Mo is used in the chemical process industry, especially for processes involving sulphuric-, hydrochloric- and phosphoric acids.

Properties of the weld metal

Good resistance against hydrogen chloride, sulphuric-, acetic- and phosphoric acids. Intermetallic precipitation will be largely avoided.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 750	> 30	> 80

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Mo	Ni	Fe
0,01	0,05	1,0	< 0,02	< 0,01	1,0	28,0	> 65,0	3,5

Welding instruction

The welding area has to be free from inpurities (oil, paint, markings). Minimize heat input. The interpass temperature should not exceed 120 °C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability	
					Spools	Rods
		I 1	R 1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
1,2	DC (+)		x	x	x	
2,0	DC (-)	x				x
2,4	DC (-)	x				x

Approvals

TÜV (No. 09162; 09163)

UTP UP 6222 Mo
UTP UP FX 6222 Mo

Wire/flux combination for high nitrogen containing steels (6Mo) and duplex-alloys

Standards :

Wire

Material-No.	:	2.4831
EN ISO 18274	:	S Ni 6625 (NiCr22Mo9Nb)
AWS A5.14	:	ER NiCrMo-3

Flux

EN 760	:	S A FB 2 55 AC

Application field

UTP UP 6222 Mo and the flux **UTP UP FX 6222 Mo** are applied for joint welding of base materials with the same or with a similar composition, e. g. Alloy 625 (UNS N06625) or NiCr22Mo9Nb, Material-No. 2.4856 or mixed combinations with stainless steels and carbon steels. Furthermore the wire-flux combination is used for cold-tough Ni-steels, e. g. X8Ni9 for LNG projects. **UTP UP 6222 Mo / UTP UP FX 6222 Mo** is also applied on alloyed or unalloyed steels for cladding of corrosion resistant plants.

Mechanical properties of the pure weld deposit

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
460	725	40	> 80 at + 20° C 65 at -196° C

Chemical weld metal analysis in %

C	Si	Cr	Mo	Ni	Nb	Fe
< 0,02	< 0,2	21,0	9,0	balance	3,3	2,0

Welding instructions

The welding area has to be free from impurities (oil, paint, markings etc.). Welding must be performed with a low heat input. The maximum interpass temperature is at 150° C.
Flux has to be re-dried prior to welding: 2 hours at 300 - 400° C.

Flux height	:	approx. 25 mm
Stick out	:	approx. 25 mm

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire EN ISO 544	Flux
1,6	200 - 250	28 - 30	30 - 50	B 300	25 kg
2,0	250 - 350	28 - 30	30 - 50	B 450	25 kg
2,4	350 - 450	28 - 30	30 - 50	B 450	25 kg
3,2	400 - 450	28 - 30	30 - 50	B 450	25 kg

Approval

TÜV (No. 03918)

UTP 68 H

Fully austenitic CrNi stick electrode for temperature resistant steels

Standards :

Material-No.	:	~1.4842
EN 1600	:	E 25 20 R
AWS A5.4	:	E 310-16

Application field

The rutile coated stick electrode **UTP 68 H** is suitable for joining and surfacing of heat resistant Cr-, CrSi-, CrAl-, CrNi-steels/cast steels. It is used for operating temperatures up to 1100° C in low-sulphur combustion gas. Application fields are in the engineering of furnaces, pipework and fittings.

Base materials

Material-No.	DIN		Material-No.	DIN	
1.4710	G-X30 CrSi	6	1.4837	G- X40 CrNiSi	25 12
1.4713	X10 CrAl	7	1.4840	G- X15 CrNi	25 20
1.4762	X10 CrAl	24	1.4841	X15 CrNiSi	25 20
1.4828	X15 CrNiSi	20 12	1.4845	X12 CrNi	25 21
1.4832	G-X25 CrNiSi	20 14	1.4848	G- X40 CrNiSi	25 20

Joining these materials with non- and low alloyed steels is possible.

Welding properties

UTP 68 H is weldable in all positions except vertical down. Fine droplet. The surface of the seams is smooth and finely rippled. Easy slag removal free from residues.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 350	> 550	> 30	> 47

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,10	0,6	1,5	25,0	20,0	balance

Welding instruction

Weld stick electrode with slight tilt and with a short arc. Re-dry the stick electrodes 2 h at 120 – 200° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	1,5 x 250*	2,0 x 250*	2,5 x 250	3,2 x 350	4,0 x 400
Amperage	A	25 – 40	40 – 60	50 – 80	80 – 110	130 – 140

* available on request

UTP 2133 Mn

Fully austenitic CrNi stick electrode for temperature resistant steels

Standards :

Material-No.	:	~ 1.4850
EN 1600	:	EZ 21 33 B 4 2

Application field

UTP 2133 Mn is suitable for joining and surfacing of heat-resistant steels and cast steels of the same or of similar nature, such as

1.4876	X10 NiCrAlTi 32 20	UNS	N 08800
1.4859	G- X10 NiCrNb 32 20		
1.4958	X 5 NiCrAlTi 31 20	UNS	N 08810
1.4959	X 8 NiCrAlTi 31 21	UNS	N 08811

Welding properties

It is used for operating temperatures up to 1050° C in carburized low-sulphur combustion gas, e. g. in petrochemical plants.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 410	> 600	> 25	> 70

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
0,14	0,3	4,5	21,0	33,0	1,3	balance

Welding instructions

Hold stick electrode vertically with a short arc and lowest heat input. String beads are welded. The interpass temperature of 150° C should not be exceeded.
Re-dry stick electrodes for 2 – 3 h at 250 -300° C.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400
Amperage	A	50 – 75	70 – 110	90 – 140

Approvals

TÜV (No. 07713)

Standards :

Material-No. : 1.4853

EN 1600 : EZ 25 35 Nb B 6 2

UTP 2535 Nb

Basic coated stick electrode with high carbon content for cast steels

Application field

UTP 2535 Nb is suitable for joining and surfacing of heat resistant CrNi-cast steels (centrifugal- and mould cast parts) of the same or of similar nature, such as

1.4852	G–X 40 NiCrSiNb 35 26
1.4857	G–X 40 NiCrSi 35 26

Welding properties

It is used for operating temperatures up to 1100° C in carburized low-sulphur combustion gas, e. g. reforming ovens in petrochemical plants.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 480	> 700	> 8

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Ti	Fe
0,4	1,0	1,5	25,0	35,0	1,2	0,1	balance

Welding instructions

Hold stick electrode vertically with a short arc and lowest heat input. String beads are welded. The interpass temperature of 180° C should not be exceeded. Re-dry stick electrodes for 2 - 3 hours at 250 - 300° C

Current type DC (+)

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 400
Amperage	A	50 – 70	70 – 120	100 – 140	

UTP 2535 CoW

Basic coated stick electrode for high temperature cast materials

Standards :
EN 1600 : EZ 25 35 CoW B 6 3

Application field

UTP 2535 CoW is suitable for joining and surfacing high-temperature cast alloys of the same or of similar nature, such e. g. G-X 50 NiCrCoW 35 25.
Main applications are centrifugal- and mould cast parts for reforming pyrolysis ovens. Working temperature of the ovens: up to 1200° C / air.

Welding properties and special properties of the weld metal

UTP 2535 CoW has a stable arc, good slag removal and fine-rippled seam structure. The weld metal has an excellent creep strength and a good resistance against carburization and oxidation.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 550	> 750	> 8

Weld metal analysis in % :

C	Si	Mn	Cr	Ni	W	Co	Fe
0,50	0,8	1,1	25,0	35,0	4,5	14,0	balance

Welding instruction

Clean welding area. Hold stick electrode as vertically as possible and with a short arc. Apply string beads with little weaving. This stick electrode is weldable with low amperage settings. The interpass temperature of 150° C should not be exceeded. Re-dry stick electrodes for 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions

PA PB PC

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350*	4,0 x 400*
Amperage	A	70 – 110	100 – 140

* available on request

UTP 2949 W

Basic coated special stick electrode with high carbon content for high temperature cast materials

Standard :

Material-No.	:	2.4879
EN ISO 14172	:	E Ni 8025 (mod.)

Application field

UTP 2949 W is suitable for joining and surfacing high alloyed 28/48 CrNi high temperature cast materials of identical or similar nature, such as material-No. 2.4879 G-NiCr28W.
Main applications are reformer tubes in petrochemical installations with a service temperature up to 1150°C.

Welding properties and special properties of the weld metal

UTP 2949 W has a smooth, stable arc. Easy slag removal. The seam has a finely rippled structure. The weld metal is high temperature resistant with very good creep strength.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 480	> 650	> 5

Weld metal analysis in % :

C	Si	Mn	Cr	Ni	W	Fe
0,45	1,1	1,2	29,0	49,0	4,5	balance

Welding instruction

Clean welding area. Hold stick electrode as vertically as possible with a short arc. Use string bead welding technique with little weaving. This stick electrode is weldable with low amperage settings. Interpass temperature max. 150° C. Re-dry stick electrodes 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 350*	5,0 x 400
Amperage	A	70 - 90	90 - 110	100 – 140	-

* available on request

UTP 3545 Nb

Basic coated special stick electrode with high carbon content for high temperature cast materials

Standards :

EN 1600	:	EZ 35 45 Nb B 6 2
EN ISO 14172	:	E Ni Z (NiCr35 Fe15Nb 0,8)

Application field

UTP 3545 Nb is suitable for joining and surfacing high alloyed 35/45 CrNi high temperature cast materials of identical or similar nature.

Main applications are reformer tubes in petrochemical installations with a service temperature up to 1175° C.

Welding properties and special properties of the weld metal

UTP 3545 Nb has a smooth and stable arc, good slag removal and a fine-rippled seam structure. The weld metal is high temperature resistant with very good creep strength.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 450	> 600	> 8

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
0,45	1,0	0,8	35,0	45,0	0,9	balance

Welding instructions

Clean welding area. Hold stick electrode as vertically as possible, keep a short arc. Use string bead welding technique with little weaving. The stick electrode is weldable with low amperage settings. Interpass temperature max. 150° C. Re-dry stick electrodes for 2 – 3 h / 120 – 200° C.

Current type DC (+)

Welding positions

PA PB PC PF

Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350	4,0 x 350
Amperage	A	70 – 90	90 – 110	100 – 140	100 – 140

UTP 5048 Nb

Basic coated stick electrode for high temperature cast steels

Standards :

Material-No.	:	~ 2.4680
EN ISO 14172	:	E Ni Z (NiCr50Nb1,5)

Application field

UTP 5048 Nb is used for joining and building up on identical and similar cast steel parts for industrial ovens such as

2.4680	G NiCr50Nb	(Alloy 657)
2.4879	G NiCr28W	(NA 22 H).

Welding properties and special properties of the weld metal

The welding deposit is resistant against carbon enriching atmosphere in ovens, fuel ash corrosion due to use of crude oil and scale resistant up to 1150° C.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 480	> 650	> 12

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb
< 0,1	0,6	0,6	50,0	balance	1,5

Welding instruction

Hold stick electrode as vertically as possible, keep a short arc. Use string bead technique. Interpass temperature max. 150° C. Fill end crater carefully. Re-dry stick electrodes for 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350*	4,0 x 350*	5,0 x 400*
Amperage	A	80 – 100	90 – 130	

* available on request

UTP 6170 Co

Basic coated NiCrCoMo stick electrode for high temperature alloys

Standards :

Material-No.	:	2.4628
EN ISO 14172	:	E Ni 6617 (NiCr22Co12Mo)
AWS A5.11	:	ENiCrCoMo-1 (mod.)

Application field

UTP 6170 Co is suitable for joining high-temperature and similar nickel-base alloys, heat resistant austenitic and cast alloys, such as 2.4663 (NiCr23Co12Mo), 2.4851 (NiCr23Fe), 1.4876 (X10 NiCrAlTi 32 21), 1.4859 (GX10 NiCrSiNb 32 20). The weld metal is resistant to hot-cracking and is used for service temperatures up to 1100° C. Scale-resistance up to 1100° C in oxidizing and carburized atmospheres, e. g. gas turbines, ethylene production plants.

Welding properties

UTP 6170 Co can be welded in all positions except vertical-down. It has a stable arc. The seam is finely rippled and notch-free. Easy slag removal.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 700	> 35	> 100

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Co	Al	Ti	Fe
0,06	0,7	0,1	21,0	9,0	balance	11,0	0,7	0,3	1,0

Heat treatment

Preheating temperature should be adjusted to the base material. Post weld heat treatments can be applied independently of the weld metal.

Welding instructions

Hold stick electrode as vertically as possible, keep a short arc. Use string bead technique. Fill end crater carefully. Interpass temperature max. 150° C. Re-dry stick electrodes for 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 300	4,0 x 350
Amperage	A	55 - 75	70 – 90	90 – 110

Approvals

TÜV (No. 04661)

UTP 6170 Co mod.

Basic coated NiCrCoMo stick electrode for high temperature alloys

Standards :

Material-No.	:	2.4628
EN ISO 14172	:	E Ni 6617 (NiCr22Co12Mo)
AWS A5.11	:	ENiCrCoMo-1 (mod.)

Application field

UTP 6170 Co mod. is suitable for joining high-temperature and similar nickel-base alloys, heat resistant austenitic and cast alloys, such as 2.4663 (NiCr23Co12Mo), 2.4851 (NiCr23Fe), 1.4876 (X10 NiCrAlTi 32 21), 1.4859 (GX10 NiCrSiNb 32 20). The weld metal is resistant to hot-cracking and is used for service temperatures up to 1100° C. Scale-resistance up to 1100° C in oxidizing and carburized atmospheres, e. g. gas turbines, ethylene production plants.

Welding properties:

UTP 6170 Co mod can be welded in all positions except vertical-down. It has a stable arc. The seam is finely rippled and notch-free. Easy slag removal.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 700	> 30	> 80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Co	Al	Ti	Fe
0,06	< 0,8	< 0,3	21,0	9,0	balance	11,0	1,4	0,3	1,0

Heat treatment

Preheating temperature should be adjusted to the base material. Post weld heat treatments can be applied independently of the weld metal.

Welding instructions

Hold stick electrode as vertically as possible, keep a short arc. Use string bead technique. Fill end crater carefully. Interpass temperature max. 150° C. Re-dry stick electrodes for 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 300	4,0 x 350
Amperage	A	55 - 60	70 – 100	90 – 120

UTP 6122 Co

Basic coated high nickel containing stick electrode for high temperature applications

Standards :

EN ISO 14172	:	E Ni 6617 (NiCr22Co12Mo)
AWS A5.11	:	ENiCrCoMo-1

Application field

UTP 6122 Co is suitable for joining and surfacing high-temperature alloys. Special applications of **UTP 6122 Co** are in oxydizing media at high temperatures, especially for the construction of gas turbines, combustion chambers and ethylene production plants.

Welding properties

UTP 6122 Co can be welded in all positions except vertical-down. Smooth, stable arc, very good slag removal. The seam is finely rippled and notch-free.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 700	> 30	> 80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Nb	Co	Fe
0,07	0,6	1,0	22,0	9,0	balance	0,5	11,0	2,0

Heat treatment

Preheating temperature should be adjusted to the base material. Post weld heat treatments can affect ductility and increase strength.

Welding instructions

Hold stick electrode as vertically as possible, keep a short arc, only a very little weaving. Fill end crater carefully. Interpass temperature max. 150° C. Re-dry stick electrodes for 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	4,0 x 350
Amperage	A	90 - 120

UTP 6225 Al

Basic coated NiCrFe stick electrode with element addition for high temperature alloys

Standards :

Material-No.	:	2.4649
EN ISO 14172	:	E Ni 6025 (NiCr25Fe10AlY)
AWS A 5.11	:	E NiCrFe-12

Application field

UTP 6225 Al is suitable for joining high-temperature and heat resistant nickel-base alloys of identical and similar nature, such as 2.4633 (NiCr25-FeAlY), 2.4851 (NiCr23Fe) and high nickel containing cast alloys.

Properties of the weld metal

The special features of the weld metal include an excellent resistance against oxidation and carburization and a good creep rupture strength. For service temperature up to 1200° C, e. g. steel tubes, rolls and baffles in ovens, ethylene cracking tubes, muffles.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 500	> 700	> 15	> 30

Weld metal analysis in %

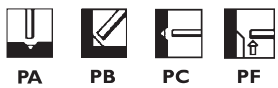
C	Si	Mn	Cr	Ni	Ti	Zr	Al	Fe	Y
0,2	0,6	0,1	25,0	balance	0,1	0,03	1,8	10,0	0,02

Welding instruction

Hold stick electrode as vertically as possible, keep a short arc. Use string beads technique and fill end crater carefully. Interpass temperature max. 150° C. Re-dry stick electrodes for 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions



Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 300	4,0 x 350
Amperage	A	40 – 55	70 – 90	90 – 110

Standards :

EN ISO 14172 : E Ni 6152 (NiCr30Fe9Nb)
AWS A5.11 : E NiCrFe-7

UTP 6230 Mn

Basic coated NiCrFe stick electrode for corrosion and high temperature resistant materials

Application field

UTP 6230 Mn is used for joining and surfacing heat resistant nickel-base alloys of identical or of similar nature, heat resistant austenitic or creep resistant austenite-ferrite-joints, such as 2.4642 (Nicrofer 6030 - alloy 690).

Properties of the weld metal

Due to the increased Cr content the resistance to stress corrosion cracking and the resistance in intense oxidizing medias will be improved. Main applications are steam generators in nuclear power stations and the reprocessing of reactor fuels.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 400	> 650	> 35

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
0,03	0,5	3,8	28,0	balance	1,8	8,5

Welding instruction

Hold stick electrode as vertically as possible, keep a short arc, only very little weaving and fill end crater carefully. Interpass temperature max. 150° C. Re-dry stick electrodes for 2 - 3 h / 250 - 300° C.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 300	4,0 x 350
Amperage	A	50 – 70	80 – 110	100 – 130

UTP A 68 H

Rods and wires for heat and scale resistant CrNi-steels

Standards :

Material-No.	:	1.4842
EN ISO 14343-A	:	W/G 25 20
AWS A5.9	:	~ ER 310 (Si)

Application field

UTP A 68 H is suitable for joining and surfacing heat - and scale-resistant 25/20 CrNi-steels and cast steels, such as

Material-No.	DIN		Material-No.	DIN	
1.4713	X10 CrAl	7	1.4849	G- X40 NiCrSiNb 38 18	
1.4762	X10 CrAl	24	1.4846	X12 CrNi	25 21
1.4845	X12 CrNi	25 21	1.4742	X10 CrAl	18
1.4841	X15 CrNiSi	25 20			

Properties of the weld metal

The weld metal is heat resistant in air and nitrogenous atmosphere at temperatures up to 1100° C, non-resistant to sulphureous combustion gases.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 400	> 650	> 30	> 60

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,12	0,9	3,2	25,0	21,0	balance

Welding instructions

Clean welding area thoroughly. No preheating and post heat treatment. Low heat input. Interpass temperature max. 150° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		M 12	I 1	EN ISO 544	L = 1000mm
1,0	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6	DC (-)		x		x
2,0	DC (-)		x		x
2,4	DC (-)		x		x
3,2	DC (-)		x		x

UTP A 2133 Mn

Fully austenitic welding wire for high temperature materials

Standards :

Material-No.	:	~ 1.4850
EN ISO 14343	:	W/GZ 21 33 Mn Nb

Application field

UTP A 2133 Mn is suitable for joining and surfacing heat resistant base materials of identical and of similar nature, such as

1.4859	G X 10 NiCrNb 32 20	
1.4876	X 10 NiCrAlTi 32 21	UNS N08800
1.4958	X 5 NiCrAlTi 31 20	UNS N08810
1.4959	X 8 NiCrAlTI 31 21	UNS N08811

A typical application is the root welding of centrifugally cast pipes in the petrochemical industry for operation temperatures up to 1050° C in dependence with the atmosphere.

Properties of the weld metal

Scale resistant up to 1050°C. Good resistance to carburising atmosphere.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 400	> 600	> 25	> 70

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
0,12	0,3	4,5	21,0	33,0	1,2	balance

Welding instruction

Clean the weld area thoroughly. Low heat input. Max. interpass temperature 150°C

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	L = 1000mm
0,8	DC (+)	x	x	
1,0	DC (+)	x	x	
1,2	DC (+)	x	x	
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x

Approvals

TÜV (No. 10451)

Standards :

Material-No. : 1.4853
EN ISO 14343-A : G/WZ 25 35 Zr

UTP A 2535 Nb

Rods and wires for high temperature cast steels with high carbon content

Application field

UTP A 2535 Nb is suitable for joinings and building up on identical and similar high heat resistant CrNi cast steel (centrifugal- and mould cast parts), such as

1.4852 G–X 40 NiCrSiNb 35 25
1.4857 G–X 40 NiCrSi 35 25

Properties of the weld metal

The weld deposit is applicable in a low sulphur, carbon enriching atmosphere up to 1150° C, such as reformer ovens in petrochemical installations.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 480	> 680	> 8

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Ti	Zr	Fe
0,4	1,0	1,7	25,5	35,5	1,2	+	+	balance

Welding instructions

Clean welding area carefully. No pre heating or post weld heat treatment. Keep heat input as low as possible and interpass temperature at max. 180° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	
1,2	DC (+)	x	x	
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x

Standards :
EN ISO 14343-A : W/GZ 35 45 Nb

UTP A 3545 Nb

Rods and wires for high temperature cast alloys with high carbon content in petrochemical industry

Application field

UTP A 3545 Nb is suitable for joining and surfacing on identical and similar high heat resistant cast alloys (centrifugal- and mould cast parts), such as G X-45NiCrNbSiTi 45 35.
The main application field is for tubes and cast parts of reformer and pyrolysis ovens at temperatures up to 1175° C / air.

Properties of the weld metal

The weld deposit is applicable in a low sulphur, carbon enriching atmosphere up to 1175° C and has an excellent creep strength and a good resistance against carburization and oxidation.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 450	> 650	> 8

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Ti	Zr	Fe
0,45	1,5	0,8	35,0	45,0	1,0	0,1	0,05	balance

Welding instructions

Clean welding area carefully. No pre-heating or post weld heat treatment. Keep heat input as low as possible and interpass temperature at max. 180° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
1,2	DC (+)	x	x	
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x

UTP A 6170 Co

NiCrCoMo rods and wires for high temperature materials

Standards :

Material-No.	:	2.4627
EN ISO 18274	:	S Ni 6617 (NiCr22Co12Mo9)
AWS A5.14	:	ER NiCrCoMo-1

Application field

UTP A 6170 Co is particularly used for joining heat resistant and creep resistant nickel base alloys of identical and similar nature, high temperature austenitic and cast alloys, such as

1.4958	X5NiCrAlTi 31 20	UNS N08810
1.4959	X8NiCrAlTi 32 21	UNS N08811
2.4663	NiCr23Co12Mo	UNS N06617

Properties of the weld metal

The weld metal is resitant to hot-cracking. It is used for operating temperatures up to 1100° C. Scale-resistant at temperatures up to 1100° C in oxidizing resp. carburizing atmospheres, e. g. gas turbines, ethylene production plants.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 750	> 30	> 120

Weld metal analysis in %

C	Si	Cr	Mo	Ni	Co	Ti	Al	Fe
0,06	< 0,3	22,0	8,5	balance	11,5	0,4	1,0	1,0

Welding instructions

Clean welding area carefully. Keep heat input as low as possible and interpass temperature at max. 150° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability	
					Spools	Rods
		Z-ArHeHC-30/2/0,05	I 1	R 1	EN ISO 544	L = 1000mm
0,8	DC (+)	x	x		x	
1,0	DC (+)	x	x		x	
1,2	DC (+)	x	x		x	
1,6	DC (+)	x	x		x	
1,6	DC (-)		x	x		x
2,0	DC (-)		x	x		x
2,4	DC (-)		x	x		x
3,2	DC (-)		x	x		x

Approvals

TÜV (No. 05450; 05451)

UTP A 6170 Co mod.

NiCrCoMo rods and wires for high temperature materials

Standards :

Material-No.	:	2.4627
EN ISO 18274	:	S Ni 6617 (NiCr22Co12Mo9)
AWS A5.14	:	ER NiCrCoMo-1

Application field

UTP A 6170 Co mod. is particularly used for joining alloys of group NiCr23Co12Mo (material-no. 2.4663), and NiCr23Fe (material-no. 2.4851) which are used in power plant construction (materials like Sanicro 25, HR3C, S 304 H, DMV 310 N). Special application fields are in oxidizing resp. carburizing atmospheres, e. g. gas turbines, ethylene production plants.

1.4958	X5NiCrAlTi 31 20	UNS N08810
1.4959	X8NiCrAlTi 32 21	UNS N08811
2.4663	NiCr23Co12Mo	UNS N06617

Properties of the weld metal

The weld metal is resitant to hot-cracking. It is used for operating temperatures up to 1000° C. Scale-resistant at temperatures up to 1000° C. Al in combination with Cr effects a high resistance to oxidation.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 450	> 750	> 30	> 80

Weld metal analysis in %

C	Si	Cr	Mo	Ni	Co	Ti	Al	Fe
0,06	0,15	22,0	9,0	balance	10,5	0,3	1,2	0,9

Welding instructions

Clean welding area carefully. Keep heat input as low as possible and interpass temperature at max. 150° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability	
					Spools	Rods
		Z-ArHeHC-30/2/0,05	I 1	R 1	EN ISO 544	L = 1000mm
0,8	DC (+)	x	x		x	
1,0	DC (+)	x	x		x	
1,2	DC (+)	x	x		x	
1,6	DC (+)	x	x		x	
1,6	DC (-)		x	x		x
2,0	DC (-)		x	x		x
2,4	DC (-)		x	x		x
3,2	DC (-)		x	x		x

UTP A 6225 Al

High nickel containing rods and wires for high temperature alloys

Standards :

Material-No.	:	2.4649
EN ISO 18274	:	S Ni 6025 (NiCr25Fe10AlY)
AWS A 5.14	:	ER NiCrFe-12

Application field

UTP A 6225 Al is suitable for welding of identical and similar alloys, such as NiCr25FeAlY, Material-No. 2.4633 (Nicrofer 6025 HT). These alloys are applicable for working temperatures up to 1200° C, particularly for thermal treatment ovens.

Properties of the weld metal

High oxidation resistance at high temperatures (also in cyclic conditions), very good corrosion resistance in carburized medias, excellent high temperaure resistance.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 500	> 720	> 25	> 50

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Ti	Zr	Al	Fe	Y
0,2	0,5	0,1	25,0	balance	0,15	0,05	2,0	10,0	0,08

Welding instructions

Clean the weld area thoroughly (free of oil, scale, markings). **UTP A 6225 Al** is welded in TIG- and Plasma-process (with external cold wire feeding). Use string beads technique. Keep heat input as low as possible (TIG max. 6,5 kJ/cm, WP max. 11 kJ/cm) and interpass temperature at max. 150° C. **UTP A 6225 Al** can only be welded with a special shielding gas in MAG-process.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability	
					Spools	Rods
		Z-ArHeHC-30/2/0,05	I 1	R 1	EN ISO 544	L = 1000mm
1,2	DC (+)	x	x		x	
1,6	DC (-)		x	x		x
2,0	DC (-)		x	x		x
2,4	DC (-)		x	x		x

Approval

TÜV (No. 10135; 10145)

Standards :

Material-No. : 2.4642
EN ISO 18274 : S Ni 6052 (NiCr30Fe9)

UTP A 6230 Mn

Rods and wires for corrosion and high heat resistant materials

Application field

UTP A 6230 Mn is used for joining and surfacing on high temperature resistant nickel base alloys of identical and similar nature, heat resistant austenitic and creep resistant austenite-ferrite-joints, such as. 2.4642 (Nicrofer 6030 - alloy 690).

Properties of the weld metal

Due to the increased Cr content the resistance to stress corrosion cracking and the resistance in intense oxidizing medias will be improved. Main applications are steam generators in nuclear power stations and the reprocessing of reactor fuels.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 400	> 650	> 35	> 80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Co	Fe
0,03	0,3	0,3	29,0	0,1	balance	< 0,1	9,0

Welding instruction

Clean the weld area thoroughly. Low heat input. Max. interpass temperature 150°C

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
1,2 *	DC (+)	x	x	
2,4 *	DC (-)	x		x

* available on request

UTP A 5521 Nb

Creep resistant NiCrMo wires for surfacing on hot working tools with highest demands, age-hardenable.

Standards :

Material-No.	:	2.4667
EN ISO 18274	:	S Ni 7718 (NiFe19Cr19Nb5Mo3)

Application field

The high temperature - and wear resistant nickel base alloy **UTP A 5521 Nb** is suited for the production and repair of hot working tools with highest demands, e. g. forging dies, forge saddles, mandrel plugs, roll mandrils, thrust rolls.

Special properties of the weld metal

Due to the special composition of this alloy the weld deposit distinguishes itself by a very good resistance to wear, oxidation and thermal shock. Excellent creep rupture strength will be obtained at extreme high tool temperatures of approx. 700° C. Machining is possible in as-welded condition.

Hardness of the pure weld deposit

As-welded condition	:	approx. 240 HB
After age hardening	:	approx. 45 HRC

Weld metal analysis in %

C	Cr	Mo	Ni	Nb	Ti	Al	Fe
< 0,05	18,0	3,0	balance	5,0	0,8	0,8	20,0

Welding instructions

Clean welding area to metallic bright. The welding area has to be free of scale, cracks and dirt (if nec. check penetration of paint). Pre-heating at 150° C according to the base material and the size of the tool.
Keep heat input as low as possible. Use string beads technique. Preheating temperature should be maintained during the whole welding operation; age-hardening in oven after welding.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		I1	Z-ArHeHC-30/2/0,05	EN ISO 544
0,8 *	DC (+)	x	x	x
1,0 *	DC (+)	x	x	x

* available on request

UTP UP 6170 Co
UTP UP FX 6170 Co

Wire Flux combination for high temperature applications

Standards :

Wire

Material-No.	: 2.4627
AWS A5.14	: ER NiCrCoMo-1
EN ISO 18274	: S Ni6617 (NiCr22Co12Mo9)

Flux

EN 760	: SA-AB 2

Application field

UTP UP 6170 Co and the flux **UTP UP FX 6170 Co** are applied for the joint welding of base materials with identical nature, e. g. Alloy 617 such as for high temperature alloys with similar nature, which are used in the terotechnology.
Furthermore this wire-flux-combination is used for welding mixed joints in the apparatus construction. Corrosion resistant claddings on non-alloyed and alloyed steels are also possible.

Mechanical properties of the weld metal of the wire-flux-combination

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength Joule
450	710	35	100

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Co	Ti	Al	Fe
0,06	< 0,3	0,1	22,0	9,0	balance	11,0	0,3	1,0	1,0

Flux height	:	approx. 25 mm
Stick out	:	approx. 25 mm

Welding instructions

The welding area has to be free of impurities (oil, paint, markings etc.). Welding must be performed with a low heat input (for obtaining good mechanical - and corrosion values). The interpass temperature should not exceed 100°C. Flux has to be re-dried prior to welding: 2 hours at 300° C +/- 50° C.

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire EN ISO 544	Flux
1,6	200 - 250	28 - 30	35 - 40	B 450	25 kg
2,0	250 - 350	28 - 30	35 -40	B 450	25 kg

UTP UP 6170 Co mod.
UTP UP FX 6170 Co mod.

Wire Flux combination for high temperature applications

Standards :

Wire

Material-No. : 2.4627
AWS A5.14 : ER NiCrCoMo-1
EN ISO 18274 : S Ni6617 (NiCr22Co12Mo9)

Flux

EN 760 : SA-AB 2

Application field

UTP UP 6170 Co mod. and the flux **UTP UP FX 6170 Co mod.** are applied for the joint welding of base materials with identical nature, e. g. Alloy 617 such as for high temperature alloys with similar nature, which are used in the terotechnology.
Furthermore this wire-flux-combination is used for welding mixed joints in the apparatus construction. Corrosion resistant claddings on non-alloyed and alloyed steels are also possible.

Mechanical properties of the weld metal of the wire-flux-combination

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength Joule
450	710	35	100

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Co	Ti	Al	Fe
0,06	< 0,3	0,1	22,0	9,0	balance	11,0	0,3	1,0	1,0

Flux height : approx. 25 mm
Stick out : approx. 25 mm

Welding instructions

The welding area has to be free of impurities (oil, paint, markings etc.) Welding must be performed with a low heat input (for obtaining good mechanical - and corrosion values). The interpass temperature should not exceed 100°C. Flux has to be re-dried prior to welding: 2 hours at 300° C +/- 50° C.

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire	Flux
				EN ISO 544	
1,6	200 - 250	28 - 30	35 - 40	B 450	25 kg
2,0	250 - 350	28 - 30	35 -40	B 450	25 kg

Approvals

TÜV (No. 10992)

UTP 068 HH

Basic coated NiCrFe stick electrode for high corrosion and high temperature resistant materials

Standards :

Material-No.	:	2.4648
EN ISO 14172	:	E Ni 6082 (NiCr20Mn3Nb)
AWS A5.11	:	E NiCrFe-3 (mod.)

Application field

UTP 068 HH is predominantly used for joining identical or similar heat resistant Ni-base alloys, heat resistant austenites, cold tough Ni-steel, and for joining heat resistant austenitic-ferritic materials, such as 2.4817 (LC NiCr15Fe), 2.4851 (NiCr23Fe), 1.4876 (X10 NiCrTiAl 32 20), 1.4941 (X8 CrNTi 18 10). Specially also used for joinings of high C content 25/35 CrNi cast steel to 1.4859 or 1.4876 for petrochemical installations with working temperatures up to 900° C. The welding deposit is hot cracking resistant and does not tend to embrittlement.

Properties of the weld metal

The welding deposit of **UTP 068 HH** is hot cracking resistant, does not tend to embrittlement and is scale resistant at high temperatures.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength Kv Joule +20° C	–196° C	Heat treatment
420	680	40	120	80	
			120	70	15 h 650° C / air

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Nb	Ni	Fe
0,025	0,4	5,0	19,0	1,5	2,2	balance	3,0

Welding instructions

Hold stick electrode as vertically as possible, only very little weaving. Fill end crater carefully. Interpass temperature max. 150° C. Re-dry electrode for 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,0 x 250	2,5 x 300	3,2 x 300	4,0 x 350	5,0 x 400
Amperage	A	40 - 60	50 - 70	70 - 95	90 - 120	120 - 160

Approvals

TÜV (No. 00238), KTA, ABS, GL, BV, DNV

UTP 7015

Basic coated stick electrode for NiCr alloys and claddings

Standards :

Material-No.	:	2.4807
EN ISO 14172	:	Ni 6182 (NiCr15Fe6Mn)
AWS A5.11	:	E NiCrFe-3

Application field

UTP 7015 with controlled cobalt content is employed for joining and surfacing of nickel-base materials. **UTP 7015** is also recommended for welding different materials, such as austenitic to ferritic steels, as well as for weld claddings on unalloyed and low-alloyed steels, e. g. for reactor construction.

Welding characteristics and special properties of the weld metal

Weldable in all positions, except vertical down. Stable arc, good slag removabiltiy. The seam is finely rippled and notch-free. The weld deposit has a fully austenitic structure and is high-temperature resistant. Not prone to embrittlement either at high or low temperatures

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength Kv Joule -20° C	Impact strength Kv Joule 196° C	Hardness HB
400	670	40	120	80	approx. 170

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
0,025	0,4	6,0	16,0	balance	2,2	6,0

Heat treatment

The preheating must be matched to the parent metal. Any thermal post-treatments can be applied without regard for the weld metal.

Welding instructions

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. The stick electrode is welded with a slight tilt and short arc. Use string beads welding technique. The interpass temperature of 150° C and a max. weaving width 2,5 x diameter of the stick electrode core wire should not be exceeded. Re-dry stick electrode prior welding for 2 – 3 h at 250 – 300° C, welding out of a hot stick electrode carrier.

Current type DC (+)

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 300	4,0 x 350	5,0 x 400
Amperage	A	50 – 70	70 – 95	90 – 120	120 – 160

Approvals

TÜV (No. 00875), GL, DNV, KTA (No. 08036)

Standards :

Material-No.	:	2.4620
EN ISO 14172	:	E Ni 6093 (NiCr15Fe8NbMo)
AWS A5.11	:	E NiCrFe-2

UTP 7015 Mo

Basic coated NiCrFe stick electrode for high temperature applications

Application field

UTP 7015 Mo is predominantly used for joining identical heat resistant NiCrFe-allyos, heat resistant austenites, cold tough Ni-steels, and for joining heat resistant austenitic-ferritic materials, such as 2.4816 (NiCr 15 Fe), 2.4951 (NiCr 20 Ti), 1.4876 (X10 NiCrTiAl 32 20), 1.4941(X8 CrNiTi 18 10). Specially also used for joinings of high C content 25/35 CrNi cast steel to 1.4859 or 1.4876 for petrochemical installations with working temperatures up to 900° C.

Properties of the weld metal

The welding deposit of **UTP 7015 Mo** is hot cracking resistant, does not tend to embrittlement and is scale resistant and resistant to cavitation at high temperatures.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 380	> 620	> 35	> 80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Nb	Ni	Fe
0,04	0,4	3,0	16,0	1,5	2,2	balance	6,0

Welding instructions

Hold stick electrode as vertically as possible with a short arc, only a very little weaving. Fill end crater carefully. Interpass temperature max. 150° C. Re-dry stick electrodes for 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 300	4,0 x 350	5,0 x 400
Amperage	A	50 – 70	70 – 95	90 – 120	120 – 160

Approvals

TÜV (No. 05259), GL, DNV

UTP 7015 HL

Core wire alloyed high performance stick electrode for joining and surfacing

Standards :

Material-No.	:	2.4807
EN ISO 14 172	:	E Ni 6182 (NiCr15Fe6Mn)
AWS A5.11	:	ENiCrFe-3

Application field

The high-performance stick electrode **UTP 7015 HL** with controlled cobalt content is used for surfacing and joining in reactor engineering.

2.4640, 2.4816	NiCr15Fe
2.4867	NiCr60Fe
2.4870	NiCr10

Different materials are also welded with **UTP 7015 HL**, such as austenitic to ferritic steels. It is also suitable for welding cold-tough steels (up to 9 % Ni content).

Welding properties

The economic efficiency of **UTP 7015 HL** follows from a higher deposition rate and longer fillet welds. Good weldability in constrained positions.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 380	> 620	> 35	> 80

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
< 0,04	0,5	6,0	16,0	balance	2,2	6,0

Welding instructions

Clean welding area to metallic bright and properly degreased. The opening angle of the seam should lie between 70 – 80°. Re-dry stick electrodes for 2 – 3 h at 250 – 300° C. The stick electrode is welded with a slight tilt and short arc. Weld string beads or slightly weaving beads with the lowest possible amperage adjustment. The crater must be filled properly and the arc drawn away to the side, in order to avoid end crater cracks.

Current type DC (+) / AC

Welding positions

PA PB PC

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 300	4,0 x 350	5,0 x 400
Amperage	A	50 – 70	70 – 105	90 – 130	130 – 170

Approvals

TÜV (No. 03158), BV

UTP 7013 Mo

High performance stick electrode, welding in a.c. 170 % recovery

Standards :

EN ISO 14172	:	E Ni 6620 (NiCr14Mo7Fe)
AWS A5.11	:	ENiCrMo-6

Application field

The high-nickel stick electrode **UTP 7013 Mo** is especially suited for welding cold-tough nickel steels, such as X8Ni9.

Welding properties

UTP 7013 Mo is destinated for welding with ac. It is weldable in all positions. Stable arc, easy slag removal.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 420	> 690	> 35	> 70 (at –196° C)

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Nb	W	Fe
0,05	< 0,6	3,5	13,0	7,0	balance	1,0	1,2	7,0

Welding instructions

The weld zone must be clean and properly degreased. Prior to welding, the stick electrodes must be dried for 2 – 3 hours at 250 – 300° C. The stick electrode is welded with a slight tilt, short arc and sufficiently high amperage adjustment. To avoid end crater cracks, the crater must be filled properly and the arc drawn away to the side.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 350
Amperage	A	70 – 100	100 – 130

UTP 7017 Mo

Basic coated high nickel containing stick electrode, weldable in a.c.

Standards :

Material-No.	:	2.4625
EN ISO 14172	:	E Ni 6095 (NiCr15Fe8NbMoW)
AWS A5.11	:	ENiCrFe-4

Application field

UTP 7017 Mo is used for joining cold-tough Ni-steels, such as X8Ni9.

Welding properties

UTP 7017 Mo is weldable in all positions except vertical down. Stable arc, good slag removability.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 390	> 660	> 30	> 60 (at -196° C)

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Nb	Fe
0,05	< 0,5	3,0	15,0	3,0	balance	2,5	7,0

Welding instructions

The weld zone must be clean and properly degreased. Prior to welding, the stick electrodes must be dried for 2 hours at 250° C. The stick electrode is welded with a short arc and sufficiently high amperage adjustment.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrode	Ø mm x L	2,5 x 300	3,2 x 300	4,0 x 350
Amperage	A	60 – 90	90 – 105	100 – 130

UTP 80 M

Basic coated nickel-copper stick electrode

Standards :

Material-No.	:	2.4366
EN ISO 14172	:	E Ni 4060 (NiCu30Mn3Ti)
AWS A5.11	:	E NiCu-7

Application field

UTP 80 M is suitable for joining and surfacing of nickel-copper alloys and of nickel-copper-clad steels. Particularly suited for the following materials: 2.4360 NiCu30Fe, 2.4375 NiCu30Al. **UTP 80 M** is also used for joining different materials, such as steel to copper and copper alloys, steel to nickel-copper alloys. These materials are employed in high-grade apparatus construction, primarily for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

Welding properties

UTP 80 M is weldable in all positions, except vertical-down. Smooth, stable arc. The slag is easily removed, the seam surface is smooth. The weld metal withstands sea water.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 300	> 450	> 30	> 80

Weld metal analysis in %

C	Si	Mn	Ni	Cu	Ti	Al	Fe
< 0,05	0,7	3,0	balance	29,0	0,7	0,3	1,0

Welding instruction

Thorough cleaning of the weld zone is essential to avoid porosity. V angle of seam about 70°, weld string beads if possible.
Weld with dry stick electrodes only! Re-dry stick electrodes 2 - 3 hours at 200° C.

Current type DC (+)

Welding positions

PA PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350	5,0 x 400
Amperage	A	55 – 70	75 – 110	90 – 130	135 – 160

Approvals

TÜV (No. 00248), ABS, GL

Standards :

Material-No. : 2.4156
EN ISO 14172 : E Ni 2061 (NiTi3)
AWS A5.11 : E Ni-1

UTP 80 Ni

Basic coated pure nickel stick electrode. Low carbon content.

Application field

UTP 80 Ni is suited for joining and surfacing on commercial pure nickel grades, including LC nickel, nickel alloys and nickel-clad steels.
These materials are employed primarily in the construction of pressure vessels and apparatus in the chemical industry, in the food industry and for power generation, where good behaviour under corrosion and temperature is demanded.

Welding properties

UTP 80 Ni is weldable in all positions, except vertical-down, and gives smooth, notch-free seams.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 300	> 450	> 30	> 160

Weld metal analysis in %

C	Si	Mn	Ni	Ti	Al	Fe
< 0,02	0,8	0,25	balance	2,0	0,2	0,1

Welding instruction

Weld with dry stick electrodes only! Prior to welding the stick electrodes must be dried 2 – 3 hours at 250 – 300° C. Clean the weld zone thoroughly. The V angle of the seam should not be less than 70°. Weld with short arc, avoiding weaving as much as possible.

Current type DC (+)

Welding positions

PA PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 300	4,0 x 350
Amperage	A	60 – 85	90 – 130	110 – 150

* available on request

Approvals

TÜV (No. 00190)

UTP A 068 HH

NiCrFe rods and wires for corrosion and high temperature materials

Standards :

Material-No.	:	2.4806
EN ISO 18274	:	S Ni 6082 (NiCr20Mn3Nb)
AWS A5.14	:	ER NiCr-3

Application field

UTP A 068 HH is predominantly used for joining identical or similar high heat resistant Ni-base alloys, heat resistant austenites, and for joining heat resistant austenitic-ferritic materials such as

2.4816	NiCr15Fe	UNS N06600
2.4817	LC- NiCr15Fe	UNS N10665
2.4851	NiCr23Fe	UNS N06601
1.4876	X10 NiCrAlTi 32 20	UNS N08800
1.6907	X3 CrNiN 18 10	

Specially also used for joinings of high C content 25/35 CrNi cast steel to 1.4859 or 1.4876 for petrochemical installations with working temperatures up to 900° C.

Properties of the weld metal

The welding deposit is hot cracking resistant and does not tend to embrittlement.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 420	680	40	20° C 160 -196° C 80

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
< 0,02	< 0,2	3,0	20,0	balance	2,7	0,8

Welding instruction

Clean weld area thoroughly. Keep heat input as low as possible and interpass temperature at approx. 150° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

Approvals

TÜV (No. 00882; 00883), KTA, ABS, GL, DNV

UTP A 80 M

Rods and wires for NiCu-alloys

Standards :

Material-No.	:	2.4377
EN ISO 18274	:	S Ni 4060 (NiCu30Mn3Ti)
AWS A5.14	:	ER NiCu-7

Application field

UTP A 80 M is suitable for joining and surfacing of nickel-copper alloys and of nickel-copper-clad steels. Particularly suited for the following materials: 2.4360 NiCu30Fe, 2.4375 NiCu30Al.

UTP A 80 M is also used for joining different materials, such as steel to copper and copper alloys, steel to nickel-copper alloys. These materials are employed in high-grade apparatus construction, primarily for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

Welding properties

The weld metal has an excellent resistance to a large amount of corrosive medias, from pure water to non-oxidising mineral acids, alkali and salt solutions.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 300	> 450	> 30	> 80

Weld metal analysis in %

C	Si	Mn	Cu	Ni	Ti	Fe
< 0,02	0,3	3,2	29,0	balance	2,4	1,0

Welding instruction

Clean the weld area thotoughly to avoid porosity. Opening groove angle ybout 70°. Weld stringer beads.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
0,8	DC (+)	x	x	x	
1,0	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6	DC (+)	x	x		x
1,6	DC (-)	x	x		x
2,0	DC (-)	x	x		x
2,4	DC (-)	x	x		x
3,2	DC (-)	x	x		x

Approvals

TÜV (No. 00249; 00250), ABS, GL

UTP A 80 Ni

Rods and wires for pure nickel alloys

Standards :

Material-No.	:	2.4155
EN ISO 18274	:	S Ni 2061 (NiTi3)
AWS A5.14	:	ER Ni-1

Application field

UTP A 80 Ni is suited for joining and surfacing on commercial pure nickel grades, including LC nickel, nickel alloys and nickel-clad steels.

Such materials are employed primarily in the construction of pressure vessels and apparatus in the chemical industry, in the food industry and for power generation, where good behaviour under corrosion and temperature is demanded.

Welding properties

The weld metal has an excellent resistance in a lot of corrosive medias, from acid to alkali solutions.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 300	> 450	> 30	> 160

Weld metal analysis in %

C	Si	Mn	Ni	Ti	Fe
< 0,02	< 0,3	0,3	balance	3,3	< 0,1

Welding instruction

Clean the weld area thotoughly to avoid porosity. Opening groove angle ybout 70°. Weld stringer beads.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	Z-ArHeHC-30/2/0,05	EN ISO 544	EN ISO 544
0,8	DC (+)	x	x	x	
1,0	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6	DC (+)	x	x		x
1,6	DC (-)	x	x		x
2,0	DC (-)	x	x		x
2,4	DC (-)	x	x		x
3,2	DC (-)	x	x		x

Approvals

TÜV (No. 00950; 00951), ABS

Standard
Special alloy

UTP A 8036

FeNi wires for INVAR-alloys

Application field

UTP A 8036 is an alloy of the same composition as the base material and used for welding cast alloys with a nickel content of 34 to 40 % (INVAR qualities). The special operational area is the structural welding of housings made of plate with a nickel content of 36 %. Application field: air plane construction.

Welding properties

The weld metal contains high mechanical properties and a very low expansion coefficient.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v J	Hardness HB
> 280	> 350	> 25	> 80	approx. 150

Weld metal analysis in %

C	Si	Mn	P	S	Ni	Fe
< 0,01	0,1	0,3	< 0,01	< 0,01	34,0 - 38,0	balance

Welding instruction

Thorough cleaning of welding area is essential. Welding parameters have to be adjusted to each range of application. Pay attention to a low heat input. The weld should be performed by applying a pulsed MIG/MAG technique.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 11	EN ISO 544	EN ISO 544
1,0 *	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6 *	DC (-)	x			x
2,4 *	DC (-)	x			x

* available on request

Standards
Special alloy

UTP A 8036 S

Ferro-Nickel rods and wires for INVAR alloys

Application field

UTP A 8036 S is an alloy of the same composition as the base material and used for welding cast alloys with a nickel content of 34 - 40 % (INVAR qualities). The special operational area is the structural welding of housings made of plate and cast pieces with a nickel content of 36 %. Application field: air plane construction.

Welding properties

The weld metal contains high mechanical properties and a very low expansion coefficient.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v J	Hardness HB
> 280	> 350	> 25	> 80	appr. 150

Weld metal analysis in %

C	Si	Mn	P	S	Ni	Fe
0,015 - 0,025	0,1	0,3	< 0,01	< 0,01	34,0 - 38,0	balance

Welding instruction

Thorough cleaning of welding area is essential. Welding parameters have to be adjusted to each range of application. Pay attention to a low heat input. The weld should be performed by applying a pulsed technique.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 1 1	EN ISO 544	EN ISO 544
1,2	DC (+)		x	x	
2,0 *	DC (-)	x			x
2,4 *	DC (-)	x			x

* available on request

UTP AF 068 HH

Nickel base flux cored wire with slag

Standards :

Material-No.	:	2.4648
EN ISO 14172	:	E Ni 6082 (NiCr20Mn3Nb)
AWS A5.34	:	E NiCr 3 T0-4

Application field

UTP AF 068 HH is a Ni-base flux cored wire (NiCr) for joining and surfacing of nickel alloys of the same or of similar nature, heterogeneous joints with C- and CrNi-steels, claddings on C-steels. Typical applications are high-temperature components.

2.4816	NiCr15Fe	UNS N06600	Alloy 600
2.4817	LC NiCr15Fe	UNS N01665	Alloy 600 LC
1.4583*	X10CrNiMoNb18 12		
1.4876	X10NiCrAlTi 32 21		Alloy 800
1.4859	GX10NiCrNb 32 20		
1.0562*	StE 355		

* Dissimilar joints with nickel-alloys

Properties of the weld metal

UTP AF 068 HH is characterised by its hot cracking resistance and tough weld metal and is used for service temperatures up to 900° C in long-term period.

Welding properties

UTP AF 068 HH has outstanding welding characteristics with a regular and fine drop transfer. The seam is finely rippled and the transition from the weld to the base metal is regular and free from notches. The wide adjustment range of welding parameters enables an application on different wall thicknesses.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	650	39	135

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Ni	Nb	Fe
0,03	0,4	3,0	0,007	0,005	20,0	balance	2,4	1,4

Welding instruction

Clean welding groove cautiously. Welding torch should be held slightly inclined, using the pulling technique.

Welding positions

PA PB PC

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		M 21	EN ISO 544
1,2	DC (+)	x	x

Approvals

TÜV (No. 10209)

UTP AF 068 HH Mn

Nickel base flux cored wire with slag

Standards :

Material-No.	:	2.4648
EN ISO 14172	:	E Ni 6082 (NiCr20Mn3Nb)
AWS A5.34	:	E NiCr 3 T0-4 mod.

Application field

UTP AF 068 HH Mn is a Ni-base flux cored wire (NiCr) for joining and surfacing of nickel alloys of the same or of similar nature, heterogeneous joints with C- and CrNi-steels, claddings on C-steels. Typical applications are high-temperature components.

2.4816	NiCr15Fe	UNS N06600	Alloy 600
2.4817	LC NiCr15Fe	UNS N01665	Alloy 600 LC
1.4583*	X10CrNiMoNb18 12		
1.4876	X10NiCrAlTi 32 21		Alloy 800
1.4859	GX10NiCrNb 32 20		
1.0562*	StE 355		

* Dissimilar joints with nickel-alloys

Properties of the weld metal

UTP AF 068 HH Mn is characterised by its hot cracking resistance and tough weld metal and is used for service temperatures up to 900° C in long-term period.

Welding properties

UTP AF 068 HH Mn has outstanding welding characteristics with a regular and fine drop transfer. The seam is finely rippled and the transition from the weld to the base metal is regular and notch-free. The wide adjustment range of welding parameters enables an application on different wall thicknesses.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	650	35	120

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Ni	Nb	Fe
0,03	0,4	6,0	0,010	0,010	20,0	balance	2,4	1,4

Welding instruction

Clean welding groove cautiously. Welding torch should be held slightly inclined, using the pulling technique.

Welding positions

PA PB PC

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability
			Spools
		M 21	EN ISO 544
1,2	DC (+)	x	x

UTP AF 7015

Nickel base flux cored wire with slag

Standards :

Material-No.	:	2.4807
EN ISO 14172	:	E Ni 6182 (NiCr15Fe6Mn)
AWS A5.34	:	E NiCrFe 3 T0-4

Application field

UTP AF 7015 is a Ni-base flux cored wire (NiCr) for joining and surfacing of nickel base alloys of the same nature, heterogeneous joints with C- and CrNi-steels, claddings on C-steels. Typical applications are high-temperature components.

DIN designation	**Mat.-No.**	**UNS No**	**alloy**
NiCr15Fe	2.4816	UNS N06600	alloy 600
LC NiCr15Fe	2.4817	UNS N01665	alloy 600 LC
X 10CrNiMoNb 18 12	1.4583		
StE 355	1.0562		

Properties of the weld metal

UTP AF 7015 is characterised by its hot cracking resistant and tough weld metal and is used for service temperatures up to 850° C in long-term period.

Welding properties

UTP AF 7015 has outstanding welding characteristics with a regular and fine drop transfer. The seam is finely rippled and the transition from the weld to the base metal is regular and free from notches. The wide adjustment range of welding parameters enables an application on different wall thicknesses.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
390	610	35	120

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Ni	Nb	Fe
0,03	0,4	7,0	0,010	0,010	15,0	balance	1,5	1,5

Welding instruction

Clean weld area thoroughly. Welding torch should be held slightly inclined, using the dragging technique.

Welding positions

PA PB PC

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		M 21	EN ISO 544
1,2	DC (+)	x	x

UTP AF 6222 MoPW

Nickel baseflux cored wire for all-position welding with slag

Standards :

Material-No.	:	2.4621
EN ISO 14172	:	E Ni 6625 (NiCr22Mo9Nb)
AWS A 5.34	:	ENiCrMo3 T1-4

Application field

The nickel-base-flux-cored wire (NiCrMo) **UTP AF 6222 Mo PW** is suitable for joining and surfacing on nickel-base materials of the same nature and on C- and CrNi-steels as well as for cladding on C-steels, furthermore in high temperature applications.

2.4856	NiCr22Mo9Nb	N 06625	Alloy 625
1.4539	X NiCrMoCu25 20 5	N 08904	Alloy 904
1.4583	X NiCrNb18		
1.0562	12StE 355		
1.5662	X 8Ni9		ASTM A553 Typ 1

Properties of the weld metal

UTP AF 6222 Mo PW distinguishes by a hot cracking resistant and tough weld metal. It is suitable for operating temperatures up to 500°C and above 800°C. It must be noted that a slight decrease in ductility will occur if prolonged heat treatment is given within the temperature range 550 - 800°C.

Welding properties

UTP AF 6222 Mo PW provides excellent positional welding. It has excellent welding properties with a regular and fine drop transfer. The weld seam is finely rippled and the transition from weld to base materials is regular and notch-free. The wide parameter range enables an application on different wall thicknesses.

Mechanical properties of the pure weld deposit at RT (untreated)

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
490	750	30	20° C 70 -196° C 60

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Mo	Ni	Nb	Fe
0,03	0,4	0,4	0,01	0,01	21,5	9,0	balance	3,5	0,5

Welding instructions

Clean welding area cautiously, slightly trailing torch position.

Welding positions

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		M 21	EN ISO 544
1,2	DC (+)	x	x

* available on request

Approvals TÜV (No. 10991)

UTP UP 068 HH
UTP UP FX 068 HH

Combination of wire and flux for nickel and nickel alloys

Standards

Wire

Material-No.	:	2.4806
EN ISO 18274	:	S Ni 6082 (NiCr20Mn3Nb)
AWS A5.14	:	ER NiCr-3

Flux

DIN EN 760	:	SA-AB 2

Application field

UTP UP 068 HH in combination with **UTP UP FX 068 HH** is used for claddings in the reactor construction and for joining of similar base metals and low-alloyed steels with stainless steels:

Mat-No.	**DIN**	**UNS-No.**
2.4816	NiCr15Fe	UNS N06600
2.4817	LC-NiCr15Fe	UNS N10665
2.4851	NiCr23Fe	UNS N06601
1.4876	X 10NiCrAlTi 32 20	UNS N08800

Mechanical properties of the pure weld metal at RT

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 350	> 600	> 35	> 100

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
< 0,02	< 0,2	3,0	20,0	balance	2,7	0,8

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Spools EN ISO 544	Fluxes
1,6	200 - 250	28 - 30	30 - 50	B 450	25 kg
2,0	250 - 350	28 - 30	30 - 50	B 450	25 kg
2,4	350 - 450	28 - 30	30 - 50	B 450	25 kg

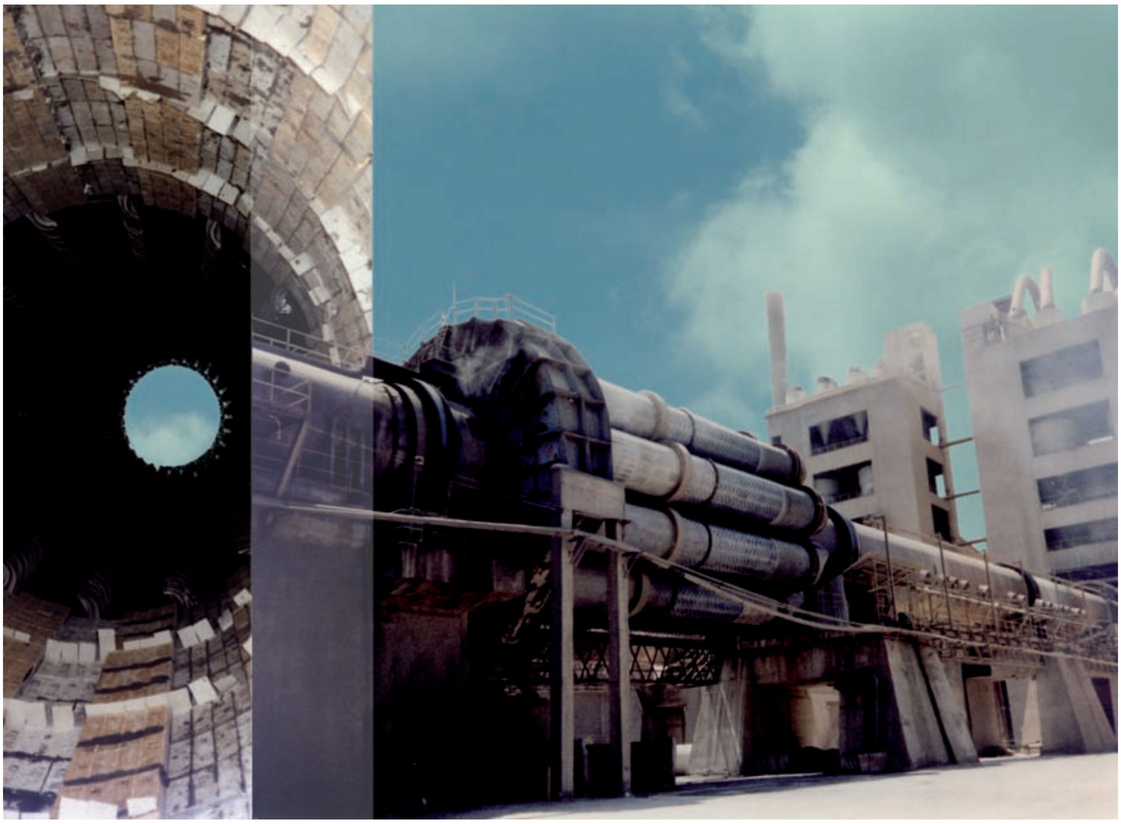
Approvals

TÜV (No. 10416; 4383)

Selection chart for dissimilar metal welding

UNS	ASTM	Mat.No.	DIN	Tradename	Nickel 200/201 (LC-)Nickel 99,2/99,6	Monel® 400 Nicorros	Inconel® 600/601 Nicrofer 7216(H)/6023
N02200 N02201	B161/162/163	2.4060 2.4061 2.4066 2.4068	Ni99,6 LC-Ni99,6 Ni99,2 LC-Ni99	Nickel 200/201 (LC)Nickel L99,2/99,6		A 80 M A 80 Ni	A 068 HH A 80 Ni
N04400	B127/163/165	2.4360	NiCu30Fe	Monel® 400 Nicorros	80 M 80 Ni		A 068 HH
N06600 N06601	B163/167/168	2.4816 2.4851	NiCr15Fe NiCr23Fe	Inconel® 600/601 Nicrofer 7216(H)/6023	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH	
N06625	B443/444	2.4856	NiCr22Mo9Nb	Inconel® 625 Nicrofer 6020 hMo	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH	6222 Mo 7015 Mo 068 HH
N08800	B163/407/409	1.4876	X10NiCrAlTi32 20	Incoloy® 800(H) Nicrofer 3220(H)	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH	7015 Mo 068 HH 6222 Mo
N08825	B163/423/424	2.4858	NiCr21Mo	Incoloy® 825 Nicrofer 4221 Nicrofer 4221 hMo	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH	7015 Mo 068 HH 6222 Mo
N08028	B668/709	1.4563	X1NiCrMoCu3127	Sanicro 28 Nicrofer 3127LC	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH	7015 Mo 068 HH 6222 Mo
N08925 S31254	B625/677	1.4529	X1NiCrMoCuN25 20 6	Cronifer 1925 hMo Alloy 254 SMO	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH	6222 Mo 7015 Mo 068 HH
N06455 N10665 N06007 N10276	B575/622 B333/622 B582/622 B575/622	2.4610 2.4617 2.4618 2.4819	NiMo16Cr16Ti NiMo28 NiCr22Mo6Cu NiMo16Cr15W	Hastelloy®- alloys	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH 80 Ni	6222 Mo 7015 Mo 068 HH
C70600 C71500 C71640	B111/122/171 B402/466	2.0872 2.0882 2.0883	CuNi10Fe CuNi30Fe CuNi30FeMn	Cupronickelalloys	80 M 80 Ni	80 M	80 Ni 7015 Mo 068 HH
				Stainlesssteels	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH	7015 Mo 068 HH 6222 Mo
				Cryogenic steels Carbon steels	80 Ni	80 M 7015 Mo 068 HH	7015 Mo 068 HH 6222 Mo

Inconel® 625 Nicrofer 6020 hMo	Incoloy® 800(H) Nicrofer 3220(H)	Incoloy® 825 Nicrofer 4221 Nicrofer 4221 hMo	Sanicro 28 Nicrofer 3127LC	Cronifer 1925 hMo Alloy 254 SMO	Hastelloy®- alloys	Cupronickel- alloys	Stainless steels	Cryogenic and Carbon steels
A 068 HH A 80 Ni	A 068 HH A 80 Ni	A 068 HH A 80 Ni	A 068 HH A 80 Ni	A 068 HH A 80 Ni	A 068 HH A 80 Ni	A 80 M A 80 Ni	A 068 HH A 80 Ni	A 80 Ni
A 068 HH	A 068 HH	A 068 HH	A 068 HH	A 068 HH	A 068 HH A 80 Ni	A 80 M	A 068 HH	A 80 M A 068 HH
A 6222 Mo A 068 HH	A 068 HH A 6222 Mo	A 068 HH A 6222 Mo	A 068 HH A 6222 Mo	A 6222 Mo A 068 HH	A 6222 Mo A 068 HH	A 80 Ni A 068 HH	A 068 HH A 6222 Mo	A 068 HH A 6222 Mo
	A 6222 Mo A 068 HH	A 6222 Mo	A 6222 Mo	A 6222 Mo	A 6222 Mo	A 80 Ni A 068 HH	A 6222 Mo A 068 HH	A 6222 Mo A 068 HH
6222 Mo 7015 Mo 068 HH		A 068 HH A 6222 Mo	A 068 HH A 6222 Mo	A 6222 Mo A 068 HH	A 6222 Mo A 068 HH	A 80 Ni A 068 HH	A 068 HH A 6222 Mo	A 068 HH A 6222 Mo
6222 Mo	7015 Mo 068 HH 6222 Mo		A 6222 Mo A 4225	A 6222 Mo A 4225	A 6222 Mo	A 80 Ni A 068 HH	A 068 HH A 6222 Mo	A 068 HH A 6222 Mo
6222 Mo	7015 Mo 068 HH 6222 Mo	6222 Mo 4225		A 4225	A 6222 Mo	A 80 Ni A 068 HH	A 068 HH A 3127 LC	A 068 HH A 3127 LC
6222 Mo	6222 Mo 7015 Mo 068 HH	6222 Mo 4225	6222 Mo 4225		A 6222 Mo	A 80 Ni A 068 HH	A 6222 Mo A 4225	A 6222 Mo A 068 HH
6222 Mo	6222 Mo 7015 Mo 068 HH	6222 Mo	6222 Mo	6222 Mo		A 80 Ni A 068 HH	A 6222 Mo A 068 HH	A 6222 Mo A 068 HH
80 Ni 7015 Mo 068 HH	80 Ni 7015 Mo 068 HH	80 Ni 7015 Mo 068 HH	80 Ni 7015 Mo 068 HH	80 Ni 7015 Mo 068 HH	80 Ni 7015 Mo 068 HH		A 80 Ni A 068 HH	A 80 M A 80 Ni
6222 Mo 7015 Mo 068 HH	7015 Mo 068 HH 6222 Mo	7015 Mo 068 HH 6222 Mo	7015 Mo 068 HH 3127 LC	6222 Mo 4225	6222 Mo 7015 Mo 068 HH	80 Ni 7015 Mo 068 HH		A 068 H A 1915
6222 Mo 7015 Mo 068 HH	7015 Mo 068 HH 6222 Mo	7015 Mo 068 HH 6222 Mo	7015 Mo 068 HH 3127 LC	6222 Mo 7015 Mo 068 HH	6222 Mo 7015 Mo 068 HH	80 M 80 Ni	7015 Mo 1915	



Group 2

Welding consumables for surfacing

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Group 2

Welding consumables for surfacing

Group 2

Welding consumables for surfacing

Stick electrodes for wear protection

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UTP 7560	E 21-UM-60-G EZ Fe20 -	Graphite basic coated tube stick electrode with tungsten-carbide filling against extreme mineral abrasion	127
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UTP A SUPER DUR W 80 Ni	WSG 21-GS-60-G Special alloy -	Sintered TIG-hard metal rod on tungsten-carbide base against extreme friction wear	134
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UTP A 3436	MSG 31-GZ-250-C S Cu1 2.0925	Complex aluminium bronze wire for wear resistant surfacings on dies	136

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Solid wires for tool steels (gas shielded-arc TIG / MIG / MAG)

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Gas shielded flux cored wires for tool steels

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Stick electrodes on Cobalt base (Cobalt hard alloys / Celsit)

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UTP CELSIT 701	E 20-UM-55-CSTZ E Co3 ~E CoCr-C	Rutile coated stick electrode on Cobalt base, core wire alloyed	207
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Solid rods on Cobalt base (Cobalt hard alloys / Celsit)

	Standards EN 14700 AWS A5.13		page
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UTP A CELSIT 712 SN	R Co3 ~R CoCr-B	CoCrW alloyed rod for TIG and gas welding	212
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Gas shielded flux cored wires on Cobalt base (Cobalt hard alloys / Celsit)

	Standards DIN 8555 EN 14700		page
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SK STELKAY 6-G	MF 20-GF-40-CSTZ -	CoCrW alloyed MIG flux cored wire for wear-, corrosion- and heat resistant claddings	215
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Hardsurfacing with UTP welding consumables

1. General

Welding consumables for building up are, corresponding to their analysis, divided in the following alloy groups (according to DIN 8555):

- **Fe-base** (alloy group 1 – 10)
- **Co- and Ni-base** (alloy group 20 – 23)
- **Cu-base** (alloy group 30 – 32)

WEAR is, technically spoken, an undesired change of a surface appearance, due to

- **Abrasion**
- **Corrosion (rust, scale)**
- **Cavitation**
- **Erosion**

Wear does not have to be limited to one only reason. It can be a combination of several reasons such as mechanical abrasion and corrosion. The hardness is the measuring unit for the wear resistance of an alloy. Hardness comparison is only possible within the same alloy group. The common hardness measuring systems are:

- **Test according to Brinell** (for soft and massive materials) — **DIN EN ISO 6506-1**
- **Test according to Rockwell C** (for hard and massive materials) — **DIN EN ISO 6508-1**
- **Test according to Vickers** (for hard and soft, thick and thin materials; very exact) — **DIN EN ISO 6507-1**

2. UTP welding consumables for tool steels

(production and repair)

2.1 Hot working tools

- Fe-base
  UTP 73 G 2, UTP 73 G 3, UTP 73 G 4, UTP 702, UTP 65 D, UTP 653, UTP 6020 plus the corresponding MIG wires and TIG rods
- Co-base
  UTP CELSIT 701, UTP CELSIT 706, UTP CELSIT 712, UTP 7010, UTP CELSIT 721 plus the corresponding MIG wires and TIG rods
- Ni-base
  UTP 700, UTP 7000, UTP 7008, UTP 6222 Mo, UTP 7015 Mo plus the corresponding MIG wires and TIG rods

a) Crack welding

Crack must be gouged out completely in tulip form by either UTP 82 AS, milling or grinding. Large and heavy tools should be pre-heated for gouging and welding at 250 – 400° C.

Suitable UTP stick electrodes:
UTP 6020, UTP 653, UTP 7015 Mo, UTP 6222 Mo.

When welding with UTP 6020 or UTP 653, the final layers con be of an Fe- or a Co-base hard material. If the crack is being welded with Ni-base stick electrodes UTP 7015 Mo or UTP 6222 Mo, the final layers have to be made with Ni- or Co-base hard materials.

b) Build up welding

The selection of the welding consumable is depending on the type and size of wear. Due to the fact that UTP stick electrodes are available in various hardness degrees, the most suitable can be selected to obtain the best results for cutting tools, mandrels or engravings. The service live obtained after welding is generally longer than that of a new tool.

Tempered tools have to be pre-heated at 400 – 600° C and this temperature should be maintained during the welding process. This is specially important for filling of engravings, where large welding deposits have to be made.

2.2 Cold working tools

a) Small (cosmetic) repairs on tempered tools can be made without or with little local pre-heating. 1 – 2 layers should be deposited as a maximum and the deposit has to be penned thoroughly.

UTP 65 D, UTP 665, UTP A 641

b) Larger repairs on heat treated tools need a preheating and interpass temperature of 480° C.

For production of new cutting tools on low alloy base material, a preheating of about 150 – 250° C is sufficient.
UTP 67 S, UTP 673, UTP 690, UTP 73 G 2

c) Major repairs and changes of patterns of a tool should be made in soft annealed condition and welded with a consumable similar to the alloy of the base metal.

The preheat and interpass temperature should be approx. 450° C.
UTP 673, UTP 67 S

2.3 High-speed steel tools

a) Repair welding

Minor repairs on cutting tools as for example: dulling or decomposing (bleeding) of the material, can be easily performed by using low preheating temperatures up to 150°C. This preheating temperature is sufficient as long as the defect does not affect the base material. A maximum of 1 - 2 layers are applicable.

In bigger repairs, for example broken teeth down to the base material, a constant (universal) preheating to 400 - 600°C is necessary. The same procedure is necessary in build ups of a larger working surface. In both cases, a thorough hammering of the weld bead has to be applied followed by low cooling.

UTP 690, UTP A 696

b) Joint welding

During the weld joining process of ruptured or broken cutting tools constant preheating temperatures to 450 - 600 °C are necessary. Welding of short seams have to be hammered immediately because of stress drop. Slow cooling.

UTP 65 D, UTP 653, UTP A 651

2.4 Plastic form steels

Plastic form steels are suitable for the production of form design tools in the plastic processing industry. Unalloyed steels, application steels and tool steels can be applied. Due to their special degree of purity, the good polishing ability, hardness regularity and structure, temperature and stress resistance and a good thermal conductivity, these form steels possess an excellent usability. Depending on the plastic material which is being used, corrosion resistance may be required as well.

These steels are optimally and individually adjustable to the requirements of the tool respectively the plastic product.

Weld filler materials are applied mainly of the same composition as the base. The welding properties of the steel and the used filler metals have to be separately tedted before application.

In surfacing treated tools (carburising, nitriding), the hardened layer must be removed, at first. A suitable welding rod for particular repairs is the TIG rod UTP A 702.

2.5 Flux metallurgic fabricated steels

Instead of the traditional melting process, these steels are not being molten, but high sensitive powders are sintered under pressure and temperature to a homgeneous and sintered material. Due to the high strength, ductility, fatigue resistance, pressure resistance and thermal resistance as well as wear resistance such materials have an outstanding quality. In general, these materials are considered to be difficult to weld. If the material is being welded, nevertheless, some of the special mechanical properties get lost because the weld pool solidifies in a weld seam with a cast structure.

3. UTP welding consumables for surfacing against grinding wear

Buffer layer

UTP 63, UTP 630, UTP 6302

Hard surfacing

UTP 67 S, UTP 670, UTP DUR 600, UTP 7200, UTP LEDURIT 61, UTP 711 B, UTP 7100, UTP 75 plus the corresponding flux cored wires.

Substantial and high wear resistant surfacings (max. 3 layers) have to be made on top of a buffer layer (soft, tough) and with eventual inter layers (tough-hard), to prevent that alloy typical stress relieve cracks are reaching into the base material.

Base materials susceptible to a hardness increase (high C-steel) should be pre-heated at 150 – 300° C.

4. UTP welding consumables for surfacing against gliding wear (metal to metal)

Surfacing with aluminium complex bronzes on steel have proven, due to their excellent friction coefficient, to be very suitable on drawing tools and forming dies.

UTP 34 N, UTP 343, UTP A 3436

5. Anti wear system of UTP against mineral wear UTP ABRADISC 6000

Hardened wear protection discs such as UTP ABRADISC 6000 are sufaced onto large weldments in order to prevent a mineral friction wear. The surfacing process is carried out dependant on the stress strain direction with the special stick electrodes UTP DICSWELD according to the given sample. Main application fields are: shovels, slides (chutes), mixers and large wear areas on caterpillars and construction machines (engines).

UTP DUR 250

Basic coated welding stick electrode for tough, easily machinable buildups against rolling wear

Standards :

DIN 8555	:	E 1-UM-250
EN 14700	:	E Fe1

Application field

UTP DUR 250 is used for surfacing on parts, where a tough and easily machinable deposit is required, such as rails, gear wheels, shafts and other parts on farming and building machineries. Also suitable as cushion and filler layer on non-alloyed and low-alloyed steels and cast steels.

Hardness of the pure weld deposit	approx. 270 HB
1 layer on steel with C = 0,5 %	approx. 320 HB

Properties of the weld metal

UTP DUR 250 has a very good resistance against compression and rolling strain. The weld metal is easily machinable.

Approximate weld metal analysis in %

C	Si	Mn	Cr	Fe
0,15	1,1	1,2	0,8	balance

Welding instructions

Hold stick electrode as vertically as possible and with a short arc. Preheat heavy parts and higher-carbon steel qualities to 150 - 300° C. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 450	4,0 x 450	5,0 x 450	6,0 x 450*
Amperage	A	100 – 140	140 – 180	180 – 230	230 - 300

* available on request

Standards :
DIN 8555 : E 1-UM-300

UTP DUR 300

Basic coated welding stick electrode for medium-hard and tough buildups against rolling wear

Application field

UTP DUR 300 is indicated for medium-hard surfacings, particularly on structural parts of base materials of higher tensile strength, such as Mn-Mo-alloyed wing and junction rails up to 850 N/mm≈, e. g. drive wheels, gear parts, crane wheels etc.

Hardness of the pure weld deposit	approx. 300 HB
1 layer on steel with C = 0,5 %	approx. 350 HB

Properties of the weld metal

UTP DUR 300 has a very good resistance against compression and rolling strain. The weld metal is easily machinable.

Approximate weld metal analysis in %

C	Si	Mn	Cr	Fe
0,17	0,7	1,2	1,3	balance

Welding instructions

Hold stick electrode as vertically as possible and with a short arc. Steels with higher tensile strength should be preheated to 250 - 350° C. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 450*	4,0 x 450	5,0 x 450
Amperage	A	90 - 140	140 – 180	170 – 210

* available on request

Standards :

DIN 8555	:	E 1-UM-350
EN 14700	:	E Fe1

UTP DUR 350

Basic coated welding stick electrode for crack and wear resistant surfacings

Application field

UTP DUR 350 is particularly suited for wear resistant surfacings on Mn-Cr-V alloyed parts, such as frogs, track rollers, chain support rolls, sprocket wheels, guide rolls etc.
The deposit is still machinable with tungstene carbide tools.

Properties of the weld metal

UTP DUR 350 has a very good resistance against compression and rolling strain in combination with slight abrasion. The weld metal is machinable with tungstene carbide tools.

Hardness of the pure weld deposit	approx. 370 HB
1 layer on steel with C = 0,5 %	approx. 420 HB

Approximate weld metal analysis in %

C	Si	Mn	Cr	Fe
0,2	1,2	1,4	1,8	balance

Welding instruction

Hold stick electrode as vertically as possible and with a short arc. Preheat heavy parts and higher-tensile steels to 250 - 350° C. Stick electrodes that have got damp should be re-dried for 2 h / 300° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 450	4,0 x 450	5,0 x 450
Amperage	A	100 – 140	140 – 180	180 – 230

Approvals

DB (No. 20.138.06)

UTP DUR 400

Standards :

DIN 8555	: E 1-UM-400
EN 14700	: E Z Fe1

Basic coated, high-efficiency welding stick electrode for crack and wear resistant surfacings. Recovery 200 %.

Application field

UTP DUR 400 is used for surfacing parts of non-alloyed and low-alloyed steel and cast steel, subjected mainly to pressure and shock, such as rolls, couplings, stamps, hammers, guide rails etc.
The deposit is still machinable with carbide cutting tools and temperature resistant up to 350° C.

Properties of the weld metal

UTP DUR 400 has a good resistance against impact and pressure wear with low abrasion. The weld metal is machinable with carbide cutting tools and temerature resistant up to 350°C.

Hardness of the pure weld deposit	approx. 450 HB
1 layer on steel with C = 0,5 %	approx. 500 HV
1 layer on steel with C = 0,12 %	approx. 380 HB

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Fe
0,13	1,5	4,0	1,5	0,5	balance

Welding instruction

Hold stick electrode as vertically as possible and with a short arc. Preheat heavy parts and high-tensile steels to 250 - 350° C. Re-dry stick electrodes that have got damp for 2 h / 300° C.

Current type DC (+) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 450	4,0 x 450	5,0 x 450
Amperage	A	120 – 160	140 – 190	190 – 260

* available on request

UTP DUR 600

Basic coated hardfacing stick electrode resisting impact and abrasion

Standards :

DIN 8555	:	E 6-UM-60
EN 14700	:	E Fe8

Application field

UTP DUR 600 is universally applicable for cladding on parts of steel, cast steel and high Mn-steel, subject simultaneously to abrasion, impact and compression. Typical application fields are the earth moving and stone treatment industry, e.g. excavator teeth, bucket knives, crusher jaws and cones, mill hammers etc., but also for cutting edges on cold cutting tools.

Hardness of the pure weld deposit	56 - 58 HRC
After soft-annealing 780 - 820° C / oven	approx. 25 HRC
After hardening 1000 - 1050° C / oil	approx. 60 HRC
1 layer on high Mn-steel	approx. 22 HRC
2 layers on high Mn-steel	approx. 40 HRC

Welding properties and special properties of the weld metal

UTP DUR 600 has excellent welding properties due to a quiet arc, an even flow and a good weld build-up, easy salg removal. Machining of the weld metal possible by grinding.

Weld metal analysis in %

C	Si	Mn	Cr	Fe
0,5	2,3	0,4	9,0	balance

Welding instruction

Hold stick electrode as vertically as possible and with a short arc. Preheat heavy parts and high-tensile steels to 200 - 300° C. On high Mn-steel, cold welding (max. 250° C) is recommended, if necessary, intermediate cooling. On parts tending to hardening cracks, a cushion layer with UTP 630 is welded. UTP 630 should also be used for welding cracks under hardfacings. If more than 3 - 4 layers are needed, apply the softer stick electrodes UTP DUR 250 or UTP DUR 300 for build-up. Re-dry stick electrodes that have got damp for 2h / 300° C.

Current type DC (+) / AC **Welding positions**

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 450	5,0 x 450
Amperage	A	80 – 100	100 – 140	140 – 180	180 – 210

Approvals

DB (No. 20.138.07)

UTP DUR 650 Kb

Basic coated hardfacing stick electrode resisting impact and abrasion

Standards :

DIN 8555	:	E 6-UM-60
EN 14700	:	E Fe8

Application field

UTP DUR 650 Kb is suitable for cladding structural parts subject to abrasion combined with impact. The main applications are tools in the earth moving industry and crushing plants as well as cold and hot working tools. The deposit is only machinable by grinding.

Properties of the weld metal

UTP DUR 650 Kb is a martensitic alloy. The stick electrode is suited in impact an pressure stress situations. Machining of the weld metal only by grinding.

Hardness of the pure weld deposit	58 - 60 HRC
1 layer on high Mn-steel	approx. 24 HRC
2 layers on high Mn-steel	approx. 45 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Nb	Fe
0,5	0,8	1,3	7,0	1,3	0,5	balance

Welding instruction

Hold stick electrode as vertically as possible, keep a short arc. Preheating of non-alloyed steels is not necessary. Preheat heavy parts and high-tensile base materials to 250 - 350° C. If more than 3 - 4 layers are needed, apply the softer stick electrodes UTP DUR 250 or UTP DUR 300 for buildup. On high Mn-steel, UTP BMC should be used. Re-dry stick electrodes that have got damp for 2 h / 300° C.

Current type DC (+) / AC

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 450	4,0 x 450	5,0 x 450	6,0 x 450*
Amperage	A	80 – 110	130 – 170	160 – 200	190 – 230

* available on request

UTP 670

Basic coated hardfacing stick electrode resisting impact, compression and abrasion

Standards :

DIN 8555 : E 6-UM-60
EN 14700 : EZ Fe8

Application field

UTP 670 is a high-efficiency stick electrode for hardfacing workpieces of steel, cast steel or high Mn-steel, subject to simultaneous wear by impact, compression and abrasion. Due to its recovery, this stick electrode is ideally suited for economic one-layer applications. Typical applications are crane wheels, rollers, chain links, sprocket wheels, gliding surfaces, screw conveyors, beaters, edge runners, guide wheels, baffle plates etc.

Properties of the weld metal

UTP 670 has a martensitic structure and is suited for impact and compression wear and slight abrasion.

Hardness of the pure weld deposit approx. 58 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	Fe
0,4	1,0	1,0	9,5	0,6	1,5	balance

Welding instruction

Hold stick electrode as vertically as possible and keep a short arc. Preheating is generally not neces-sary. For multipass applications it is advisable to weld cushion layers with UTP DUR 250 and to apply UTP 670 for the last 3 layers. Preheating temperature of high Mn-steels should not exceed 250° C, if necessary in-termediate cooling or welding in a water bath. Stick electrodes that have got damp should be redried for 2 h / 300° C.

Current type DC (+) / AC

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350*	3,2 x 450	4,0 x 450	5,0 x 450
Amperage	A	50 – 70	90 – 120	130 – 160	170 – 210

* available on request

Standards :

DIN 8555	:	E 7-UM-200-KP
EN 14700	:	E Fe9

UTP CHRONOS

Basic coated high Mn-steel stick electrode for claddings exposed to compression and shock

Application field

UTP CHRONOS is suitable for buildups on high Mn-steel of the same and of similar nature and on C-steels. Main applications are the reconditioning of crusher jaws and cones, excavator teeth and buckets, edge mills and runners, railway units.

Properties of the weld metal

Fully austenitic structure, tough, with strong tendency to workhardening under pressure and shock. Machinable only with tungstene carbide tools or by grinding.

Hardness of the pure weld deposit

As-welded condition:	approx. 220 HB
After workhardening :	up to 550 HV

Weld metal analysis in %

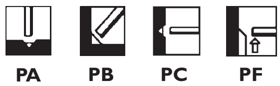
C	Si	Mn	Fe
0,9	0,8	13,0	balance

Welding instruction

Hold stick electrode as vertically as possible. Welding should be done at lowest possible temperature. Interpass temperature should not exceed 250° C. It is therefore recommended to weld short beads and to allow for intermediate cooling or to place the workpiece in a cold water bath with only the welding area sticking out. Stick electrodes that have got damp should be redried for 2 h / 300° C.

Current type DC (+) / AC

Welding positions



Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 450	4,0 x 450
Amperage	A	120 – 150	150 – 180

Approvals

DB (No. 20.138.05)

UTP 7200

Basic coated, CrNi alloyed, Mn-hard-steel stick electrode against compression and shock

Standards :

DIN 8555	:	~ E 7-UM-250-KP
EN 14700	:	EZ Fe9
AWS A5.13	:	~ E FeMn-A

Application field

UTP 7200 is predominantly suited for tough and crack resistant joinings and surfacings on parts of high Mn-steel subject to extreme impact, compression and shock. Buildups on C-steel are also possible. The main application areas are the building industry, quarries and mines for surfacing worn high Mn steel parts, e.g. excavator pins, buckets and teeth, mill hammers, crusher jaws, cones and beaters, impeller bars, railway building machinery, shunts, heart and cross pieces.

Properties of the weld metal

The high Mn-content produces a fully austenitic deposit. The deposit is highly workhardening and hardens during service from originally 200 - 250 HB to 450 HB. Machining is possible with tung-stene carbide tools.

Hardness of the pure weld deposit

After welding :	200 - 250 HB
After workhardening :	400 - 450 HB

Weld metal analysis in %

C	Mn	Ni	Cr	Fe
0,7	13	4,0	4,5	balance

Welding instruction

Hold stick electrode as vertically as possible. Welding should be done at low temperature. Interpass temperature should not exceed 250° C. It is therefore recommended to weld short beads and to allow for continuous cooling during welding or to place the workpiece in a cold water bath with only the welding area sticking out of water.

Current type DC (+) / AC

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 450	5,0 x 450
Amperage	A	110 – 140	150 – 180	180 – 210

Approvals

DB (No. 20.138.08)

UTP BMC

Basic coated Chromium alloyed Mn-steel stick electrode for high wear resistant claddings, stainless

Standards :

DIN 8555	:	E 7-UM-250-KPR
EN 14700	:	E Fe9

Application field

UTP BMC is suitable for claddings on parts subject to highest pressure and shock in combination with abrasion. Surfacing can be made on ferritic steel as well as austenitic hard Mn-steel and joints of hard Mn-steel can be welded.
Main application fields are in the mining- and cement industry, crushing plants, rail lines and steel works, where working parts are regenerated, such as breaker jaws, paving breakers and beating arms, frogs and cross pieces, roll shafts, flight pushers and wobbler drives.

Properties of the weld metal

Fully austenitic structure. Due to the addition of Cr, increased resistance against friction and corrosion. Very high workhardening and high toughness.

Hardness of the pure weld deposit

After welding :	approx. 260 HB
After work hardening :	up to 550 HB

Weld metal analysis in %

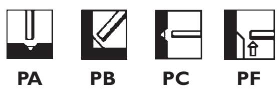
C	Si	Mn	Cr	Fe
0,6	0,8	16,5	13,5	balance

Welding instruction

Hold the stick electrode nearly vertical. Welding should be done at low temperature. Interpass temperature should not exceed 250° C. It is therefore recommended to weld short beads and to allow for continuous cooling or to place the workpiece in a cold water bath with only the welding area sticking out of water. Re-drying: 2h/300° C

Current type DC (+) / AC

Welding positions



Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 450	4,0 x 450	5,0 x 450
Amperage	A	110 – 150	140 – 190	190 – 240

UTP HydroCav

Basic-coated stick electrode against cavitation wear, stainless

Standards :

DIN 8555	:	E 5-UM-250-CKZT
EN 14700	:	EZ Fe9

Application field

UTP HydroCav is suitable for wear-resistant surfacings on weldments where high resistance to cavitation pitting, corrosion, pressure and impact is required, as for example in water turbine construction and pump construction. Due to the strong ability of work-hardening the weld deposit hardness under impact stress can be doubled. The main application field are surfacing on soft martensitic 13/4 CrNi-steels on Kaplan turbine blades.

Welding properties

UTP HydroCav has good welding properties and is weldable in all positions, except vertical-down. It has a stable arc, even weld build-up, and good slag removability.

Hardness of the pure weld deposit

as-welding condition	approx. 21 HRC
After cold hardening	approx. 50 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Co	Fe
0,2	2,0	9,0	16,0	0,5	0,5	13,0	balance

Welding instructions

Clean welding area thoroughly to metallic bright. The interpass temperature should not exceed 250°C. Preheating of solid work pieces to 80 - 100°C is advantageous. Weld stick electrode with short arc and steep guidance. Re-drying: 2h/200° C

Current type | = + | ~ |

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 450
Amperage	A	70 – 90	90 – 120	120 – 150

UTP ANTINIT DUR 300

Basic coated CrNi stick electrode for wear resistant surfacings in the armatures construction

Standards :
DIN 8555 : E 8-UM-300-CP (mod.)
EN 14700 : E Fe10

Application field

UTP ANTINIT DUR 300 is suitable for wear and corrosion resistant surfacings on ferritic and austenitic base materials in the armatures construction. The extremely low Co-content permits the use in the nuclear area for claddings on valve seats.

Properties of the weld deposit

The weld deposit of **UTP ANTINIT DUR 300** has a ferritic-austenitic structure in a ratio of approx. 45 : 55 %. This alloy distinguishes itself by a high resistance against corrosive medias. It has also a high resistance against abrasion, cavitation and erosion. The ferritic-austenitic weld deposit is IK-resistant and has a low friction coefficient.

Hardness of the pure weld deposit

as-welding condition	310 HB
after heat treatment 1 h / 550° C	380 HB

Weld metal analysis in %

C	Si	Mn	P	S	Cr	Ni	Co	Fe
0,12	5,0	6,5	< 0,02	< 0,015	21,0	8,0	< 0,15	balance

Welding instruction

Oxides must be removed in the welding area. Stick electrodes are weldable as vertically as possible with a short arc and in string bead technic. If one-layer-welding has to be made, pre-heating and interpass temperature have to be adjusted to the base material. If several layers are applied, the workpiece should be preheated to min 300 – 400° C. Pre-heating temperature should be maintained during the whole welding operation. Pay attention to an uniform and homogeneous temperature. The entired wear and corrosion resistance will be obtained on multi-pass applications. Re-dry stick electrodes 2 - 3 h at 250 - 300° C.

Current type DC (+)

Welding positions

PA PB PC

Availability / Current adjustments

Eldetrodes	Ø mm x L	3,2 x 350*	4,0 x 350*
Amperage	A	90 – 110	110 – 130

* available on request

UTP 7114

Standards :
DIN 8555 : E 10-UM-40-G

Rutile coated hardfacing stick electrode resisting wear by impact and abrasion.

Application field

UTP 7114 is suitable for claddings on machine parts subject to a combination of impact and friction wear. The tough chromium carbide weld deposit is crack resistant and is used for sliding guidance, metal-to-metal sealing faces, valve seats, conveyor rolls. Buffer layers are generally not necessary. It is used for operating temperatures up to 200° C.

Welding properties

UTP 7114 has excellent welding properties. The fine droplet spray arc results in smooth notch-free seams with good slag removal. The weld deposit is still machinable.

Hardness of the pure weld metal

35 HRC

Weld metal analysis in %

C	Si	Cr	Ni	Fe
1,2	1,0	18,0	6,0	balance

Welding instruction

Clean welding area to metallic bright. Pre-heating temperature is linked to the welding application (150 – 400° C). On non- and low-alloyed steels, at least 3 layers should be applied.

Current type DC (+) / AC

Welding positions

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350
Amperage	A	70 – 100

Standards :

DIN 8555	:	E 10-UM-60-GRZ
EN 14700	:	E Fe14

UTP LEDURIT 60

Rutile coated high efficiency stick electrode for high wear resistant claddings against mineral abrasion

Application field

UTP LEDURIT 60 is universally applicable on parts predominantly subject to grinding abrasion combined with light impact, such as conveyor screws, digging teeth, sand pumps and mixer wings. It is also suited as a final layer on tough-hard deposits (UTP DUR 600) or high Mn-steel (UTP BMC).

Welding properties

UTP LEDURIT 60 has excellent welding characteristics and a very easy slag removal. The homogeneous and finely rippled seam surface does, for most applications, not require any finishing by grinding.

Hardness of the pure weld metal	approx. 60 HRC
1 layer on steel with C = 0,15 %	approx. 55 HRC
1 layer on high Mn-steel	approx. 52 HRC

Weld metal analysis in %

C	Si	Cr	Fe
3,2	1,0	29,0	balance

Welding instruction

Hold stick electrode as vertically as possible, keep a short arc. Preheating is in general not necessary. On multipass-welds a cushion layer with UTP 630 is recommended, in order to prevent hardening cracks in the weld deposit. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350	5,0 x 450*
Amperage	A	50 – 80	90 – 120	120 – 150	150 – 200

* available on request

UTP LEDURIT 61

Rutile-basic coated hardfacing stick electrode for high abrasion and medium impact
Recovery 160 %

Standards :

DIN 8555	:	E 10-UM-60-GRZ
EN 14700	:	E Fe14
AWS A5.13	:	~ E FeCr-A 1

Application field

UTP LEDURIT 61 is suited for highly wear resistant claddings on parts subject to strong grinding abrasion combined with medium impact, such as conveyor screws, scraper blades, digging teeth, mixer wings, sand pumps. Also as a final layer on crusher jaws.

Welding properties

UTP LEDURIT 61 has excellent welding characteristics and a very easy slag removal. The homogeneous and finely rippled seam surface does, for most applications, not require any finish-ing by grinding.

Hardness of the pure weld deposit	approx. 60 HRC
1 layer on steel with C = 0,15 %	approx. 55 HRC
1 layer on high Mn-steel	approx. 52 HRC

Weld metal analysis in %

C	Si	Cr	Fe
3,5	1,0	35,0	balance

Welding instruction

Hold stick electrode as vertically as possible, keep a short arc. Preheating is in general not necessary. On multipass-applications a cushion layer with UTP 630 is recommended in order to prevent hardening cracks in the weld deposit. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 450	5,0 x 450
Amperage	A	80 – 100	90 – 130	130 – 180	140 – 190

UTP LEDURIT 65

High-efficiency stick electrode without slag resisting extreme abrasion at elevated temperatures

Standards :

DIN 8555	:	E 10-UM-65-GRZ
EN 14700	:	E Fe16

Application field

UTP LEDURIT 65 is suited for highly abrasion resistant claddings on parts subject to extreme sliding mineral abrasion, also at elevated temperatures up to 500° C. The extremely high abrasion resistance is reached by the very high content of special carbides (Mo, V, W, Nb). Main application fields are surfacings on earth moving equipment, working parts in the cement and brick industry as well as in steel mills for radial breakers und revolving-bar screens of sintering plants.

Welding properties

UTP LEDURIT 65 has an even droplet transfer in the spray arc. The smooth welding bead is without slag covering. In general there is no need for any finishing by grinding.

Hardness of the pure weld deposit	approx. 65 HRC
1 layer on steel with C = 0,15 %	approx. 58 HRC
1 layer on high Mn-steel	approx. 55 HRC

Weld metal analysis in %

C	Cr	Mo	Nb	V	W	Fe
4,5	23,5	6,5	5,5	1,5	2,2	balance

Welding instruction

Hold stick electrode as vertically as possible, keep a short arc. Reduce dilution with the base metal by weaving. For multipass applications a cushion layer with UTP 630 is recommended. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 450	5,0 x 450
Amperage	A	110 – 150	140 – 200	190 – 250

Standards :

DIN 8555 : E 10-UM-60-G
EN 14700 : E Fe14

UTP 718 S

High-efficiency stick electrode for arcing in the sugar cane industry

Application field

UTP 718 S is universally applicable on parts predominantly subject to grinding abrasion combined with light impact, such as conveyor screws, digging teeth, sand pumps, mixer wings, scraper blades etc.A special application field is cladding on sugar mill rolls in the sugar cane industry.

Welding properties

UTP 718 S has excellent welding properties, easily controllable flow due to the missing slag formation and homogenous droplet transfer in the spray arc. In general there is no need for any finishing by grinding.

Hardness of the pure weld deposit

60 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Fe
3,5	1,2	2,5	28,0	balance

Welding instruction

Hold stick electrode as vertically as possible, keep a short arc. Reduce dilution with the base metal by weaving. For multipass applications a cushion layer with UTP 630 is recommended. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350*	4,0 x 450*
Availability	A	120 – 150	140 – 170

* available on request

UTP 711 B

Rutile-basic coated surfacing stick electrode against abrasion

Standards :

DIN 8555	:	E 10-UM-60-G
EN 14700	:	E Fe14
AWS A5.13	:	~ E FeCr-A1

Application field

UTP 711 B is applicable on parts subject to mineral friction wear combined with light impact, such as mixer wings, conveyor screws, scraper blades, digging teeth.

Welding properties

UTP 711 B has excellent welding properties due to the spray arc and very easy slag removal. The very smooth seam surface does, for most applications, not require any finishing by grinding.

Hardness of the pure weld deposit	60 - 62 HRC
1 layer on C-steel	approx. 55 HRC

Weld metal analysis in %

C	Cr	Fe
3,5	35,0	balance

Welding instruction

Hold stick electrode as vertically as possible, keep a short arc. Preheating is in general not necessary. On multipass-applications a cushion layer with UTP 630 is recommended in order to prevent hardening cracks in the weld deposit. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	4,0 x 450*
Amperage	A	100 - 150

* available on request

UTP 7100

High-efficiency stick electrode without slag resisting abrasion and moderate impact loads. Recovery 180 %

Standards :

DIN 8555	:	E 10-UM-65-GRZ
EN 14700	:	EZ Fe14
AWS A5.13	:	~ E FeCr-A 1

Application field

The high Cr-C-alloyed hardfacing stick electrode **UTP 7100** is used for surfacings on parts made of constructional steel, cast steel or Mn-steel, which are subject to grinding wear, such as idlers, digging buckets, digging teeth, ploughshares, mixing wings and conveyor screws.
On multi-pass applications it is excellently suitable as buffer layer on high-strength buildung-up layers UTP DUR 600 or UTP 670. On Mn-hard steels it is advisable to weld the building-up layers with UTP 630 or UTP 7200.

Welding properties

UTP 7100 has excellent welding properties. The electrode is also suitable for light out-of-position weldings. Good electric loading, a very stable arc, minimal development of fume, flat and regular seam surface. High deposition rate due to the recovery of 180 %.

Hardness of the pure weld deposit	60 - 63 HRC
1. layer on St 52	55 HRC

Weld metal analysis in %

C	Cr	Fe
5,0	35,0	balance

Welding instruction

Hold stick electrode as vertically as possible and with a short arc. The weld deposit has high hardness values already in the 1. layer due to a low welding amperage and as a result of a low dilution with the base metal.

Current type DC (+) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 350	5,0 x 450
Amperage	A	90 – 120	110 – 140	130 – 160

UTP 75

Graphite basic coated stick electrode with sintered core wire on tungsten-carbide base against extreme mineral abrasion

Standards :

DIN 8555	:	E 21-UM-65-G
EN 14700	:	EZ Fe20

Application field

UTP 75 is, due to the high hardness, particularly suited for hardfacing of parts subject to extremely severe mineral abrasion with very low impact stress, such as sand mixer blades, conveyor screws in the ceramics industry, earth drills, injection screws of brick moulding machines, teeth and bars of grates in the steel industry, bucket and shovel teeth, strippers on asphalt processing machines, trench milling tools.

Welding properties

UTP 75 has a smooth and stable arc and a self-removing slag. The smooth bead surface does, in most cases, not require any machining by grinding with silicon carbide or diamond wheels.

Hardness of the pure weld deposit : approx. 65 HRC

Microhardness of the tungsten carbides : approx. 2500 HV

Weld metal analysis in %

WC	CrC	Fe
70,0	10,0	balance

Welding instruction

Hold stick electrode vertically, make slightly weaving beads, keep a short arc. Preheating is generally not necessary. Apply max. 2 layers. Re-dry stick electrodes that have become damp for 2h/300° C.

Current type DC (–) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	4,0 x 300	5,0 x 300*
Amperage	A	110 – 140	140 – 170

* available on request

Standards :

DIN 8555	:	E 21-UM-60-G
EN 14700	:	EZ Fe20

UTP 7560

Graphite basic coated tube stick electrode with tungsten-carbide filling against extreme mineral abrasion

Application field

UTP 7560 is suitable for claddings on tools and machine parts subject to highest mineral wear, such as drill bits, roller bits, sets of drill-rods, excavator buckets, mixer blades. It is also suitable for highly stressed machine parts, which are used for the reprocessing of sand, cement, lime, clay, coal, slags.

Properties of the weld deposit

The weld deposit consists of a FeC matrix with a hardness of approx. 60 HRC and inserted tungsten-carbide grains (approx. 2500 HV). The content of tungsten-carbide is 60 %, the grain size approx. 0,5 mm.

Hardness of the pure weld deposit

Matrix: approx. 60 HRC
W2C: 2500 HV

Weld metal analysis in %

W_2C	FeC
60,0	balance

Welding instruction

Clean welding area to metallic bright. Pre-heating depends on the dimension of work pieces, 250 – 300° C. The stick electrode is welded with a short arc and an amperage adjustment as low as possible. Slow cooling down from the welding peak temperature.

Current type DC (+) / AC

Welding positions

PA

slight vertically

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350*	4,0 x 350*	5,0 x 350*	6,0 x 350*
Amperage	A	70 – 100	90 – 120	110 – 130	130 – 170

* available on request

UTP 34 N

Standards :

DIN 8555	:	E 31-UM-200-CN
EN 14700	:	E Cu1
AWS A5.6	:	E CuMnNiAl

Basic coated complex aluminium-bronze stick electrode with 13 % Mn for wear and corrosion resistant surfacings on dies

Application field

UTP 34 N is suitable for joinings and surfacings on copper-aluminium alloys, specially with high Mn-content as well as for claddings on cast iron materials and steel. Main application fields are in the shipbuildung (propeller, pumps, armatures) and in the chemical industry. The good friction coefficient permits claddings on shafts, bearings, stamps, drawing tools and all kind of gliding surface.

Welding properties and special properties of the weld deposit

UTP 34 N has excellent welding properties, spatterfree welding, good slag removal. The weld deposit has high mechanical values, a good corrosion resistance in oxidizing media, best gliding properties and a very good machinability. Crack resistant and pore-free.

Hardness of the pure weld deposit approx. 200 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Hardness HB
> 400	> 650	> 25	approx. 220

Weld metal analysis in %

Mn	Ni	Cu	Al	Fe
13,0	2,5	balance	7,0	2,5

Welding instruction

Clean welding area thoroughly. Pre-heating of thick-walled parts to 150 - 250° C. Hold electode as vertically as possible and weld with slight weaving. Weld with dry stick electrodes only!
Re-drying: 2 - 3 h at 150° C.

Current type DC (+)

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350
Amperage	A	50 – 70	70 – 90	90 – 110

Standards :

DIN 8555	:	E 31-UM-300-CN
EN 14700	:	E Cu 1
AWS A5.13	:	~ E CuAl-C

UTP 343

Basic coated hard bronze stick electrode against extreme gliding wear

Application field

UTP 343 is used for highly wear resistant buildups on drawing and extruding tools, which, under severe load, shouldn't leave any trace of wear on the piece deformed.
Especially used in the car industry (deep-drawing stamps, stamps for bodyworks etc) Surfacings can be applied on bronzes of similar nature as well as on steel or cast steel parts.

Welding properties

UTP 343 has good welding properties. The seam has a smooth and regular structure.

Hardness of the pure weld deposit : approx. 300 HB

Weld metal analysis in %

Cu	Al	Fe
balance	12,0	3,0

Welding instruction

UTP 343 is welded with shortest possible arc in thin weaving beads. Preheat base materials of similar nature to 200 – 400° C. Avoid local over-heatings. Hold stick electrode as vertically as possible. To avoid overheating and a large weld pool, use lowest possible amperage setting, in order to avoid hardening and reduce cracking susceptibility created via a strong dilution with the base material. Especially on hardened base materials a buffer layer with UTP 34 N is recommended. Complex bronze stick electrode. Re-drying: 2 – 3 h / 150° C.

Current type DC (+)

Welding positions 

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 350
Amperage	A	70 – 90	90 – 110

UTP A DUR 250

Copper coated MAG wire for tough but machinable buildups exposed to rolling wear

Standards :

Material-No.	:	1.8401
DIN 8555	:	MSG 1-GZ-250
EN 14700	:	SZ Fe 1

Application field

UTP A DUR 250 is used for MAG buildups on structural parts subject to rolling wear and where a good machinability is required, such as rails and rail crossings, crane wheels, rollers, couplings, shafts and gear parts.

Properties of the weld metal

UTP A DUR 250 has a very good resistance against compression and rolling strain. The weld metal is easily machinable.

Hardness of the pure weld deposit : approx. 250 HB

Weld metal analysis in %

C	Si	Mn	Cr	Ti	Fe
0,3	0,3	1,0	1,0	0,2	balance

Welding instruction

Machine welding area to metallic bright. Massive parts have to be preheated to 300° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability Spools
		M 12	M 13	M 21	EN ISO 544
1,2	DC (+)	x	x	x	x
1,6 *	DC (+)	x	x	x	x

* available on request

Approvals

DB (No. 20.138.09)

UTP A DUR 350

Copper coated MAG wire for medium hard, wear resistant surfacing

Standards :

Material-No.	:	1.8405
DIN 8555	:	MSG 2-GZ-400
EN 14700	:	SZ Fe 2

Application field

UTP A DUR 350 is suited for MAG buildups on structural parts subject to compression, impact and abrasion, such as caterpillar track components, machine and gear parts, stamps.

Properties of the weld metal

The weld deposit of **UTP A DUR 350** may be soft annealed and hardened. Post-weld machining by grinding is possible.

Hardness of the pure weld deposit :

untreated	approx. 450 HB
hardened 820 - 850° C/oil	approx. 62 HRC
soft annealed 720 - 740° C	approx. 200 HB
1 layer on non-alloyed steel	approx. 350 HB

Weld metal analysis in %

C	Si	Mn	Cr	Ti	Fe
0,7	0,3	2,0	1,0	0,2	balance

Welding instruction

Machine welding area to metallic bright. Massive parts have to be preheated to 200 - 300° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability Spools
		M 12	M 13	M 21	EN ISO 544
1,0	DC (+)	x	x	x	x
1,2	DC (+)	x	x	x	x

* available on request

UTP A DUR 600

Copper coated MAG wire for highly wear resistant surfacings exposed to impact and abrasion

Standards :

Material-No.	:	1.4718
DIN 8555	:	W/MSG 6-GZ-60-S
EN 14700	:	SZ Fe 8

Application field

UTP A DUR 600 is universally applicable for TIG and MAG buildups on structural parts subject to high impact and medium abrasion. Main applications are found in quarries, crushing plants, mines, steel works, cement works as well as cutting tools and dies in the car industry. Despite the high hardness, the deposit is very tough, crack resistant and has an excellent cutting behaviour.

Properties of the weld metal

Despite the high hardness, the weld deposit of **UTP A DUR 600** is tough, crack resistant and has a good cutting capacity. Machining by grinding possible.

Hardness of the pure weld deposit

untreated	54 - 60 HRC
soft annealed 800° C	approx. 250 HB
hardened 1000° C/oil	approx. 62 HRC
1 layer on non-alloyed steel	approx. 53 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Fe
0,5	3,0	0,5	9,5	balance

Welding instruction

Grind the welding area to metallic bright. Generally, only tool steels have to be preheated to 450° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 21	C 1	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	x	x	x	
1,0	DC (+)		x	x	x	x	x	
1,2	DC (+)		x	x	x	x	x	
1,6	DC (+)		x	x	x	x	x	
1,6	DC (-)	x						x
2,0	DC (-)	x						x
2,4	DC (-)	x						x
3,2	DC (-)	x						x

UTP A DUR 650

Copper coated MAG wire for highly wear resistant surfacings exposed to impact and abrasion

Standards :

DIN 8555	:	MSG 3-GZ-60
EN 14700	:	S Fe 8

Application field

UTP A DUR 650 is universally used for MAG buildups on structural parts subject to high impact and abrasion. Main applications are rail tamping tools, percussion tools, tool holders, shredder hammers, parts of stone treatment industry, press moulds for production of abrasive parts. Also as final layer on hard Mn-steel. Machining by grinding is possible.

Welding properties and special properties of the weld metal

UTP 673 has excellent welding properties, even and finely rippled bead formation and a very good slag removal. Welding with low current settings is possible (cut edges). High temperature resistant up to 350°C.

Hardness of the pure weld deposit: 55 - 60 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	W	Fe
0,36	1,1	0,4	5,2	1,4	0,3	1,3	balance

Welding instruction

Grind welding area. Preheating to 150 - 300° C is only necessary on massive structural parts. If more than 3 layers are needed, weld buffer layers or buildups with UTP A DUR 250.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability Spools
		M 12	M 13	M 21	EN ISO 544
1,0 *	DC (+)	x	x	x	x
1,2	DC (+)	x	x	x	x
1,6 *	DC (+)	x	x	x	x

* available on request

Standards :
DIN 8555 : WSG 21-GS-60-G

UTP A SUPER DUR W 80 Ni

Sintered TIG hard metal rod on tungsten carbide base against extreme friction wear

Application field
UTP A SUPER DUR W 80 Ni is suitable for highly wear resistant claddings on parts subject to extreme friction and grinding wear, particularly for barking blades, drawing heads, traction wheels, descaling rolls, mixer blades, pressure worms, pressing nozzles, impeller bars, fly cutters for tunnel construction and coal mining, guide jaws and - plates.

Welding properties and special properties of the weld metal
The weld deposit of **UTP A SUPER DUR W 80 Ni** consists of very hard tungsten carbides, distributed in a Ferro-Nickel-Matrix. A very good resistance against abrasion strain is the high part of tungsten carbides.

Hardness of the pure weld metal	:	55 - 60 HRC
Microhardness of the tungsten carbides	:	approx. 2500 HV

Weld metal analysis in %

WC	Ni	Fe
80,0	10,0	10,0

Welding instruction
Clean welding area thoroughly. Generally no pre-heating, pre-heat massive parts to 150 – 200° C. Apply welding rod in droplets with a crescent-shaped movement of the TIG-torch. Pay attention to a low dilution with the base metal. Clad wihout interruption, if possible. Finishing by using diamond-grinding wheels or by washing.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Rods
		I 1	I 2	L (mm)
3,3 *	DC (-)	x		300
4,0 *	DC (-)		x	300

* available on request

UTP

UTP A 34 N

Complex aluminium bronze rod and wire for corrosion and wear resistant surfacings on dies containing 13 % Mn

Standards :

Material-No.	:	2.1367
DIN 8555	:	W/MSG-31-GZ-200-CN
EN 14700	:	S Cu 1
AWS A5.7	:	ER CuMnNiAl

Application field

UTP A 34 N is used for MIG joining and surfacing on complex aluminium bronzes, particularly on such with high Mn content and on steel and nodular cast iron. Due to its good seawater resistance and the general corrosion resistance, this alloy is suitable in the ship building industry (propellers, pumps and armatures) and in the chemical industry (valves, slides, pumps) on parts subject to chemical aggression in combination with erosion. Surfacing on shafts, gliding surfaces, bearings and dies have proven, due to the excellent friction coefficient, to be very suitable.

Welding properties and special properties of the weld metal

The weld of **UTP A 34 N** should be performed by applying pulsed MIG technique. The weld metal distinguishes itself by high mechanical values. It is tough, pore-free and crack resistant. Machining is possible with tungstene carbide tools. The weld is corrosion resistant and nonmagnetic.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	El. conductivity $\frac{S \cdot m}{mm^2}$	Hardness HB
400	650	25	3	220

Weld metal analysis in %

Mn	Ni	Cu	Al	Fe
13,0	2,5	balance	7,5	2,5

Welding instruction

Clean welding area to metallic bright. Preheat larger workpieces to approx. 150° C. Keep heat input as low as possible. Interpass temperature of 150° C should not be exceeded.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	
1,2	DC (+)	x	x	
1,6	DC (+)	x	x	
1,6	DC (-)	x		x
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x

UTP A 3436

Complex aluminium bronze wire for wear resistant surfacings on dies

Standards :

Material-No.	:	2.0925
DIN 8555	:	MSG 31-GZ-250-C
EN 14700	:	S Cu 1
AWS A5.13	:	~ ER CuNiAl

Application field

UTP A 3436 is used for TIG and MIG welding on copper-aluminium-forging alloys according to DIN 17 665 and on cast-aluminium-bronzes according to DIN 17 14. It is particularly suited for wear resistant surfacings on steel and cast-aluminium-bronzes, when high resistance against cavitation, erosion and corrosion in seawater is required. Special applications are surfacings on ship propellers with damages caused by erosion and cavitation and on drawing tools.

Special properties of the weld metal

The weld metal has an excellent resistance against wear and corrosion in seawater. Good gliding properties.

Hardness of the pure weld metal approx. 230 HB

Weld metal analysis in %

Mn	Ni	Cu	Al	Fe
1,0	6,0	balance	10,0	3,0

Welding instruction

Clean welding area to metallic bright by grinding. Preheat massive and stress loaded work pieces to 250 - 300° C and maintain this temperature during the welding operation. Max. 2 layers should be applied. If more layers are necessary, buffer layers with UTP A 34 N should be welded. Cool cladded work pieces slowly. Stress-relief annealing of stressed work pieces during 4 h at 580° C, furnace cooling.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		I 1	EN ISO 544
1,2 *	DC (+)	x	x
1,6 *	DC (+)	x	

* available on request

UTP A 7550

Standards :

DIN 8555	:	G/WSG 21-UM-55-CG
EN 14700	:	C Ni 20

Heavy coated, flexible tungsten-carbide welding rod against extreme mineral friction wear, corrosion resistant

Application field

UTP A 7550 can be welded by oxy-acetylene or TIG process. The rod is based on a Ni-Cr-B-Si matrix enveloping tungsten carbides. These carbides have two different grain sizes and build a compact shielding layer on the rod. The matrix melts at 1050° C, i.e. under the melting range of steels.

UTP A 7550 is particularly suitable for claddings on machine parts subject to extreme friction wear by hard, abrasive materials. This alloy is used in brickyards, industries of argillaceous earth, cement factories, mining, offshore such as for producing the machines and systems of the mentioned industries.

Properties of the weld metal

Only suitable for slight to medium impact stress. The weld deposit is corrosion resistant.

Hardness

Carbide	:	approx. 2500 HV
Matrix	:	approx. 55 HRC

Weld metal analysis in %

W_2C	NiCrBSi-Matrix
60,0	40,0

Welding instructions

The weld area must be metallic clean, preheating to 300 - 500°C depending the size. Keep welding torch flat to the work piece and melt surface slightly. Avoid overheating.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
6,0	DC (+)	x	x	
6,0 (x450 mm)	DC (-)	x		x

* available on request

UTP A 7560

Tungsten-carbide tube rod against extreme mineral abrasion

Standards :

DIN 8555	:	G 21-GF-60 G
EN 14700	:	T Fe 20

Application field

The filled gas welding rod **UTP A 7560** is suitable for claddings on tools and machine parts subject to highest mineral wear, such as drill bits, roller bits, sets of drill-rods, excavator buckets, mixer blades. It is also suitable for highly stressed machine parts, which are used for the reprocessing of sand, cement, lime, clay, coal, slags.

Properties of the weld metal

UTP A 7560 is suited for extreme mineralic abrasion with medium impact strain.

Hardness

Carbide	:	approx. 2500 HV
Matrix	:	approx. 60 HRC

Weld metal analysis in %

W_2C	FeC
60,0	40,0

Welding instruction

Clean welding area to metallic bright. Preheating temperature 300 - 500° C, depending on the size of the workpiece. Hold torch as flat as possible to the workpiece. Melt surface slightly. Avoid overheating.

Welding procedure and availablility

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	L (mm)
3,5 *	DC (-)	x	700
4,0 *	DC (-)	x	700
5,0 *	DC (-)	x	700

* available on request

Reduce excess of acetylene (reduced flame) in oxyacetylene welding.

Standards :
DIN 8555 : Special alloy

UTP 7502

Gas welding cast rod with low melting matrix and coarse hard metal grain for deep drilling technique

Application field

UTP 7502 is suitable for high wear resistant cladding in the deep drilling technique, e. g. drill bits for core removing holes, stabilizer, face cutters such as in mining and foundries.
The oxy-acetylene rod is made of a special CuZnNi-matrix with inlayed tungsten-carbides. Their regular distribution enables high quality claddings.

Properties of the weld metal

The weld deposit of **UTP 7502** consits of very hard tungsten carbides, imbedded in a corrosion resistant matrix.

Hardness

Carbide approx. 2500 HV

Working temperature approx. 900° C

Weld metal analysis in %

W_2C	CuZnNi-Matrix
60,0	40,0

Welding instruction

The cladding surface has to be cleaned to metallic bright and has to be free of impurities. Spread flux UTP Flux HLS-B on the surface, apply a thin layer of the brazing alloy UTP 2. The use of this flux is also recommended when applying **UTP 7502**. Avoid overheating.

Flame adjustment : neutral (neither gas - nor oxygen-excess)

Availability

Length of rod	mm	approx. 450	approx. 450
Weights of rod	g	approx. 500	approx. 500
Grain size	mm	1,6 - 3,2*	3,2 - 4,8*

* available on request

UTP-system for mineral wear protection

UTP ABRADISC 6000

Hardened wear protection discs for cladding on extensive parts with UTP DISCWELD-Stick electrodes

Application field

UTP ABRADISC 6000 discs enable a complete abrasive protection of large construction parts. Fixing is made according to a proposed sample with the special stick electrodes **UTP DISCWELD**, depending on the direction of the solicitation. The advantages of this process are:

- Fast deposit
- Low welding stress level
- Short breakdown time
- Similar hardness (60 HRC) on the whole surface
- No pre-heating necessary
- High efficiency
- No deformation
- Cost cutting
- No dilution

Main application fields

The main application fields are buckets, slide slips, mixers, large wear patterns of machines and crawlers.

Intsruction for use

Clean cautiously the welding zone and set correctly the **UTP ABRADISC 6000** discs on the surface. Weld with **UTP DISCWELD** ∅ 3,2 mm (70 -100 A, DC (+) / AC) stick electrodes in the central hole, connected with the base material through a fillet weld. Cladding on rounded surfaces is possible as long as the central hole is connected to the work piece.

Availability

One set (72 pieces **UTP ABRADISC 6000** 5 mm thick + 36 stick electrodes **UTP DISCWELD** ∅ 3,2 x 350 mm) is sufficient to cover approx. 0,5 m≈.
Wear resistant strips ABRASTRIP 6000 S available on request.

SK 300-O

Standards :

DIN 8555 : MF 1-GF-250
EN 14700 : TZ Fe 1

Open-arc flux cored wire for tough, easily machinable surfacings against rolling wear

3Application field

The self-shielding open arc wire **SK 300-O** is used for buildups on parts which are mainly subject to rolling and gliding abrasive wear, such as crane wheels, rail couplings, idlers, slide-ways, flanges, as well as for buffer layers and buildups under highly wear resistant hardfacings.

Hardness of the pure weld deposit : approx. 285 HB

Properties of the weld metal

SK 300-O has a very good resistance against compression and rolling strain. The weld metal is easily machinable.

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ti	Fe
0,1	0,6	1,0	0,5	0,4	0,9	balance

Welding instruction

Clean welding area. Preheat massive pieces to min. 150° C, use dragging welding technique with approx. 25 - 30 mm wire stickout.

Welding positions


PA


PB

Welding procedure and availability

Ø (mm)	Current type	Availability Spools 15 kg EN ISO 544
1,6 *	DC (+)	x
2,4 *	DC (+)	x

* available on request

SK 250-G

Standards :

DIN 8555 : MF 1-GF-250
EN 14700 : TZ Fe 1

MAG flux cored wire for tough, easily machinable surfacings against rolling wear

Application field

The metal powder flux cored wire **SK 250-G** is suitable for surfacings on construction parts subject mainly to rolling and gliding wear in combination with high compression and shock, such as jaw linkages, gearwheels, shafts, couplings. A further application field is buffer - and cushion layers on hard alloys. Easily machinable.

Hardness of the pure weld metal : 225 HB

Properties of the weld metal

SK 250-G has a very good resistance against compression and rolling strain. The weld metal is easily machinable.

Weld metal analysis in %

C	Si	Mn	Cr	Fe
0,09	0,5	1,2	0,45	balance

Welding instruction

Clean welding area to metallic bright. Preheat massive parts to min. 150° C. Use dragging or pushing welding technique in spray arc with approx. 20 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		M 21	EN ISO 544
1,2	DC (+)	x	x
1,6 *	DC (+)	x	x

* available on request

Standards :

DIN 8555 : MF 1-GF-350

EN 14700 : TZ Fe 1

SK 400-O

Open-arc flux-cored wire for tough, medium hard deposits

Application field

The self-shielding open arc wire **SK 400-O** is suited for wear resistant buildups on parts which are subject to high pressure in combination with rolling and gliding wear, such as chain links, idlers, sprocket wheels, wobblers, rope guide rolls. Machining with tungstene carbide tools is possible.

Hardness of the pure weld deposit: approx. 40 HRC

Properties of the weld metal

SK 400-O is resistant against compression strain and rolling stress with simultaneous abrasion. Chip removing machining with tungsten carbide tools is possible.

Weld metal analysis in %

C	Si	Mn	Cr	Fe
0,11	0,6	0,6	2,4	balance

Welding instruction

Clean welding area. Preheat massive pieces and high strength steels to min. 250° C, use dragging welding technique with approx. 25 - 30 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Availability
		Spools
		EN ISO 544
1,6 *	DC (+)	x

* available on request

SK 350-G

MAG flux cored wire for tough, medium hard surfacings

Standards :

DIN 8555	:	MF 1-GF-350
EN 14700	:	T Z Fe1

Application field

The metal powder flux cored wire **SK 350-G** is suitable for surfacings on construction parts subject to high shock in combination with rolling and gliding wear, such as carriage parts of crawler vehicles, sprocket wheels, rope pulleys, shafts, gearwheels, gliding metals parts. Easily machinable.

Properties of the weld metal

SK 350-G is resistant against compression strain and rolling stress with simultaneous abrasion. Chip removing machining with tungsten carbide tools is possible.

Hardness of the pure weld metal : 330 HB

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Fe
0,22	0,4	1,4	1,45	0,5	balance

Welding instruction

Clean welding area to metallic bright. Preheat massive construction parts and high strength steel to min. 250° C. Use dragging or pushing welding technique with approx. 20 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 21	C 1	EN ISO 544
1,2	DC (+)	x	x	x
1,6	DC (+)	x	x	x

SK 258-O

Open-arc flux cored wire for highly wear resistant surfacings

Standards :

DIN 8555 : MF 4-GF-55-ST
EN 14700 : T Fe8

Application field

The self-shielding open arc wire **SK 258-O** is universally used for build ups on parts subject to a combination of pressure, impact and abrasion.

Earthmoving equipment, bucket knives, surface protection on buckets, mill hammers, conveyor screws, shredders, percussion tools, coal plain. Machining is only possible by grinding.

Properties of the weld metal

SK 258-O is a martensitic alloy and especially suited for strong compression and impact strain.

Hardness of the pure weld deposit : 55 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	W	Fe	Ti
0,47	0,8	1,5	5,7	1,5	1,5	balance	0,9

Welding instruction

Clean welding area. Preheating is generally not necessary, use dragging welding technique with approx. 25 - 30 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Availability	
		Spools	Coils
		EN ISO 544	
1,6	DC (+)	x	
2,4	DC (+)	x	
2,8	DC (+)	x	x

Standards :

DIN 8555 : MF 6-GF-60
EN 14700 : T Fe8

SK 600-G

MAG flux cored wire for tough-hard and highly wear resistant surfacings

Application field

The metal powder flux cored wire **SK 600-G** is universally used for surfacings on construction parts subject to combined stresses of compression, impact and friction, such as crusher jaws, baffle plates, coal planes and cutting tools. The weld deposit is unsensitive against outbreaks. Machinable by grinding.

Properties of the weld metal

SK 600-G is a martensitic alloy and especially suited for strong compression and impact strain.

Hardness of the pure weld metal : 55 - 60 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Fe	Ti
0,52	1,2	1,5	5,9	0,9	balance	0,1

Welding instruction

Clean welding area thoroughly. Generally no preheating. Preheat tool steels to 350 - 400° C. Use dragging or pushing welding technique in spray - or short arc with approx. 20 mm wire stickout.

Welding positions PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 21	C 1	EN ISO 544
1,2	DC (+)	x	x	x
1,6	DC (+)	x	x	x

SK 650-G

MAG flux cored wire for tough-hard surfacings against impact and abrasion

Standards :
DIN 8555 : MF 10-GF-60-GP
EN 14700 : T Fe8

Application field

The metal powder flux cored wire **SK 650-G** is used for buildups on parts subject to compression, impact and abrasion, such as cutting edges and working surfaces on cold and hot working tools, forging and trimming dies, axial and planing rolls, rotors and beaters for mineral and stone crushing, teeth and scraper blades of building machines, taper tools and shredder hammers.

Properties of the weld metal

Machining is possible by grinding or with tungstene carbide tools.

Hardness of the pure weld metal: 58 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	W	Fe
0,45	0,6	0,9	5,5	1,4	1,0	1,6	balance

Welding instruction

Clean welding area to metallic bright. Preheat hot - and cold working tools to 400° C, stress relief, if necessary, at 550° C. Use dragging or pushing welding technique in spray - or short arc with approx. 20 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 21	C 1	EN ISO 544
1,2	DC (+)	x	x	x
1,6	DC (+)	x	x	x
2,4 *	DC (+)	x	x	x

* available on request

SK 258 TiC-O

Open-arc TiC flux cored wire for wear resistant claddings against compression, impact and abrasion

Standards :

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

Application field

The self-shielded (open-arc) flux cored wire **SK 258 TiC-O** is universally suitable for claddings on wearing parts subject to combined loads of impact and abrasion, such as breaking drums and hammer crushers, crushing parts, gravel pumps, conveyor screws, pressure drums for the cement industry, mixer parts, earthwork equipment. Machinable by grinding. Max applied thickness 10 - 15 mm in 3 - 4 layers.

Properties of the weld metal

The weld deposit of **SK 258 TiC-O** is goog machinable by grinding and is consisting of a martensitic matrix with finely distributed Ti-carbides. (not suited for flame-cutting)

Hardness of the pure weld metal: 58 HRC

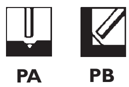
Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ti	Fe
1,8	0,2	0,9	6,1	1,4	5,5	balance

Welding instruction

Clean welding area to metallic bright. Peheat massive parts and high performance steels to min. 250° C. Due to a high preheating and working temperature the crack susceptibility of the weld deposit will be reduced. Use dragging welding technique with approx. 35 - 40 mm wire stickout.

Welding positions



Welding procedure and availability

Ø (mm)	Current type	Availability		
		Spools	Coils	Drums
		EN ISO 544		
1,2	DC (+)	x		
1,6	DC (+)	x		
1,6 *	DC (+)		x	
2,4	DC (+)	x		
2,4 *	DC (+)			x
2,8	DC (+)	x	x	
2,8 *	DC (+)			x

Standards :

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

SK 258 TiC-G

MAG TiC flux cored wire for wear resistant claddings against compression, impact and abrasion

Application field

The metal powder flux cored wire **SK 258 TiC-G** is universally suitable for claddings on wearing parts subject to a combined loads of impact and abrasion, such as breaking drums and hammer crushers, crushing parts, gravel pumps, conveyor screws, pressure drums for the cement industry, mixer parts, earthwork equipment. Machinable by grinding. Max applied thick-ness 10 - 15 mm in 3 - 4 layers.

Properties of the weld metal

The weld deposit of **SK 258 TiC-G** is goog machinable by grinding and is consisting of a martensitic matrix with finely distributed Ti-carbides. (not suited for flame-cutting)

Hardness of the pure weld deposit : 59 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ti	Fe
1,6	0,3	0,8	5,6	1,1	5,8	balance

Welding instruction

Clean welding area to metallic bright. Preheat massive construction parts and high strength steel to min. 250° C. Due to a high preheating and working temperature the crack susceptibility of the weld deposit will be reduced. Use pushing or dragging welding technique with spray arc and with approx. 20 mm wire stickout.

Welding positions PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Coils
		M 13	EN ISO 544	
1,2	DC (+)	x	x	
1,6	DC (+)	x	x	
2,0 *	DC (+)	x	x	
2,4 *	DC (+)	x	x	
2,8	DC (+)	x		x

* available on request

SK 218-O

Standards :

DIN 8555 : MF 7-GF-200-KP
EN 14700 : T Z Fe9

Open-arc flux cored wire for wear resistant buildups on high Mn-steel.

Application field

The self-shielded open arc wire **SK 218-O** is particularly used for joining and surfacing of worn parts made of high Mn-steel such as excavator parts, crusher plates and cones, gripper tips, rails and shunts, baffle plates, blasting equipment parts. Surfacing of parts made of non-alloy and low-alloy steel, which are subject to high compressive and impact stresses, is also possible.

Special properties of the weld deposit

Fully austenitic structure, workhardening, tough and crack-resistant.

Hardness of the pure weld deposit

As-welded condition : approx. 200 HB

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,9	0,6	14,0	3,5	0,4	balance

Welding instruction

Clean welding area. No preheating on high Mn-steel, interpass temperature of 250° C (due to welding heat effect) not to be exceeded. If necessary, intermediate cooling or weld with the work-piece in a water bath. Use dragging welding technique with approx. 25 - 30 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Availability	
		Spools	Drums
		EN ISO 544	
1,6 *	DC (+)	x	
2,0	DC (+)	x	
2,4 *	DC (+)	x	x
2,8 *	DC (+)	x	x

* available on request

SK AP-O

Open-arc flux cored wire for wear resistant buildups exposed to compressive and impact stresses

Standards :
DIN 8555 : MF 7-GF-250-KP
EN 14700 : T Z Fe9

Application field

The self-shielded open arc wire **SK AP-O** is used for buildups on parts subject to highest compression and impact in combination with abrasion. The buildup can be applied on non-alloy and low-alloy steel as well as on high Mn-steel. Main applications are the mining and cement in-dustries, stone crushing, railway traffic and steel works, where crusher jaws and cones, crusher hammers, heart and cross pieces, roller spindles and wobblers are built up.

Special properties of the weld deposit

Fully austenitic structure, by addition of Cr improvement of the friction and corrosion resistance. Very high workhardenability and good toughness.

Hardness of pure weld deposit

As-welded condition : approx. 205 HB

Weld metal analysis in %

C	Mn	Si	Cr	Fe
0,37	16,0	0,4	12,8	balance

Welding instruction

Clean welding area. No preheating on Mn-steel, interpass temperature of 250° C (due to welding heat) not to be exceeded. Allow cooling down at intervalls or weld with the workpiece in a water bath. Use dragging welding technique with approx. 25 - 30 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Availability		
		Spools	Coils	Drums
		EN ISO 544	EN ISO 544	EN ISO 544
1,2	DC (+)	x		
1,6	DC (+)	x		
2,4	DC (+)	x		
2,8	DC (+)	x	x	
2,8 *	DC (+)			x

* available on request

SK 402-O

Open-arc CrNiMn flux cored wire for buffer layers and crack resistant joints.

Standards :

DIN 8555	:	MF 8-GF-200-ZRKN
EN 14700	:	T Z Fe10

Application field

The self-shielded open arc wire **SK 402-O** is used mainly for tough, crack resistant buffer lay-ers and for build up prior to hard surfacings tending to hardness cracks. Welding of cracks on high tensile steels and on cast steel and joints on Mn-steel and wear plates are possible. Universally applicable for corrosion and scale resistant, work hardened and easy machinable cladding on non- and low-alloy steels.

Welding properties and special properties of the weld metal

The weld deposit of **SK 402-O** is non-scaling, stainless, crack resistant and cold hardening. Not suited for flame cutting.

Hardness of pure weld deposit 160 HB

Weld metal analysis in %

C	Mn	Si	Cr	Ni	Fe
0,09	6,0	0,9	18,0	7,8	balance

Welding instruction

Clean welding area. Preheat massive pieces and high tensile steel to min. 250° C. Use dragging welding tech-nique and 25 - 30 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Availability	
		Spools	Coils
		EN ISO 544	
1,4 *	DC (+)	x	
1,6	DC (+)	x	
2,0 *	DC (+)	x	
2,4	DC (+)	x	
2,8 *	DC (+)	x	x

* available on request

Standards :

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

SK 255-O
SK 866-O

Open-arc flux cored wire for highly wear resistant claddings against abrasion

Application field

The self-shielded open arc wires **SK 255- O and SK 866-O** are used for buildups on structural parts which are subject to strong mineral abrasion but little impact stress, such as conveyor and transport screws, gliding and guiding surfaces, mixer blades, milling rolls and beater plates in coal mills, sand pumps, surfacing of refuse removing trucks.

Properties of the weld metal

Excellent welding properties and a smooth seam surface generally make the finishing by grinding unnecessary. Also suitable as final layer on previous tough-hard buildups with SK 258-O or SK AP-O.

Hardness of the pure weld deposit : 60 HRC

Weld metal analysis in %

C	Mn	Si	Cr	Fe	B
4,4	0,7	0,9	25,0	balance	0,6

Welding instruction

Clean welding area and remove fatigued material. Preheating is generally not necessary. Use dragging welding technique with approx. 25 - 30 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Type	Ø (mm)	Current type	Availability	
			Spools	Drums
			EN ISO 544	EN ISO 544
SK 255-O	1,2	DC (+)	x	
	1,6	DC (+)	x	
	2,0 *	DC (+)	x	
SK 866-O	2,4	DC (+)	x	x
	2,8	DC (+)	x	
	2,8 *	DC (+)		x

* available on request

Standards :

DIN 8555 : MF 7-GF-65-GR
EN 14700 : T Z Fe15

SK A 43-O

Open-arc flux cored wire for highly wear resistant hardfacings against abrasion

Application field

The self-shielded open arc wire **SK A 43-O** is used for surfacing of structural parts subject to extremely high abrasive wear by dust, sand, gravel, ore, coal, chamotte, cement and slag, such as mill rollers, mill plates, transport screws, fan blades, ID fans, mixer blades, slides, sand propellers, slag and coal crushers, pressing dies.

Properties of the weld metal

Very good weldability and excellent bead appearance make generally a finishing by grinding unnecessary. Suitable for working temperatures up to 450° C.

Hardness of the pure weld deposit : 64 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Nb	Fe
5,6	1,3	0,2	20,2	6,7	balance

Welding instruction

Clean welding area and remove fatigued material. Preheating is generally not necessary. Use dragging welding technique, possibly weaving, and with 25 - 30 mm wire stickout.

Welding positions PA PB

Welding procedure and availability

Ø (mm)	Current type	Availability	
		Spools	Drums
		EN ISO 544	EN ISO 544
1,6	DC (+)	x	
2,4	DC (+)	x	
2,4 *	DC (+)	x	x
2,8	DC (+)	x	

* available on request

SK A 45-O

Standards :

DIN 8555 : MF 7-GF-70-GRTZ
EN 14700 : T Z Fe16

Open-arc flux cored wire for heat resistant claddings against abrasion

Application field

The self-shielded open arc wire **SK A 45-O** is used for hardfacing of structural parts subject to extremely high abrasive wear caused by dust, cement, by blending and sintering slag at elevated working temperatures up to 600° C, such as sinter crushers and fire grate bars, blast furnace bells in the baffle area, coating of the slides of coke discharging machines, blower carrying wheels, hammer crushers for cement and brick crushing, delivery chutes of blast furnaces, mixer blades.

Preperties of the weld metal

Finishing by grinding is generally not necessary due to the very good welding characteristics and smooth seam surface.

Hardness of the pure weld deposit : 63 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Nb	W	V	Fe
5,3	0,7	0,2	21,0	6,3	6,0	1,9	1,0	balance

Welding instruction

Clean welding area, preheating is generally not required. Dragging welding technique, possibly weaving, with 25 - 30 mm wire stickout.

Welding positions PA PB

Welding procedure and availability

Ø (mm)	Current type	Availability	
		Spools	Drums
		EN ISO 544	EN ISO 544
1,6	DC (+)	x	
2,4	DC (+)	x	
2,8	DC (+)		x

* available on request

Standards :

DIN 8555	:	MF 7-GF-70-GRTZ
EN 14700	:	T Z Fe16

SK 299-O

Open-arc flux cored wire for heat resistant hardfacings against mineral abrasion

Application field

The self-shielded open arc wire **SK 299-O** is used for hardfacings of structural parts subject to extremely high abrasive wear at elevated working temperatures up to 700° C, such as sinter crushers, fire grate bars, blast furnace bells in the baffle area, chute and wear components of the Paul-Wurth-charging-system, brick crushers, screw conveyors, cement and concrete pumps, gravel washing plants.

Properties of the weld metal

Finishing by grinding is generally not necessary due to the good welding characteristics and the smooth seam surface.

Hardness of the pure weld deposit : 64 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Nb	V	B	Fe
4,9	1,0	0,3	11,3	6,8	6,0	0,7	balance

Welding instruction

Clean welding area, preheating is generally not required. Dragging welding technique, possibly weaving, 25 - 30 mm wire stickout.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Availability Spools EN ISO 544
1,6 *	DC (+)	x
2,4	DC (+)	x
2,8	DC (+)	x

* available on request

UTP UP DUR 250
UTP UP FX DUR 250

Copper coated SAW wire for machinable surfacings and filler layers

Standards :

Material-No.	:	1.8401
DIN 8555	:	UP 1-GZ-250
EN 14700	:	SZ Fe1

Application field

The combination of wire and flux **UTP UP DUR 250 / UTP UP FX DUR 250** is used for submerged arc welding on construction parts, where resistance against rolling wear and a good machinability is required, such as surfacings on rail crossings, couplings, wobbler drives, crane wheels, shafts and gear parts.

Hardness of the pure weld deposit : approx. 250 HB

Wire analysis in %

C	Si	Mn	Cr	Ti	Al	Fe
0,3	0,4	1,0	1,0	0,2	0,1	balance

Welding instruction

Clean welding area to metallic bright. Preheat massive parts to 150° C, cooling down slowly.

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire EN ISO 544	Flux
3,0 *	400 - 500	28 - 30	30 - 50	B 450	25 kg
4,0 *	500 - 600	28 - 30	30 - 50	B 450	25 kg

* available on request

UTP UP DUR 300
UTP UP FX DUR 300

Copper coated SAW wire for machinable surfacings

Standards :

Material-No.	:	1.8404
DIN 8555	:	UP 2-GZ-300
EN 14700	:	SZ Fe1

Application field

The combination of wire and flux **UTP UP DUR 300 / UTP UP FX DUR 300** is used for submerged arc welding on construction parts, where resistance against rolling wear and a good machinability is required, such as surfacings on rail crossings, couplings, wobbler drives, crane wheels, shafts and gear parts.

Hardness of the pure weld deposit : approx. 300 HB

Wire analysis in %

C	Si	Mn	Cr	Ti	Al	Fe
0,5	0,4	1,0	1,2	0,2	0,1	balance

Welding instruction

Clean welding area to metallic bright. Preheat massive parts to 150° C, cooling down slowly.

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire EN ISO 544	Flux
3,0 *	400 - 500	28 - 30	30 - 50	B 450	25 kg
4,0 *	500 - 600	28 - 30	30 - 50	B 450	25 kg

* available on request

Standards :

Material-No..	:	1.4718
DIN 8555	:	UP 6-GZ-55
EN 14700	:	S Fe8

UTP UP DUR 600
UTP UP FX DUR 600

Copper coated SAW wire for tough-hard surfacings against impact and abrasion

Application field

The combination of wire and flux **UTP UP DUR 600 / UTP UP FX DUR 600** is universally used for submerged arc welding on construction parts subject to high impact and medium abrasion loads. Main application fields are systems in quarries, stone treatment industry, mining, steel mills and cement industry. Despite high hardness, the deposit is very tough and crack resistant. Machining by grinding is possible.

Hardness of the pure weld metal : 52 - 55 HRC

Wire analysis in %

C	Si	Mn	Cr	Fe
0,45	3,0	0,5	9,5	balance

Welding instruction

Clean welding area to metallic bright. Preheat massive construction parts and high strength steels to 250 - 400° C. Let the weld cooling down slowly, if necessary stress relief annealing.

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire	Flux
				EN ISO 544	
4,0	500 - 600	28 - 30	30 - 50	B 450	25 kg

* available on request

Standards :

Material-No.	:	Special alloy
DIN 8555	:	UP 3-GZ-50-T
EN 14700	:	SZ Fe8

UTP UP 73 G 2
UTP UP FX 73 G 2

Copper coated SAW wire for heat resistant surfacings

Application field

The combination of wire and flux **UTP UP 73 G 2 / UTP UP FX 73 G 2** is used for high wear resistant buildups on construction parts and tools subject to high abrasion and pressure in combination with medium impact loads at elevated performance temperatures, e. g. forging tools, roll mandrills, mangle rolls, thrust rolls as well as for the production of high-grade work surfaces made of non- or low alloyed base materials.

Properties of the weld metal

Machinable by grinding or hard metal alloys.

Hardness of the pure weld deposit

untreated	:	48 - 52 HRC
tempered 550° C	:	approx. 55 HRC

Wire analysis in %

C	Si	Mn	Cr	Mo	Ti	Fe
0,35	0,3	1,2	7,0	2,0	0,3	balance

Welding instruction

Clean welding area to metalic bright. Preheat massive construction parts and tool steels to 250 - 400° C, if necessary stress relief annealing at 550° C. Slow cooling.

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire	Flux
				EN ISO 544	
3,0 *	400 - 500	28 - 30	30 - 50	B 450	25 kg

* available on request

Standards :

Material-No.	:	Special alloy
DIN 8555	:	UP 3-GZ-40-T
EN 14700	:	S Fe 3

UTP UP 73 G 3
UTP UP FX 73 G 3

Copper coated SAW wire for heat-resistant surfacings

Application field

Due to the excellent hot wear resistance and toughness, the combination of wire and flux **UTP UP 73 G 3 / UTP UP FX 73 G 3** is used for highly stressed surfacings on hot working tools which are simultaneously subject to high mechanical, thermal and abrasive loads, such as forge saddles, rolls, rotors, hot-shear blades.

Properties of the weld metal

Machining with hard metal alloys.

Hardness of the pure weld metal

untreated	:	38 - 42 HRC
tempered at 550° C	:	approx. 45 HRC

Wire analysis in %

C	Si	Mn	Cr	Mo	Ti	Fe
0,25	0,5	0,7	5,0	4,0	0,6	balance

Welding instruction

Clean welding area to metallic bright. Preheat massive construction parts and tool steels to 250 - 400° C, if necessary stress relief annealing at 550° C. Slow cooling.

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire	Flux
				EN ISO 544	
2,4 *	300 - 350	28 - 30	30 - 50	B 450	25 kg

* available on request

UTP UP 73 G 4
UTP UP FX 73 G 4

Copper coated SAW wire for tough and wear-resistant surfacings

Standards :

Material-No.	:	Special alloy
DIN 8555	:	UP 3-GZ-350-T
EN 14700	:	S Z Fe3

Application field

Due to the good hot wear resistance and toughness, the combination of wire and flux **UTP UP 73 G 4 / UTP UP FX 73 G 4** is used for surfacings on hot working tools and construction parts, which are subject to impact, pressure and abrasion at elevated temperatures, such as rolls, running wheels, guidings, recipients, drums. Hot wear resistant claddings can be made on non- and low alloyed base materials.

Properties of the weld metal

The weld deposit is machinable.

Hardness of the pure weld deposit : 32 - 35 HRC

Wire analysis in %

C	Si	Mn	Cr	Mo	Fe
0,1	0,4	0,6	6,5	3,3	balance

Welding instruction

Clean welding area to metallic bright, cracks in the tool have to be gouged out completely. Preheating temperature of 400° C on tools should be maintained, stress relief, if necessary, at 550° C. Preheating to 150° C generally on non-and low alloyed materials.

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire	Flux
				EN ISO 544	
2,4 *	300 - 350	28 - 30	30 - 50	B 450	25 kg
3,0 *	320 - 450	28 - 30	30 - 50	B 450	25 kg
4,0 *	400 - 500	28 - 30	30 - 50	B 450	25 kg

* available on request

Standards :

Material-No.	:	1.4115
DIN 8555	:	UP 5-GZ-400-RZ
EN 14700	:	S Z Fe7

UTP UP 661
UTP UP FX 661

Martensitic SAW wire for wear and corrosion resistant hardfacings

Application field

The combination of wire and flux **UTP UP 661 / UTP UP FX 661** is suitable for high-grade buildups on non- and low alloyed base steels / kinds of steel and tool steels. Application fields are sealing faces on fittings, plungers and claddings on rotors. The martensitic welding deposit has a high wear resistance also at elevated temperatures as well as a good resistance against water, steam and diluted organic acids.

Properties of the weld metal

Scale resistant up to 900° C.

Hardness of the pure weld deposit	approx. 40 HRC
1st layer on tempering steel C 45	approx. 55 HRC

Wire analysis in %

C	Si	Mn	Cr	Mo	Fe
0,22	0,7	0,7	17,5	1,2	balance

Welding instruction

Clean welding area to metallic bright. Preheating and interpass temperature 150 - 400° C, depending on the size of the workpiece and the base material. Slow cooling and, if necessary, tempering.

Welding procedures and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire	Flux
				EN ISO 544	
3,0 *	400 - 500	28 - 30	30 - 50	B 450	25 kg
4,0 *	500 - 600	28 - 30	30 - 50	B 450	25 kg

* available on request

UTP UP 662
UTP UP FX 662

Martensitic SAW wire for wear and corrosion resistant hardfacings

Standards :
Material-No. : 1.4122
DIN 8555 : UP 6-GZ-45-RZ
EN 14700 : S Z Fe7

Application field
The combination of wire and flux **UTP UP 662 / UTP UP FX 662** is suitable for high-grade buildups on non- and low alloyed base steels / kinds of steel and tool steels. Application fields are sealing faces on fittings, plungers and claddings on rotors. The martensitic welding deposit has a high wear resistance also at elevated temperatures as well as a good resistance against water, steam and diluted organic acids.

Properties of the weld metal
Scale resistant up to 900° C.

Hardness of the pure weld deposit : approx. 45 HRC

Wire analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,40	0,5	0,5	16,5	1,0	0,5	balance

Welding instruction
Clean welding area to metallic bright. Preheating temperature 150 - 400° C, depending on the size of the workpiece and the base material. Slow cooling and, if necessary, tempering.

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire	Flux
				EN ISO 544	
3,0 *	320 - 450	28 - 30	30 - 50	B 450	25 kg

* available on request

UTP 73 G 2

Basic coated stick electrode for wear resistant surfacings on hot and cold working steels

Standards :

DIN 8555	:	E 3-UM-55-ST
EN 14700	:	E Fe8

Application field

UTP 73 G 2 is, due to its high hardness, toughness and heat resistance ideally suited for buildups on parts subject to severe friction, compression and moderate impact loads at elevated
temperatures, such as back centers, gripping pliers, gliding and guiding surfaces, hot and cold punching tools, valves, slides, hot-shear blades, extrusion press pristons, forging tools, stripping columns, trimming tools, roll mandrils, punching tools for sheet metals.
UTP 73 G 2 is used to good advantage for the production of new cold and hot working tools. In such cases cladding is made on base material with an accordingly high tensile strength.

Welding properties

The stick electrode has excellent welding properties, a stable and regular flow, good bead appearance and very easy slag removal. Heat resistant up to 550° C

Hardness of the pure weld metal : 55 - 58 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Fe
0,35	0,5	1,3	7,0	2,5	balance

Welding instruction

Preheat the workpiece to 400° C. Hold stick electrode as vertically as possible and with a short arc. Allow the workpiece to cool down slowly. Finishing by grinding. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 400
Amperage	A	60 – 90	80 – 110	100 – 140	130 – 170

UTP 73 G 3

Basic coated stick electrode for wear resistant surfacings on hot working steels exposed to impact, compression and abrasion

Standards :

DIN 8555	:	E 3-UM-45-T
EN 14700	:	E Z Fe6

Application field

UTP 73 G 3 is, due to its high strength, toughness and heat resistance ideally suited for buildups on parts subject to friction, compression and impact at elevated temperatures, such as hot shears blades, gate shear, forging saddles, hammers, forging dies, Al-die cast moulds.
UTP 73 G 3 is also used to good advantage for the production of new cold and hot working tools with low-alloy base materials.

Welding properties

The stick electrode has excellent welding properties, a stable and regular flow, good bead appearance and very easy slag removal. Heat resistant up to 550° C.

Hardness of the pure weld metal : approx. 45 - 50 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Fe
0,3	0,5	0,6	5,0	4,0	balance

Welding instruction

Preheat the workpiece to 400° C. Hold stick electrode as vertically as possible and with a short arc. Take care of a slow cooling of the workpiece. Finishing by grinding or hard metal alloys. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 400*
Amperage	A	60 – 90	80 – 100	100 – 140	130 – 170

* available on request

UTP 73 G 4

Basic coated stick electrode for tough, crack resistant surfacings against compression, impact and abrasion on hot working tools

Standards :

DIN 8555	:	E 3-UM-40-PT
EN 14700	:	E Z Fe3

Application field

UTP 73 G 4 is, due to its toughness and heat resistance, ideally suited for surfacings on parts and tools subject to abrasion, compression and impact at elevated temperatures. Particularly for buildups on forging dies, die cast moulds, rollers, wobbler drives, hot-shear blades.
UTP 73 G 4 also offers an economic solution for the production of new tools, for which a base material with an adequate tensile strength is recommended.

Welding properties

The stick electrode has excellent welding properties, a stable and regular flow, good bead appearance and very easy slag removal. Heat resistant up to 550° C.

Hardness of the pure weld metal : approx. 38 - 42 HRC

Weld metal analysis in %

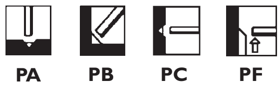
C	Si	Mn	Cr	Mo	Fe
0,15	0,5	0,6	6,5	3,5	balance

Welding instruction

Preheat the workpiece to 400° C. Hold stick electrode as vertically as possible and with a short arc. Take care of a slow cooling of the workpiece. Machining is possible with tungstene carbide tools. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions



Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 400*
Amperage	A	60 – 90	80 – 110	100 – 140	130 – 170

* available on request

UTP 694

Basic coated stick electrode for wear resistant surfacings on hot working tools

Standards :

DIN 8555	:	E 3-UM-45-T
EN 14700	:	E Fe3

Application field

UTP 694 is suited for hot wear resistant buildups on hot working tools, subject mainly to friction and compression, e. g. hot cutting knives, edges on forging tools, roll mandrils, axial rollers, die cast moulds, where high-alloy hot working steels, such as e.g. 1.2344, 1.2365, 1.2581, 1.2567 are used. Due to the excellent metal-to-metal gliding properties also suitable for buildups on guiding and gliding surfaces, such as hammer tracks.

Welding properties and special properties of the weld metal

UTP 694 has a good weldability except in vertical-down welding, has good temperature resistance and a quiet arc and a good slag removal. Good chip removal machinable with carbide tools.

Hardness of the pure weld metal : approx. 45 HRC

Weld metal analysis in %

C	Si	Mn	Cr	V	W	Fe
0,27	0,3	1,7	2,4	0,6	4,5	balance

Welding instruction

Clean welding area carefully and preheat workpiece to 400° C. Hold stick electrode as vertically as possible and with a short arc. Preheating temperature should be maintained during the whole welding operation. Subsequent slow cooling. Re-dry stick electrodes that have got damp for 2 h / 300° C.

Current type DC (+)

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350	4,0 x 400*
Amperage	A	70 – 100	100 – 130	120 – 160

* available on request

UTP DUR 550 W

Basic coated stick electrode for heat resistant surfacings on hot working tools with high tempering resistance

Standards :

DIN 8555	: E 3-UM-55-ST
EN 14700	: E Fe3

Application field

UTP DUR 550 W is used for buildups on highly thermal stressed hot working tools, which are simultaneously subject to abrasion, compression and impact. Main application fields are edges on forging dies, mandrils, trimming tools, hot shear blades.

The elevated temperature hardness (up to 550° C) and the abrasion resistance are reached by addition of tungsten, molybdenum, chromium, cobalt and vanadium. **UTP DUR 550 W** is suitable for the production and repair of high quality hot working tools.

Welding properties

UTP DUR 550 W has excellent welding properties, a stable and regular flow, good bead appearance and very easy slag removal.

Hardness of the pure weld metal (untreated)

55 - 57 HRC	(at 20° C)
approx. 45 HRC	(at 550° C)

Weld metal analysis in %

C	Si	Mn	Cr	V	W	Co	Fe
0,35	0,8	0,8	2,2	0,35	8,5	2,2	balance

Welding instruction

Clean welding area to metallic bright and preheat workpiece to 400° C. Preheating temperature should be maintained during the whole welding operation. Slow cooling in oven or under cover, temper 1 - 2 x at 550° C, if possible.

Current type DC (+) / AC

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350*	3,2 x 350*	4,0 x 350*
Amperage	A	70 – 100	100 – 140	120 – 160

* available on request

UTP 673

Rutile coated stick electrode for wear resistant surfacings on cold and hot working tools

Standards :

DIN 8555	:	E 3-UM-60-ST
EN 14700	:	E Fe8

Application field

UTP 673 is used for wear resistant buildups on cold and hot working tools, particularly for cutting-edges on hot cutting tools, hot-shear blades, trimming tools and cold cutting knives. The production of new cutting tools by welding on non-alloy or low-alloy base materials is also possible.

Welding properties

UTP 673 has excellent welding properties, a homogeneous, finely rippled bead appearance due to the spray arc and very easy slag removal. This stick electrode is weldable with very low amperage settings (advantage for edge buildup). Heat resistant up to 550° C

Hardness of the pure weld metal: approx. 58 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	W	Fe
0,3	0,8	0,4	5,0	1,5	0,3	1,3	balance

Welding instruction

Preheat high-alloy tool steels to 400 - 450° C and maintain this temperature during the whole welding process. Hold stick electrode vertically with a short arc and lowest possible amperage setting. Machining only by grinding. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (–) / DC (+) / AC

Welding positions PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,0 x 300*	2,5 x 300	3,2 x 350	4,0 x 400
Amperage	A	30 – 50	50 – 70	90 – 120	130 – 160

* available on request

Standards :

DIN 8555	:	E 3-UM-350-T
EN 14700	:	E Fe5

UTP 702

Basic coated, age-hardenable martensitic stick electrode for wear resistant hardfacings on cold and hot working tools

Application field

Due to its high-grade structure, **UTP 702** is used for repair, preventive maintenance and production of highly stressed cold and hot working tools, such as punching tools, cold shears for thick materials, drawing -, stamping - and trimming tools, hot cutting tools, Al-die cast moulds, plastic moulds, cold forging tools. The weld deposit is, in as-welded condition, easily machinable and the subsequent age hardening opitmises the resistance to wear and alternating temperatures.

Welding instruction

UTP 702 has excellent welding properties, a smooth and regular drop transfer, good bead appearance and easy slag removal.

Hardness of the pure weld metal:

untreated:	34 - 37 HRC
After age hardening 3 - 4 h / 480° C	50 - 54 HRC

Weld metal analysis in %

C	Si	Mn	Mo	Ni	Co	Ti	Fe
0,025	0,2	0,6	4,0	20,0	12,0	0,3	balance

Welding instruction

Clean welding area to metallic bright. Only massive tools should be preheated to 100 - 150° C. On low-alloy steels at least 3 - 4 layers should be applied. Keep heat input as low as possible.

Current type DC (+)

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 350	4,0 x 350
Amperage	A	70 – 90	100 – 120	120 – 140

UTP 702 HL

Basic coated, age-hardenable martensitic high efficiency stick electrode for highly wear resistant hardfacings on cold and hot working tools

Standards :

DIN 8555	:	E 3-UM-350-T
EN 14700	:	E Fe5

Application field

Due to its high-grade structure, **UTP 702 HL** is used for repair, preventive maintenance and production of highly stressed cold and hot working tools, such as punching tools, hot cutting tools, Al-die cast moulds, plastic moulds, cold forging tools. The weld deposit is, in as-welded condition, easily machinable and the subsequent age hardening opitmises the resistance to wear and alternating temperatures.

Welding properties

UTP 702 HL has excellent welding properties, a stable and regular flow, good bead appearance and very easy slag removal. High deposition rate.

Hardness of the pure weld metal :

untreated:	34 - 37 HRC
after age hardening 3 - 4 h / 480° C	50 - 54 HRC

Weld metal analysis in %

C	Si	Mn	Mo	Ni	Co	Ti	Fe
0,03	0,3	0,6	4,5	19,0	11,5	0,3	balance

Welding instruction

Clean welding area to metallic bright. Only massive tools should be preheated to 100 - 150° C. On low-alloy steels at least 3 - 4 layers should be applied. Keep heat input as low as possible.

Current type DC (+)

Welding positions PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350*	3,2 x 350*	4,0 x 450*
Amperage	A	70 – 100	100 – 140	120 – 170

* available on request

Standards :

DIN 8555	:	E 3-UM-50-CTZ
EN 14700	:	E Z Fe6

UTP 750

Rutile coated stick electrode for heat resistant surfacings with high tempering resistance, stainless

Application field

UTP 750 is suited for heat resistant buildups on hot working steels particularly exposed to metallic gliding wear and elevated thermal shock stress, such as diecast moulds for brass, aluminium and magnesium, hot-pressed mandrils, trimming tools, hot-shear blades, extruding tools, forging dies and hot flow pressing tools for steel. Due to the excellent metal-to-metal gliding properties, also suitable for buildups on guiding and gliding surfaces. Tempering resistant up to 650° C, scale-resisting up to 900° C, nitrable, stainless.

Welding properties

UTP 750 has excellent welding properties, a homogeneous, finely rippled seam and a self-lifting slag, good bead appearance.

Hardness of the pure weld deposit:

untreated	48 - 52 HRC
soft annealed 850 - 900° C	approx. 35 HRC
hardened 1000 - 1150° C /air	48 - 52 HRC
tempered 700° C	approx. 40 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Co	Fe
0,2	0,5	0,2	11,5	4,5	1,0	12,5	balance

Welding instruction

Clean welding area to metallic bright. Preheating temperature depends on the welding application (150 - 400° C). On low-alloy steels at least 3 - 4 layers should be applied.

Current type DC (+) / AC

Welding positions PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250*	3,2 x 350*	4,0 x 350*
Amperage	A	60 – 90	80 – 120	120 – 160

* available on request

UTP 690

Standards :

DIN 8555	:	E 4-UM-60-ST
EN 14700	:	E Fe4
AWS A5.13	:	E Fe 5-B (mod.)

Rutile coated high efficiency stick electrode for high speed steels for high wear resistant surfacings on cold and hot working steels

Application field

UTP 690 is used for repair and production of cutting tools, particularly for building-up cutting edges and working surfaces. The deposit is highly resistant to friction, compression and impact, also at elevated temperatures up to 550° C. The production of new tools by welding on non-alloy and low-alloy base metals is also possible (cladding of cutting edges).

Welding properties

UTP 690 has excellent welding properties, a smooth, finely rippled bead appearance due to the spray arc and very easy slag removal. The weld deposit is equivalent to a high speed steel with increased Mo-content.

Hardness of the pure weld metal :	approx. 62 HRC
soft annealed 800 - 840° C	approx. 25 HRC
hardened 1180 - 1240° C and tempered 2 x 550° C	approx. 64 - 66 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	W	Fe
0,9	0,8	0,5	4,5	8,0	1,2	2,0	balance

Welding instruction

Clean the welding area and preheat high-speed steel tools to 400 - 600° C, maintain this temperature during the whole welding process, followed by slow cooling. Machining by grinding is possible. Hold stick electrode vertically and with a short arc. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 450
Amperage	A	70 – 90	90 – 110	110 – 130

UTP 665

High Cr-alloyed special stick electrode for repairing tool steels and 5- and 12 % Cr-cutting tools, quick repair

Standards :

DIN 8555	:	E 5-UM-350-RS
EN 14700	:	E Fe7

Application field

UTP 665 is especially suitable for repairs on tool steels, particularly cutting tools made of 12-% chromium cutting steels, such as 1.2601, 1.2080, 1.2436, 1.2376, 1.2379, on broken or fatigued areas. Modification of moulds can also be done. The mentioned tool steels are particularly used in the car industry as stamping - and pressing tools.

Welding properties

UTP 665 has excellent welding properties. Smooth, stable arc, spatterfree and fine rippled seams without undercutting. Very good slag removal. The weld deposit is equivalent to high alloyed chromium steel, crack - and pore resistant, stainless.

Hardness of the pure weld metal :	35 - 40 HRC
on Cr cutting steel 1 - 2 layers	55 - 57 HRC

Weld metal analysis in %

C	Mn	Si	Cr	Fe
0,06	0,8	0,6	17,0	balance

Welding instruction

Pre-heat 12-% chromium cutting steels to 400 - 450° C in hardened as well as in soft annealed conditions. Soft-annealing and throughout preheating is recommended at massive tools and prolonged working. Generally a local preheating and peening of the welding bead will be enough for smaller repair works. Slow cooling in oven or under a cover.

Current type DC (+) / AC

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250*	3,2 x 350*	4,0 x 350*
Amperage	A	50 – 70	70 – 100	100 – 130

* available on request

UTP 67 S

Basic coated hardfacing stick electrode for cold working tools, core wire alloyed

Standards :

DIN 8555	:	E 6-UM-60-S
EN 14700	:	E Fe8

Application field

UTP 67 S is universally applicable on workpieces of steel, cast steel or hard Mn-steel subject to a combination of impact, compression and abrasive wear, such as radial cams, drums, bearing surfaces, wheel rims, rollers, tires, rails, switch blades, gearwheels, plough blades, stamping mills, crusher jaws, beaters, excavator parts, rope pulleys , baffle plates, block machines etc. A specialized area in which **UTP 67 S** has given excellent results is the building-up of cutting edges of cold cutting tools (Cr cutting steels) in the car industry.

Welding properties

Smooth arc, regular and smooth seam surface, especially when building-up edges. Easy slag removal. Slag removal is not required on multi-pass applications.

Hardness of the pure weld deposit		56 - 58 HRC
after soft-annealing	820° C/oven	approx. 25 HRC
after hardening	850° C/oil	52 - 54 HRC
	1000° C/oil	60 - 62 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Fe
0,5	3,0	0,5	9,0	balance

Welding instruction

Hold stick electrode as vertically as possible and keep a short arc. Preheating is only necessary for surfacing higher-carbon materials, for tool steels a temperature of 300 - 400° C is required. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (–) / DC (+) / AC

Welding positions PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350	5,0 x 450
Amperage	A	50 – 70	70 – 100	110 – 140	140 – 170

UTP 700

Standards :

DIN 8555	:	E 23-UM-200-CKTZ
EN 14700	:	E Ni2
AWS A5.11	:	E NiCrMo-5

Rutile coated stick electrode on NiCrMoW base for high heat resistant hardfacings on hot working tools, core wire alloyed

Application field

UTP 700 is suited for wear resisting cladding on hot working tools subject to thermal load, such as forging dies, hot piercing plugs, hot cutting knives and press rams. For high-corrosion resistant claddings, such as e.g. flat faces of armatures.

Welding properties

UTP 700 has excellent welding properties, stable spray arc with finely rippled seam surface and very easy slag removal. The weld deposit is heat resistant and highly corrosion resistant, scale resistant and workhardening. Machinable with cutting tools.

Hardness of the pure weld metal: approx. 280 HB

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	W	Fe
0,15	1,0	1,0	17,0	18,0	balance	4,5	5,5

Welding instruction

Clean welding area to metallic bright. Preheating tools to 350 – 400° C, temperature should be maintained. Slow cooling. Hold stick electrode as vertically as possible and with a short arc. Select lowest possible amperage, in order to prevent mixing with the base metal. Re-dry electrodes that have got damp for 2 h / 300° C.

Current type DC (+) / AC

Welding positions PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250*	3,2 x 300	4,0 x 350
Amperage	A	45 – 90	70 – 110	100 – 150

* available on request

UTP 7000

Rutile basic coated high efficiency stick electrode on NiCrMoW base for heat resistant hardfacings on hot working tools

Standards :

DIN 8555	:	E 23-UM-200-CKTZ
EN 14700	:	E Z Ni 2

Application field

UTP 7000 is particularly suited for wear resisting cladding on working surfaces of hot working tools subject to thermal load, such as forging jaws, forging dies, forging saddles, hot piercing plugs, hot cutting tools, hot trimming tools, roll mandrils, hot moulding plugs.

Welding properties

UTP 7000 has excellent welding properties, a regular and finely rippled bead appearance due to spray arc. Very easy slag removal. The weld deposit is highly corrosion resistant, scale resistant and workhardening. Machinable with cutting tools.

Hardness of the pure weld deposit :	approx. 220 HB
after workhardening	approx. 450 HB

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	W	Co	Fe
0,04	0,3	0,9	16,0	17,0	balance	5,0	1,5	5,0

Welding instruction

Clean welding area, preheat tools to 350 – 400° C and maintain this temperature during the whole welding process. Slow cooling in an oven. Hold stick electrode vertically and with a short arc. Select lowest possible amperage, in order to reduce dilution with the base metal. Cracks in the tool have to be gouged out completely and welded with UTP 7015 HL or UTP 068 HH. Final layers have to be welded with **UTP 7000**. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions


PA


PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350	5,0 x 450
Amperage	A	80 – 100	100 – 120	130 – 160	180 – 220

* available on request

UTP 7008

Standards :

DIN 8555	:	E 23-UM-250-CKTZ
EN 14700	:	E Z Ni2

Rutile basic coated high efficiency stick electrode on NiCrMoW base for heat resistant hardfacings on hot working tools

Application field

UTP 7008 is particularly suited for wear resisting cladding on hot working tools subject to thermal load, such as forging saddles, forging jaws, forging dies, hot piercing plugs, hot cutting knives, hot trimming tools and hot press rams.

Welding properties

UTP 7008 has excellent welding properties, a homogeneous, finely rippled bead appearance due to the spray arc, very easy slag removal. The weld deposit is highly corrosion resistant, scale resistant and work-hardening. Machinable with cutting tools.

Hardness of the pure weld deposit :	approx. 260 HB
workhardened	approx. 500 HB

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	V	W	Fe
0,04	0,5	1,3	16,0	16,0	balance	1,0	7,0	6,0

Welding instruction

Clean welding area. Preheat tools to 350 - 400° C, temperature should be maintained during the welding process. Slow cooling in oven. Hold stick electrode as vertically as possible and with a short arc. Select lowest possible amperage, in order to reduce dilution with the base metal. Re-dry stick electrodes that have got damp for 2 h / 300° C.

Current type DC (+) / AC

Welding positions

PA **PB**

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350
Amperage	A	60 – 90	80 – 120	110 – 150

UTP 5520 Co

Basic coated stick electrode on NiCrCoMoTiAl base for hardfacings on hot working tools with extreme thermal load, age-hardenable

Standards :

DIN 8555	:	E 23-UM-250-CKPTZ
EN 14700	:	E Ni2

Application field

UTP 5520 Co is particularly suited for wear resisting cladding on working surfaces of hot working tools subject to thermal load, such as e.g. forging saddles, forging jaws, forging dies, hot piercing plugs, hot press rams, hot cutting knives and trimming tools.

Welding properties

UTP 5520 Co has good welding properties, a good bath control, a homogeneous bead appearance and easily slag removal. The weld deposit is heat resistant, scale resistant, resistant against thermal shock and wear resistant against compression, impact and abrasion at elevated temperatures.

Hardness of the pure weld metal

untreated	approx. 250 HB
workhardened	approx. 450 HB
after age-hardening	approx. 380 HB

Weld metal analysis in %

C	Cr	Mi	Mo	Co	Ti	Al	W
0,05	19,0	balance	6,0	12,0	3,0	1,0	1,0

Welding instruction

Clean welding area thoroughly. Preheat tools to 350 – 400° C, temperature should be maintained during the welding process. Slow cooling in oven. Hold stick electrode as vertically as possible and with a short arc. Weld buffer layers with UTP 7015 Mo and final layers with UTP 700 / UTP 7000, if necessary. Select lowest possible amperage, in order to reduce dilution with the base metal. Re-dry stick electrodes that have got damp for 2 h / 300° C.

Current type DC (+)

Welding positions

PA PC

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350*	4,0 x 350*	5,0 x 450*
Amperage	A	70 – 110	110 – 140	140 – 190

* available on request

UTP A 73 G 2

Copper coated wire for highly wear resistant build-ups on hot and cold working tools

Standards :

Material-No..	:	Special alloy
DIN 8555	:	W/MSG 3-GZ-55-ST
EN 14700	:	S Z Fe8

Application field

UTP A 73 G 2 is used for highly wear resistant buildups on machine parts and tools, subject to heavy abrasion and compression combined with moderate impact at elevated temperatures, such as forging tools, roll mandrils, hot trimming knives, mangle and axial rolls as well as for the production of high-quality working surfaces by cladding non- or low-alloy base material.

Properties of the weld metal

Machinable by grinding or with tungstene carbide tools

Hardness of the pure weld deposit :

untreated	53 - 58 HRC
soft-annealed 820° C	approx. 20 HB
hardened 1050° C/oil	approx. 58 HRC
tempered 600° C	approx. 53 HRC
1 layer on non-alloyed steel	approx. 45 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ti	Fe
0,35	0,3	1,2	7,0	2,0	0,3	balance

Welding instruction

Clean welding area to metallic bright. Cracks in the base material have to be gouged out completely. Preheating temperature of 400° C on tools should be maintained. Stress relief, if necessary, at 550° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 21	C 1	EN ISO 544	EN ISO 544
0,8 *	DC (+)		x	x	x	x	x	
1,0	DC (+)		x	x	x	x	x	
1,2	DC (+)		x	x	x	x	x	
1,6	DC (+)		x	x	x	x	x	
1,6	DC (-)	x						x
2,0	DC (-)	x						x
2,4	DC (-)	x						x
3,2	DC (-)	x						x
4,0 *	DC (-)	x						x

* available on request

UTP A 73 G 3

Copper coated wire for repair and production of high quality hot working tools

Standards :

Material-No.	:	Special alloy
DIN 8555	:	W/MSG 3-GZ-45-T
EN 14700	:	S Z Fe3

Application field

UTP A 73 G 3 is, due to the excellent hot wear resistance and toughness, used for highly stressed hot working tools, which are simultaneously subject to high mechanical, thermal and abrasive loads, such as e.g. forging dies for hammers and presses, forging dies, Al-die cast moulds, plastic moulds, hot-shear blades and for filling engravings by using cheaper base metals.

Properties of the weld metal

Machining is possible with tungstene carbide tools.

Hardness of the pure weld deposit:

untreated	42 - 46 HRC
soft-annealed 780° C	approx. 230 HB
hardened 1030° C/oil	approx. 48 HRC
tempered 600° C	approx. 45 HRC
1 layer on non-alloy steel	approx. 35 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ti	Fe
0,25	0,5	0,7	5,0	4,0	0,6	balance

Welding instruction

Machine welding area to metallic bright. Cracks in the base material have to be gouged out completely. Preheating temperature of 400° C on tools should be maintained. Stress relief, if necessary, at 550° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 21	C 1	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	x	x	x	
1,0	DC (+)		x	x	x	x	x	
1,2	DC (-)	x						x
1,6	DC (+)		x	x	x	x	x	
1,6	DC (-)	x						x
2,0	DC (-)	x						x
2,4	DC (-)	x						x

Approval

TÜV (No. 06741)

UTP A 73 G 4

Standards :

DIN 8555	:	W/MSG 3-GZ-40-T
EN 14700	:	S Z Fe3

Copper coated wire for tough and wear resistant surfacings on hot working tools

Application field

UTP A 73 G 4 is, due to its excellent hot wear resistance and toughness, used for buildups on hot working tools and structural parts subject to impact, compression and abrasion at elevated temperatures, such as forging dies, die cast moulds, plastic moulds, guides, recipients, continuous casting rolls. Hot wear resistant claddings can be made on non-alloy or low-alloy base materials, such as e. g. boiler tubes in coal burning power stations. The deposit is machinable with cutting tools.

Welding properties and special properties of the weld metal

UTP A 73 G4 has very good welding properties, good weld buildup and an even flow of the weld pool.

Hardness of the pure weld deposit :

untreated	38 - 42 HRC
soft-annealed 800° C	approx. 230 HB
hardened 1030° C/oil	approx. 48 HRC
tempered 550° C	approx. 42 HRC
1 layer on non-alloy steel	approx. 30 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Fe
0,1	0,4	0,6	6,5	3,3	balance

Welding instruction

Machine welding area to metallic bright. Cracks in the base material have to be gouged out completely. Preheating temperature of 400° C on tools should be maintained. Stress relief, if necessary, at 550° C. Preheating on non- and low-alloy materials is generally not required.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 21	C 1	EN ISO 544	EN ISO 544
1,0	DC (+)		x	x	x	x	x	
1,2	DC (+)		x	x	x	x	x	
1,2 *	DC (-)	x						x
1,6	DC (+)		x	x	x	x	x	
1,6	DC (-)	x						x
2,0	DC (-)	x						x
2,4	DC (-)	x						x
3,2	DC (-)	x						x

* available on request

Approval

TÜV (No. 06742)

Standards :

Material-No.	:	1.2567
DIN 8555	:	W/MSG 3-45-T
EN 14700	:	S Z Fe3

UTP A 694

Copper coated wire for repair and production of hot working tools

Application field

UTP A 694 is used for hot wear resistant buildups on highly stressed moulds und cuttings made of hot working steels, such as die cast moulds, plastic moulds, forging dies, hot trimming tools as well as for the production of high-quality working surfaces by cladding non-alloy or low-alloy base materials.

Welding properties and special properties of the weld metal

UTP A 694 is good weldable with a quiet arc, has good temperature change resistance at low and high temperatures. With carbide tools chip removing machining is possible.

Hardness of the pure weld deposit

untreated	:	approx. 45 HRC
soft annealed 780° C	:	approx. 230 HB
hardened 1080° C / oil	:	approx. 52 HRC
tempered 600° C	:	approx. 48 HRC
1 layer on non-alloy steel	:	approx. 40 HRC

Weld metal analysis in %

C	Si	Mn	Cr	V	W	Fe
0,3	0,2	0,3	2,4	0,6	4,3	balance

Welding instruction

Clean welding area to metallic bright. Cracks in the base material have to be gouged out completely. Preheating temperature of 400° C on tools should be maintained. Stress relief, if necessary, at 550° C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 21	C 1	EN ISO 544	EN ISO 544
1,0 *	DC (+)		x	x	x	x	x	
1,2 *	DC (+)		x	x	x	x	x	
1,6 *	DC (+)		x	x	x	x	x	
1,6 *	DC (-)	x						x
2,0 *	DC (-)	x						x
2,4 *	DC (-)	x						x

* available on request

Standards :

Material-No.	:	1.2606
DIN 8555	:	W/MSG 3-60-T
EN 14700	:	S Z Fe3

UTP A 673

Wire for wear resistant surfacings on cold and hot working tools

Application field

UTP A 673 is used for the repair and production of hot working tools, such as die cast moulds, forging dies, hot cutting knives, hot-shear blades, axial rolls, roll mandrils, upset plates as well as for the production of working surfaces on non-alloy and low-alloy base materials.

Properties of the weld metal

Machining is possible with tungstene carbide tools.

Hardness of the pure weld deposit:

untreated	53 - 58 HRC
soft annealed 820° C	approx. 230 HB
hardened 820° C / oil	approx. 58 HRC
tempered 600° C	approx. 53 HRC
1 layer on non-alloy steel	approx. 45HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	W	Fe
0,35	1,0	0,4	5,0	1,5	0,3	1,3	balance

Welding instruction

Clean welding area to metallic bright. Cracks in the base material have to be gouged out completely. Preheating temperature of 400° C on tools should be maintained. Stress relief, if necessary, at 550° C. Slow cooling.

Welding procedures and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 21	C 1	EN ISO 544	EN ISO 544
1,2 *	DC (+)		x	x	x	x	x	
1,6 *	DC (+)		x	x	x	x	x	
1,6 *	DC (-)	x						x
2,4 *	DC (-)	x						x
3,2 *	DC (-)	x						x

* available on request

UTP A 702

High alloyed, age-hardenable wire for high wear resistant surfacings on cold and hot working tools

Standards :

Material-No.	:	1.6356
DIN 8555	:	W/MSG 3-GZ-350-T
EN 14700	:	S Z Fe5

Application field

UTP A 702 is used for repair, preventive maintenance and production of highly stessed cold and hot working tools, such as punching dies, cold and hot cutting knives, Al-die cast moulds, cold forging dies, drawing-, stamping- and chamfering tools. The weld deposit is, in as-welded condition, machinable, and the subsequent artificial aging optimises the resistance to hot wear and alternating temperatures.

Properties of the weld metal

The weld deposit of **UTP A 702** has high strength and good toughness.

Hardness of the pure weld deposit

untreated	:	32 - 35 HRC
hot-aged 3 - 4 h / 480° C	:	50 - 54 HRC

Weld metal analysis in %

C	Mo	Ni	Co	Ti	Al	Fe
0,02	4,0	18,0	12,0	1,6	0,1	balance

Welding instruction

Machine welding area to metallic bright. Preheat massive pieces to 100 - 150° C, on low-alloyed base metal apply min. 3 - 4 layer. Weld with lowest possible heat input.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 20	M 21	EN ISO 544	EN ISO 544
1,0 *	DC (+)		x	x	x	x	x	
1,2	DC (+)		x	x	x	x	x	
1,6	DC (-)	x						x
2,0	DC (-)	x						x
2,4	DC (-)	x						x

* available on request

UTP A 696

Wire with properties of high-speed steel

Standards :

Material-No.	:	1.3348
DIN 8555	:	W/MSG 4-GZ-60-S
EN 14700	:	S Z Fe4
AWS A5.13	:	R Fe 5-A

Application field

UTP A 696 is used for the production and repair of tools made of Mo alloyed high-speed steel, such as tools and planing tools, formcutters, broaching tools, reamers, twist drills etc. **UTP A 696** is suitable for the following base materials:

Material-No.	DIN 17007
1.3316	S 9-1-2
1.3333	S 3-3-2
1.3344	S 6-5-3
1.3346	S 2-9-1

A further application field is the production of wear protection coating on non-alloyed or low-alloyed base material.

Special properties of the weld deposit

The weld deposit of **UTP A 696** is equivalent to a high-speed steel with high cutting performance. After cooling the weld deposit is only machinable by grinding. Machining with tungstene carbide tools is only possible after soft-annealing.

Hardness of the pure weld deposit

untreated	:	60 - 64 HRC
soft annealed 800° C	:	approx. 250 HB
hardened 1230° C / oil + tempered 540° C 2 x	:	62 - 66 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	W	Fe
1,0	0,2	0,2	4,0	8,5	2,0	1,8	balance

Welding instruction

Preheating to 350 - 650° C, depending on the dimension of the workpiece. This temperature should be maintained during the whole welding process. This stick electrode is weldable with very low amperage settings and subsequent slow cooling to 100° C in an oven or under asbestos.

Heat treatment

hardened	:	1190 - 1240° C, quenchant: oil, warm bath : 450 - 500° C
tempered	:	450 - 500° C, 2 x 1 h, cooling in still air
soft annealed	:	800 - 850° C, 2 - 4 h

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 21	C 1	EN ISO 544	EN ISO 544
1,2 *	DC (+)		x	x	x	x	x	
1,6	DC (-)	x						x

* available on request

UTP A 661

Wire for wear and corrosion resistant surfacings

Standards :

Material-No.	:	1.4115
DIN 8555	:	W/MSG 5-GZ-400-RZ
EN 14700	:	S Fe7

Application field

UTP A 661 is used for wear resistant claddings on construction parts made of non-alloyed or low-alloyed steels and cast steels, hot working steels, high alloyed steels and cast steels, particularly for one-layer-welding. Special application fields are claddings on machine parts made of high tensile steel for hardening and tempering, hot working tools, continuous casting rolls and dummy blocks, membrane sides in coal burning power stations and parts resistant against high temperature up to 900° C.

Special properties of the weld deposit

The martensitic weld deposit is wear resistant also at elevated temperatures. It is resistant against water, seawater, steam and diluted organic acids. High thermal strength.

Hardness of the pure weld deposit

untreated	:	approx. 40 HRC
one-layer-welding on C 45	:	approx. 55 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Fe
0,22	0,7	0,7	17,5	1,2	balance

Welding instruction

UTP A 661 Welding with MIG pulsed current provides a low-in-spatter deposit of perfect appearance. The preheating must be matched to the parent metal and the welding scope, generally between 150° C - 400° C. Slow cooling in still air or under a cover resp. in an oven. Tempering, if necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 21	C 1	EN ISO 544	EN ISO 544
1,0 *	DC (+)		x	x	x	x	x	
1,2	DC (+)		x	x	x	x	x	
1,6	DC (+)		x	x	x	x	x	
2,4	DC (-)	x						x

* available on request

Approvals

TÜV (No. 06743)

UTP A 5519 Co

Wire on NiCrCoMoTiAl base for surfacings on hot working tools with extreme thermal load, age-hardenable

Standards :

DIN 8555	:	MSG 23-GZ-250-CKTZ
EN 14700	:	S Z Ni2

Application field

UTP A 5519 Co is used for claddings on forging tools subject to extreme thermal shock, compression, impact and abrasion, such as forging saddles, exponential areas on dies, hot-shear blades and impact extrusion mandrils.

Special properties of the weld metal

Due to the special composition of alloys, the deposit is heat resistant, resistant against oxidation, scale and thermal shock. Artificial aging enhances the hardness of the weld deposit. Machining is possible with tungstene carbide tools. Workhardened, age hardeable.

Hardness of the pure weld deposit

untreated	:	approx. 250 HB
after age-hardening 4 h / 850° C + 16 h / 760° C	:	approx. 380 HB
after workhardening	:	approx. 400 HB

Weld metal analysis in %

C	Cr	Ni	Mo	Co	Ti	Al	Fe
0,03	20,0	balance	4,5	14,0	3,0	1,5	< 2,0

Welding instruction

Clean welding area to metallic bright. Preheating temperature of 350 - 400° C should be maintained during the whole welding operation, subsequent slow cooling. Select lowest possible amperage, in order to prevent mixing with the base metal. Regarding thick-layer-claddings on forging saddles the buildup layers have to be welded with UTP A 6222 Mo, final layers with UTP A 5519 Co. Hammering for the purpose of stress reduction. Grinding with strong oxide formation. Stress-relief annealing at 550° C, if necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		R 1	Z-ArHeHC-30/2/0,05	EN ISO 544
1,2 *	DC (+)	x	x	x

* available on request

SK D12-G

MAG flux cored wire for high wear resistant surfacings on hot and cold working tools

Standards :

DIN 8555	:	MF 3-GF-55-ST
EN 14700	:	T Z Fe3

Application field

The metal powder flux cored wire **SK D12-G** is suitable for claddings of highly stressed hot working tools subject to strong abrasion at medium thermal load, such as forging dies, female dies, cutting tools, rams, axial drums, roll mandrills. Heat resistant claddings can be welded on non- and low-alloyed base materials.

Properties of the weld metal

The weld deposit is machinable by tungsten carbide tools and heat resistant up to 550° C.

Hardness of the pure weld deposit: 55 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Fe	Ti
0,35	0,4	1,2	7,5	1,7	balance	0,3

Welding instruction

Clean welding area to metallic bright. Cracks in the base material have to be gouged out completely. Preheating temperature of 400° C on tools should be maintained. Stress relief, if necessary, at 550° C. Preheating temperature of 100° C on non- and low-alloy materials is generally sufficient. Use slightly dragging or pushing welding technique with approx. 20 mm stick out.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		M 13	EN ISO 544
1,2	DC (+)	x	x
1,6	DC (+)	x	x

Standards :

DIN 8555 : MF 3-GF-45-T
EN 14700 : T Fe3

SK D40-G

MAG flux cored wire for production and repair of high quality hot working tools

Application field

The metal powder flux cored wire **SK D40-G** is, due to ist heat resistance and toughness, used for high stressed hot working tools simultaneously subject to high mechanical, thermal and abrasive loads, such as forging dies for hammers and presses, Al-die cast moulds, hot shear blades and filler welding of engraving on low-alloyed base materials.

Properties of the weld metal

Machining by hard metal tools, e. g. HSC and washing.

Hardness of the pure weld deposit 42 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	W	Ti	Fe
0,21	0,5	0,6	5,4	2,5	1,0	2,2	0,10	balance

Welding instruction

Clean welding area to metallic bright. Cracks in the base material have to be gouged out completely. Pre-heating temperature of 400° C on tools should be maintained. Stress relief, if necessary, at 550° C - 580° C. Preheating temperature of 100° C on non- and low-alloyed materials is generally sufficient. Use slightly dragging or pushing welding technique with approx. 20 mm stick out.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 13	M 21	EN ISO 544
1,2 *	DC (+)	x	x	x
1,6 *	DC (+)	x	x	x
2,0 *	DC (+)	x	x	x

* available on request

SK D8-G

MAG flux cored wire for tough, heat resistant surfacings on hot working tools

Standards :

DIN 8555	:	MF 3-GF-40-T
EN 14700	:	T Z Fe3

Application field

The metal powder flux cored wire **SK D8-G** is, due to its heat resistance and toughness, suitable for claddings on high stressed hot working tools subject to compression, impact and abrasion at elevated temperatures, such as forging dies, female dies, stamps, die cast moulds, guidings, rollers. Heat resistant claddings can be welded on non- and low-alloyed base materials.

Properties of the weld metal

The weld deposit is machinable by tungsten carbide tools and heat resistant up to 550° C.

Hardness of the pure weld metal

untreated (+ 20° C)	40 HRC
tempered at 550° C / 2 h	43 HRC
soft-annealed 800° C / 4 h	25 HRC

Weld metal analysis in %

C	Si	Mn	Cr	W	V	Fe
0,1	0,5	1,1	2,4	3,8	0,6	balance

Welding instruction

Clean welding area to metallic bright. Cracks in the base material have to be gouged out completely. Preheating temperature of 400° C on tools should be maintained. Stress relief, if necessary, at 550° C. Preheating temperature of 100° C on non- and low-alloyed materials is generally sufficient. Use slightly dragging or pushing welding technique with approx. 20 mm stick out.

Welding positions

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		M 13	EN ISO 544
1,2	DC (+)	x	x
1,6	DC (+)	x	x
2,4 *	DC (+)	x	x

* available on request

SK D15-G

Standards :
DIN 8555 : MF 8-GF-55-ST
EN 14700 : T Fe3

MAG flux cored wire for heat resistant surfacings on hot working tools

Application field

The metal powder flux cored wire **SK D15-G** is used for high stressed hot working tools, which are simultaneously subject to abrasion, compression and impact. Main application fields are axial rolls, roll mandrills, hot shear blades. The elevated temperature hardness (up to 550° C) and the abrasion resistance are reached by addition of tungsten, molybdenum, chromium, cobalt and vanadium. **SK D15-G** is suitable for the production and for the repair of high quality hot working tools.

Properties of the weld metal

The weld deposit of **SK D15-G** has a martensitic structure and may be machined by grinding.

Hardness of the pure weld deposit 60 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	W	Co	Fe
0,4	0,4	0,6	1,4	0,5	0	9,0	3,0	balance

Welding instruction

Clean welding area to metallic bright. Preheating temperature of 400° C on tools should be maintained. Slow cooling in an oven or under a cover, tempering at 550° C, if necessary. Use neutral or slight pushing welding technique. Pulsed arc improves weldability.

Welding positions

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		M 13	EN ISO 544
1,2 *	DC (+)	x	x
1,6	DC (+)	x	x

* available on request

SK D25-G

Standards :
DIN 8555 : MF 3-GF-350-T
EN 14700 : T Z Fe5

MAG flux cored wire for heat resistant surfacings, age-hardenable

Application field

The metal powder flux cored wire **SK D25-G** is suitable for repair, preventive maintenance and production of highly stressed cold and hot working tools, such as cutting tools, die cast moulds, female dies, stamps, forging tools. The weld deposit is, in as-welded condition, easily machinable and the subsequent age hardening opitmises the resistance to wear.

Properties of the weld metal

The weld deposit of **SK D25-G** has high strength and good toughness.

Hardness of the pure weld deposit 36 HRC

Weld metal analysis in %

C	Si	Mn	Mo	Ni	Co	Ti	Fe
0,035	0,1	0,1	4,0	17,5	8,0	0,4	balance

Welding instruction

Clean welding area to metallic bright. Preheat larger workpieces to 150° C for welding with low heat input. Avoid heat accumulation. Use slight dragging or pushing welding technique with approx. 20 mm stick out.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		I 3	EN ISO 544
1,2 *	DC (+)	x	x

* available on request

Standards :

DIN 8555 : MF 4-GF-60-ST
EN 14700 : T Z Fe8

SK D20-G

MAG flux cored wire with the properties of high-speed steel

Application field

The metal powder flux cored wire **SK D20-G** is suitable for repair of tools made of high speed steel and for the production of tools on a low-alloyed base steel; cutting edges of tools, shear blades, chamfering - and bending tools. Also suitable for build-up on working surfaces as a general wear protection.

Properties of the weld metal

The weld deposit of **SK D20-G** has finely distributed carbides in a martensitic matrix. The properties are such as the ones of high-speed steel.

Hardness of the pure weld deposit 60 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	V	W	Fe
1,0	0,5	0,5	4,0	8,2	2,0	1,8	balance

Welding instruction

Clean welding area to metallic bright. Cracks in the base material have to be gouged out completely. Preheating temperature of 500 - 550° C on HSS-tools should be maintained. Slow cooling, tempering at 550° C, if necessary. Use slight dragging or pushing welding technique with 20 mm stickout.

Welding positions

Welding procedures and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 13	I 1	EN ISO 544
1,2	DC (+)	x	x	x
1,6	DC (+)	x	x	x

Standards :
DIN 8555 : MF 5-GF-45-CTZ
EN 14700 : T Z Fe3

SK D35-G

MAG flux cored wire for heat and corrosion resistant surfacings

Application field

The metal powder flux cored wire **SK D35-G** is suitable for wear resistant buildups on hot working tools subject to metallic gliding wear and elevated temperature load, such as diecast tools for brass, aluminium and magnesium, hot-pressed mandrils, trimming tools, hot-shear blades, extruding tools, forging dies and hot flow pressing tools for steel. Due to the high alloy components, surfacings on structural parts are also possible, where wear - and corrosion resistance are required.

Properties of the weld metal

The weld deposit of **SK D35-G** is crack resistant and machinable with tungsten carbide tools.

Hardness of the pure weld metal 50 HRC

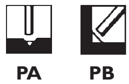
Weld metal analysis in %

C	Si	Mn	Cr	Mo	Co	Fe
0,16	0,8	0,2	13,0	2,4	14,0	balance

Welding instruction

Clean welding area to metallic bright. Preheat tools to 400° C. Use slight dragging or pushing welding technique in spray - or short arc with approx. 20 mm stickout.

Welding positions



Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 13	I 1	EN ISO 544
1,2	DC (+)	x	x	x
1,6	DC (+)	x	x	x

SK TOOL ALLOY C-G

MAG flux cored wire on NiCrMoW base for heat resistant surfacings on hot working tools

Standards :
DIN 8555 : MF 23-GF-200-CKTZ
EN 14700 : T Ni2

Application field
The metal powder flux cored wire **SK tool alloy C-G** is used for heat - and high corrosion resistant claddings subject to compression, impact, abrasion, corrosion at elevated temperatues up to 1100° C, such as die engraving, forge saddles, trimming tools, mandrel plugs, sealing faces on fittings and pumps.

Properties of the weld metal
Good resistance against thermal shock. Easily machinable.

Hardness of the pure weld deposit 190 HB

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	W	Fe
0,05	0,3	1,0	16,0	balance	16,0	4,0	7,0

Welding instruction
Clean welding area to metallic bright. Preheating temperature should be maintained and has to be adjusted to the base material. Slow cooling down. Welding with pushing technique, possibly with pulsed arc and approx. 20 mm wire stickout.

Welding positions PA

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability	
					Spools	Coils
		M13	M 21	I 1	EN ISO 544	
1,2 *	DC (+)	x	x	x	x	
1,6	DC (+)	x	x	x	x	
2,0 *	DC (+)	x	x	x	x	
2,4 *	DC (+)	x	x	x	x	
2,8 *	DC (+)	x	x	x		x

* available on request

SK U520-G

MAG flux cored wire on NiCrCoMoTiAl base for surfacings on hot working tools with extreme thermal loads, age-hardenable

Standards :

DIN 8555 : MF 23-GF-200-CKTZ
EN 14700 : T Ni2

Application field

The metal powder flux cored wire **SK U520-G** is used for extreme thermal stressed hot working tools, which are subject to compression, impact, abrasion and corrosion at elevated temperatures up to 1150°C, such as forging saddles, forging jaws, die engravings, trimming tools, mandrel plugs, hot press rams.

Properties of the weld metal

The weld deposit of **SK U520-G** is crack resistant, warm-hardenable and machinable with tungsten carbide tools.

Hardness of the pure weld metal 205 HB

Weld metal analysis in %

C	Mn	Si	Cr	Ni	Mo	W	Fe	Co	Ti	Al
0,02	0,2	0,2	19,5	balance	4,0	0,9	2,5	11,0	2,8	1,8

Welding instruction

Clean welding area to metallic bright. Preheating temperature should be maintained and has to be adjusted to the base material. Slow cooling down. Welding with pushing technique, possibly with pulsed arc and approx. 20 mm wire stickout.

Welding positions

PA

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Coils
		IM13	I 1	EN ISO 544	
1,6 *	DC (+)	x	x	x	
2,4 *	DC (+)	x	x	x	x

* available on request

Standards :
DIN 8555 : E 20-UM-250 CKTZ
DIN 14700 : EZ CoI

UTP 7010

Basic coated stick electrode for heat resistant and thermal shock resistant claddings, core wire alloyed

Application field

UTP 7010 is suited for the repair and new production of hot working tools subject to highest heat, thermal shock, compression, impact and abrasion. Main applications are hot dies, hot pressing blades, hot trimming tools, roll mandrils. Special applications are between-layer buildups on workpieces in nuclear reactor engineering.

Welding properties and special properties of the weld deposit

UTP 7010 has excellent welding properties, good weld pool control, regular bead appearance and easy slag removal. The weld deposit is highly corrosion and scaling resistant, has a high workhardenability and is heat resistant up to 900° C. Machinable with cutting tools.

Hardness of the pure weld deposit:

untreated : approx. 230 HB
workhardened : approx. 450 HB

Weld metal analysis in %

C	Si	Mn	Cr	Ni	W	Co	Fe
0,1	0,5	1,2	21,0	11,0	14,0	balance	2,0

Welding instruction

Clean welding area, preheat tools to 350 - 400° C and maintain this temperature during the who-le welding process. Slow cooling in an oven. Hold stick electrode vertically and with a short arc. Select lowest possible amperage, in order to reduce dilution with the base metal. Re-dry stick electrodes that have got damp for 2h/300° C.

Current type DC (+) / AC

Welding positions 

PA PB

Availability / Current adjustments

Stick electrodes	Ø mm x L	3,2 x 300*	4,0 x 350*	5,0 x 450*
Amperage	A	70 – 110	110 – 150	120 – 180

* available on request

Approvals

KTA (No. 08117)

UTP CELSIT 721

Rutile coated stick electrode on Cobalt base, core wire alloyed

Standards :

DIN 8555	:	E 20-UM-300-CKTZ
EN 14700	:	E Co1

Application field

UTP CELSIT 721 is used for crack resistant hardfacing on parts subject to a combination of impact, pressure, abrasion, corrosion and high temperatures up to 900° C, such as running and sealing faces on gas, water, steam and acid fittings and pumps, valve seats and cones for combustion engines, working parts in gas and power plants, hot working tools with changing thermal load.

Properties of the weld metal

Excellent gliding characteristics, good polishability and toughness, highly workhardening, nonmagnetic, machinable with cutting tools.

Welding properties

UTP CELSIT 721 has excellent welding properties and a homogenenous, finely rippled seam due to spray arc. Very easy slag removal.

Hardness of the pure weld metal	30 - 32 HRC
workhardened	approx. 45 HRC
Hardness at 600° C	approx. 240 HB

Weld metal analysis in %

C	Cr	Mo	Ni	Co
0,3	31,0	5,0	3,5	balance

Welding instruction

Clean welding area, preheating temperature 150 - 400° C, depending on the size of the workpiece and the base material. Slow cooling. Hold stick electrode vertically and with a short arc and lowest possible amperage. Re-dry stick electrodes that have become damp for 2h/300° C

Current type DC (+) / AC

Welding positions PA

Availability / Current adjustments

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 350
Amperage	A	80 – 120	110 – 140

* available on request

Standards :
DIN 8555 : E 20-UM-300-CKTZ
EN 14700 : E CoI

UTP CELSIT 721 HL

Rutile coated high efficiency stick electrode on Cobalt base

Application field

UTP CELSIT 721 HL is used for crack resistant hardfacing on parts subject to a combination of impact, pressure, abrasion, corrosion and high temperatures up to 900° C, such as running and sealing faces on gas, water, steam and acid fittings and pumps, valve seats and cones for combustion engines, working parts in gas and power plants, hot working tools with changing thermal load.

Properties of the weld metal

Excellent gliding characteristics, good polishability and toughness, highly workhardening, nonmagnetic, machinable with cutting tools.

Welding properties

UTP CELSIT 721 HL has excellent welding properties and a homogenenous, finely rippled seam due to spray arc. Very easy slag removal.

Hardness of the pure weld deposit 30 - 32 HRC
workhardened approx. 45 HRC
Hardness at 600° C approx. 240 HB

Weld metal analysis in %

C	Cr	Mo	Ni	Co
0,3	31,0	5,0	3,5	balance

Welding instruction

Clean welding area, preheating temperature 150 - 400° C, depending on the size of the workpiece and the base material. Slow cooling. Hold stick electrode vertically and with a short arc and lowest possible amperage. Re-dry stick electrodes that have become damp for 2 h / 300° C

Current type DC (+) / DC (–) / AC

Welding positions PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,0 x 300*	2,5 x 350*	3,2 x 450*	4,0 x 450*
Amperage	A	40 – 60	70 – 90	100 – 140	130 – 180

* available on request

UTP CELSIT 706

Rutile coated stick electrode on Cobalt base, core wire alloyed

Standards :

DIN 8555	:	E 20-UM-40-CSTZ
EN 14700	:	E Z Co2
AWS A5.13	:	E CoCr-A

Application field

UTP CELSIT 706 is used for high-grade hardfacing on parts subject to a combination of erosion, corrosion, cavitation, impact, pressure, abrasion and high temperatures up to 900° C, such as tight surfaces on fittings, valve seats and cones for combustion engines, gliding surfaces metal-metal, highly stressed hot working tools without thermal shock, milling mixers and drilling tools.

Properties of the weld metal

Excellent gliding characteristics, easy polishability, good toughness, nonmagnetic. Machining by grinding or with tungsten carbide cutting tools.

Welding properties

UTP CELSIT 706 has excellent welding properties and a homogenenous, finely rippled seam due to spray arc. Very easy slag removal.

Hardness of the pure weld deposit	40 - 42 HRC
Hardness at 500°C	approx. 130 HRC
Hardness at 700°C	approx. 160 HV

Weld metal analysis in %

C	Cr	W	Co
1,1	27,5	4,5	balance

Welding instruction

Clean welding area, preheating temperature 450 – 600° C, very slow cooling. Hold stick electrode vertically and with a short arc and lowest possible amperage. Re-dry stick electrodes that have become damp for 2 h / 300°C.

Current type DC (+) / AC

Welding positions 

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 350	5,0 x 350*
Amperage	A	70 – 110	90 – 130	110 – 150

* available on request

UTP CELSIT 706 HL

Standards :

DIN 8555	:	E 20-UM-40-CSTZ
EN 14700	:	E Z Co2
AWS A5.13	:	E CoCr-A

Rutile coated stick electrode on Cobalt base, core wire alloyed

Application field

UTP CELSIT 706 HL is used for high-grade hardfacings on parts subject to a combination of erosion, corrosion, cavitation, impact, pressure, abrasion and high temperatures up to 900° C, such as tight surfaces on fittings, valve seats and cones for combustion engines, gliding surfaces metal-metal, highly stressed hot working tools without thermal shock, milling mixers and drilling tools.

Properties of the weld metal

Excellent gliding characteristics, easy polishability, good toughness, nonmagnetic. Machining by grinding or with tungsten carbide cutting tools.

Welding properties

UTP CELSIT 706 HL has excellent welding properties and a homogenenous, finely rippled seam due to spray arc. Very easy slag removal.

Hardness of the pure weld deposit		40 - 42 HRC
Hardness	at 500° C	approx. 310 HV_{15}
	at 600° C	approx. 270 HV_{15}
	at 700° C	approx. 250 HV_{15}

Weld metal analysis in %

C	Cr	W	Co
1,1	27,5	4,5	balance

Welding instruction

Clean welding area, preheating temperature 450 – 600° C, very slow cooling. Hold stick electrode vertically and with a short arc and lowest possible amperage. Re-dry stick electrodes that have become damp for 2 h / 300°C.

Current type DC (+) / DC (–) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,0 x 300*	2,5 x 350*	3,2 x 450*	4,0 x 450*
Amperage	A	40 – 60	70 – 90	100 – 130	130 – 160

* available on request

Standards :

DIN 8555	:	E 20-UM-40-CSTZ
EN 14700	:	E Co2
AWS A5.13	:	E CoCr-A

UTP CELSIT V

Basic coated stick electrode on Cobalt base, core wire alloyed

Application field

UTP CELSIT V is used for high-grade hardfacings on parts subject to a combination of impact, pressure, abrasion, erosion, corrosion, cavitation and high temperatures up to 900° C, such as sealing faces on gas, water, steam and acid fittings, valve seats and cones for combustion engines, gliding surfaces metal-metal, highly stressed hot working tools without thermal shock, milling mixers and drilling tools. Excellent gliding characteristics, good polishability, good toughness, non-magnetic.

Properties of the weld metal

Machining by grinding or with tungsten carbide cutting tools.

Hardness of the pure weld deposit	40 - 42 HRC
Hardness at 500° C	approx. 33 HRC
Hardness at 700° C	approx. 160 HV

Weld metal analysis in %

C	Cr	W	Co
1,1	27,5	4,5	balance

Welding instruction

Clean welding area, preheating temperature 450 - 600° C, very slow cooling. Hold electrode vertically and with a short arc and lowest possible amperage. Re-dry electrodes that have become damp for 2 h / 300°C.

Current type DC (+)

Welding positions PA

Availability / Current adjustment

Electrodes	Ø mm x L	3,2 x 350*	4,0 x 350*	5,0 x 350*
Amperage	A	70 – 110	90 – 130	110 – 150

* available on request

Approvals

KTA (No. 08116)

Standards :

DIN 8555 : E 20-UM-50-CSTZ
EN 14700 : E Co3
AWS A5.13 : ~ E CoCr-B

UTP CELSIT 712

Rutile coated stick electrode on Cobalt base, core wire alloyed

Application field

UTP CELSIT 712 is used for highly wear resistant hardfacing on parts subject to a combination of abrasion, erosion, cavitation, corrosion, pressure and high temperatures up to 900° C, such as running, sealing and gliding faces on fittings and pumps, tools for wood, paper, plastic, shredding tools, highly stressed hot working tools without thermal shock.

Properties of the weld metal

Machining by grinding or with tungsten carbide cutting tools.

Welding properties

UTP CELSIT 712 has excellent welding properties and a homogeneous, finely rippled seam due to spray arc. Very easy slag removal.

Hardness of the pure weld deposit	48 - 50 HRC
Hardness at 500° C	approx. 40 HRC
Hardness at 700° C	approx. 33 HRC

Weld metal analysis in %

C	Cr	W	Co
1,6	29,0	8,5	balance

Welding instruction

Clean welding area, preheating temperature 500 - 600° C, very slow cooling. Hold stick electrode vertically and with a short arc and lowest possible amperage. Re-dry stick electrodes that have become damp for 2 h / 300°C.

Current type DC (+) / AC

Welding positions


PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350*	4,0 x 350*	5,0 x 350*
Amperage	A	70 – 110	90 – 130	110 – 150

* available on request

UTP CELSIT 712 HL

Rutile coated high efficiency stick electrode on Cobalt base

Standards :

DIN 8555	:	E 20-UM-50-CSTZ
EN 14700	:	E Co3
AWS A5.13	:	E CoCr-B

Application field

UTP CELSIT 712 HL is used for highly wear resistant hardfacing on parts subject to a combination of abrasion, erosion, cavitation, corrosion, pressure and high temperatures up to 900° C, such as running, sealing and gliding faces on fittings and pumps, tools for wood, paper, plastic, shredding tools, highly stressed hot working tools without thermal shock.

Properties of the weld metal

Machining by grinding or with tungsten carbide cutting tools.

Welding properties

UTP CELSIT 712 HL has excellent welding properties and a homogeneous, finely rippled seam due to spray arc. Very easy slag removal.

Hardness of the pure weld deposit		48 - 50 HRC
Hardness	at 500° C	approx. 370 HV_{15}
	at 600° C	approx. 350 HV_{15}
	at 700° C	approx. 330 HV_{15}

Weld metal analysis in %

C	Cr	W	Co
1,6	29,0	8,5	balance

Welding instruction

Clean welding area, preheating temperature 500 – 600° C, very slow cooling. Hold stick electrode vertically and with a short arc and lowest possible amperage. Re-dry stick electrodes that have become damp for 2 h / 300° C.

Current type DC (+) / DC (–) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 450*	4,0 x 450*
Amperage	A	100 – 130	130 – 160

* available on request

UTP CELSIT 701

Rutile coated stick electrode on Cobalt base, core wire alloyed

Standards :

DIN 8555	:	E 20-UM-55-CSTZ
EN 14700	:	E Co3
AWS A5.13	:	~ E CoCr-C

Application field

UTP CELSIT 701 is suited for highly wear resistant hardfacing on parts subject to severe abrasion in combination with corrosion and high temperatures up to 900° C, such as working parts in the chemical industry, running and sealing faces on fittings, valve seats and cones for combustion engines, cutting and crushing tools, hot working tools exposed to severe stresses without thermal shock, milling, mixing and drilling tools. Excellent gliding characteristics, good polishability, slightly magnetic.

Properties of the weld metal

Machining by grinding or with tungsten carbide cutting tools.

Welding properties

UTP CELSIT 701 has excellent welding properties, a homogeneous, finely rippled seam due to spray arc and very easy slag removal.

Hardness of the pure weld metal	54 - 56 HRC
Hardness at 600° C	approx. 42 HRC
Hardness at 800° C	approx. 34 HRC

Weld metal analysis in %

C	Cr	W	Co
2,3	32,0	13,0	balance

Welding instruction

Clean welding area, preheating temperature 500 – 600° C, very slow cooling. Hold stick electrode vertically with a short arc and lowest possible amperage. Re-dry stick electrodes that have become damp for 2h/300° C.

Current type DC (+) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 300*	4,0 x 350*	5,0 x 400*
Amperage	A	70 – 110	90 – 130	110 – 150

* available on request

UTP CELSIT 701 HL

Rutile coated high efficiency stick electrode on Cobalt base

Standards :

DIN 8555	:	E 20-UM-55-CSTZ
EN 14700	:	E Co3

Application field

UTP CELSIT 701 HL is suited for highly wear resistant hardfacings on parts subject to severe abrasion in combination with corrosion and high temperatures up to 900° C, such as working parts in the chemical industry, running and sealing faces on fittings, valve seats and cones for combustion engines, cutting and crushing tools, hot working tools exposed to severe stresses without thermal shock, milling, mixing and drilling tools. Excellent gliding characteristics, good polishability, slightly magnetic.

Properties of the weld metal

Machining by grinding or with tungsten carbide cutting tools.

Welding instruction

UTP CELSIT 701 HL has excellent welding properties, a homogeneous, finely rippled seam due to spray arc and very easy slag removal.

Hardness of the pure weld deposit		54 - 56 HRC
Hardness	at 500° C	approx. 450 HV_{15}
	at 600° C	approx. 400 HV_{15}
	at 700° C	approx. 340 HV_{15}

Weld metal analysis in %

C	Cr	W	Co
2,3	32,0	13,0	balance

Welding instruction

Clean welding area, preheating temperature 500 - 600° C, very slow cooling. Hold stick electrode vertically with a short arc and lowest possible amperage. Re-dry stick electrodes that have become damp for 2 h / 300° C.

Current type DC (+) / DC (–) / AC

Welding positions PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,0 x 200*	2,5 x 350*	3,2 x 450*	4,0 x 450*
Amperage	A	40 – 60	70 – 90	100 – 130	130 – 160

* available on request

UTP CELSIT 755

Basic coated high efficiency stick electrode on Cobalt base against extreme heat wear

Standards :

DIN 8555	:	E 20-UM-55-CGTZ
EN 14700	:	E Z Co3

Application field

UTP CELSIT 755 is suited for heat resistant hardfacings on parts subject to abrasion in combination with erosion and corrosion at high temperatures up to 1000° C, such as sintering crushers, grates in sintering plants, heating grates, conveyor screws.

Properties of the weld metal

The overeutectic Cobalt hardalloy has a high content of primary carbides (65 %) in an austenitic struture, increasing the risk of stress-cracking in the weld metal. Very good oxidation resistance up to 650° C.

Welding properties

UTP CELSIT 755 has good welding properties, a homogeneous seam due to spray arc without slag covering.

Hardness of the pure weld metal

at 20° C	approx. 55 HRC
at 500° C	approx. 390 HV_{15}
at 600° C	approx. 290 HV_{15}
at 700 °C	approx. 190 HV_{15}

Weld metal analysis in %

C	Si	Mn	Cr	Nb	Co	Ti	Fe
5,5	1,4	1,4	25,0	6,5	balance	1,5	6,0

Welding instruction

Clean welding area. Preheating is generally not required. Hold stick electrode vertically with a short arc and lowest possible amperage. Re-dry stick electrodes that have become damp for 2 h / 300° C.

Current type DC (+) / AC

Welding positions

PA PC *

* = only Ø 2,5 and 3,2 mm

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350*	3,2 x 450*	4,0 x 450*
Amperage	A	80 – 110	90 – 130	120 – 170

* available on request

UTP A CELSIT 721

CoCrMo alloyed rod for TIG and gas welding

Standards :

DIN 8555 : G/WSG 20-G0-300-CKTZ
EN 14700 : R Z Co1

Application field

UTP A CELSIT 721 is suitable for hardfacing of parts subject to a combination of pressure, impact, abrasion, corrosion and high heat up to 900° C, such as running and sealing faces of gas, water, steam and acid fittings and pumps, valve seats and cones for combustion engines, work-ing parts on turbines and power plants, hot working tools with frequent changes of high thermal load.

Properties of the weld metal

Excellent gliding characteristics, very good polishability, high toughness, nonmagnetic.

Hardness of the pure weld deposit:	30 - 32 HRC
workhardened	approx. 45 HRC
Hardness at 600° C	approx. 240 HB

Rod analysis in %

C	Cr	Mo	Ni	Co
0,25	28,0	5,0	2,8	balance

Welding instruction

Clean welding area, preheating to 150 - 400° C, depending on the size of the workpiece and the base material. Slow cooling.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I1	L (mm)
3,2	DC (-)	x	1000
4,0	DC (-)	x	1000

* available on request

Adjust acetylene excess (reduced flame) in oxyacetylene welding.

UTP A CELSIT 706 V

CoCrW alloyed rod for TIG and gas welding

Standards :

DIN 8555	:	G/WSG 20-G0-40-CSTZ
EN 14700	:	R Z CO2
AWS A5.13	:	R CoCr-A

Application field

UTP A CELSIT 706 V is suitable for high grade hardfacing of parts subject to a combination of erosion, corrosion, cavitation, pressure, impact, abrasion and high heat up to 900° C, such as tight surfaces of fittings, valve seats and cones for combustion engines, gliding surfaces metal to metal, highly stressed hot working tools without thermal shock, milling, mixing and drilling tools.

Properties of the weld metal

Excellent gliding characteristics, very good polishability, high toughness, non-magnetic. Machinable by grinding and with tungsten carbide tools.

Hardness of the pure weld deposit: 40 - 42 HRC
Hardness at 600° C approx. 33 HRC

Rod analysis in %

C	Cr	W	Co
1,2	27,0	4,5	balance

Welding instruction

Clean welding area, preheating temperature 450 - 600° C, very slow cooling.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	L (mm)
3,2	DC (-)	x	1000
4,0	DC (-)	x	1000
5,0	DC (-)	x	1000

Approvals

KTA (No. 08115)

Adjust acetylene excess (reduced flame) in oxyacetylene welding.

UTP A CELSIT 712 SN

CoCrW-alloyed welding wire for TIG- and gas welding

Standards :

DIN 8555	:	G/WSG 20-G0-50-CSTZ
EN 14700	:	R Co3
AWS A5.13	:	~ R CoCr-B

Application field

UTP A CELSIT 712 SN is suitable for highly wear resistant hardfacing of parts subject to a combination of abrasion, erosion, cavitation, corrosion, pressure and high heat up to 900° C, such as running, sealing and gliding faces of fittings and pumps, valve seats and cones for combustion engines, tools for the wood, paper and plastic industry, gliding surfaces metal to metal, milling, mixing and drilling tools, heavy-duty hot working tools without thermal shock.

Properties of the weld metal

Excellent gliding characteristics, good polishability, slightly magnetic. Machinable by grinding and with tungsten carbide tools.

Hardness of the pure weld deposit: 48 - 50 HRC
Hardness at 600° C approx. 40 HRC

Rod analysis in %

C	Cr	W	Co
1,8	29,0	8,5	balance

Welding instruction

Clean welding area, preheating temperature 500 – 600° C, very slow cooling.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	L (mm)
3,2	DC (-)	x	1000
4,0	DC (-)	x	1000

Adjust acetylene excess (reduced flame) in oxyacetylene welding.

UTP A CELSIT 701 N

CoCrW-alloyed rod for TIG and gas welding

Standards :

DIN 8555	:	G/WSG 20-G0-55-CSTZ
EN 14700	:	R Co3
AWS A5.13	:	~ R CoCr-C

Application field

UTP A CELSIT 701 N is suitable for highly wear resistant hardfacing of parts subject to a combination of abrasion, corrosion and high heat up to 900° C, such as working parts in the chemical industry, running and sealing faces of fittings, valve seats and cones for combustion engines, cutting and shredding tools, heavy-duty hot working tools without thermal shock, milling, mixing and drilling tools.

Properties of the weld metal

Excellent gliding characteristics, good polishability, slightly magnetic. Machinable by grinding and with tungsten carbide tools.

Hardness of the pure weld deposit:	54 - 56 HRC
Hardness at 600° C	approx. 42 HRC
Hardness at 800° C	approx. 34 HRC

Rod analysis in %

C	Cr	W	Co
2,3	32,0	13,0	balance

Welding instruction

Clean welding area, preheating temperature 500 – 600° C, very slow cooling.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	L (mm)
3,2	DC (-)	x	1000
4,0 *	DC (-)	x	1000

* available on request

Reduce excess of acetylene (reduced flame) in oxyacetylene welding.

Standards :

DIN 8555 : MF 20-GF-300-CKTZ

EN 14700 : T Co1

SK STELKAY 21-G

CoCrMo-alloyed MIG flux cored wire for wear, corrosion and heat resistant build-ups.

Application field

The metal powder cored wire **SK STELKAY 21-G** is used for crack resistant buildups on structural parts subject to a combination of compression, impact, abrasion, corrosion and high tem-peratures up to 900° C, such as running and sealing faces on gas, water, steam and acid fittings and pumps, valve seats and cones for combustion engines, working parts on turbine and power units, hot working tools with high alternating thermal load.

Properties of the weld metal

Excellent gliding properties, polishable and tough, non-magnetic.

Hardness of the pure weld deposit: 30 HRC

Weld metal analysis in %

C	Mn	Si	Cr	Ni	Mo	Fe	Co
0,27	1,0	1,3	28,0	2,4	5,0	3,5	balance

Welding instruction

Clean welding area, preheating to 150 - 400° C, depending on the size of the workpiece and the base material. Welding with pushing technique, possibly with pulsed arc and approx. 20 mm wire stickout.

Welding positions

PA

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 13	I 1	EN ISO 544
1,2	DC (+)	x	x	x
1,6	DC (+)	x	x	x
2,4 *	DC (+)	x	x	x

Standards :

DIN 8555 : MF 20-GF-40-CSTZ

SK STELKAY 6-G

CoCrW-alloyed MIG flux cored wire for wear, corrosion and heat resistant hardfacing.

Application field

The metal powder wire **SK STELKAY 6-G** is used for hardfacing of parts subject to a combination of erosion, corrosion, cavitation, compression, impact, abrasion and high temperatures up to 900° C, such as tight surfaces on fittings, valve seats and cones for combustion engines, gliding surfaces metal to metal, highly stressed hot working tools, milling, mixing and drilling tools.

Properties of the weld metal

Excellent gliding characteristics, good polishability, high toughness, nonmagnetic. Machinable by grinding or with tungsten carbide tools.

Hardness of the pure weld deposit: 40 HRC

Weld metal analysis in %

C	Mn	Si	Cr	W	Fe	Co
0,95	0,9	1,5	30,0	4,2	3,0	balance

Welding instruction

Clean welding area to metallic bright, preheating to 450 - 600° C and very slow cooling. Welding with pushing technique, if possible with pulsed arc and approx. 20 mm wire stickout.

Welding positions

PA

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability
				Spools
		M 13	I 1	EN ISO 544
1,2	DC (+)	x	x	x
1,6	DC (+)	x	x	x
2,4 *	DC (+)	x	x	x

* available on request

Standards :
DIN 8555 : MF 20-GF-50-CSTZ

SK STELKAY 12-G

CoCrW-alloyed MIG flux cored wire for wear, abrasion, corrosion and heat resistant hardfacing.

Application field

The metal powder cored wire **SK STELKAY 12-G** is used for hardfacing of parts subject to abrasion, corrosion and temperatures up to 900° C, such as running, gliding and sealing faces on fittings and pumps, tools for the wood, paper and plastic industry, shredder tools, highly stressed hot working tools without thermal shock.

Properties of the weld metal

Machinable by grinding or with tungsten carbide tools.

Hardness of the pure weld deposit: 48 HRC

Weld metal analysis in %

C	Mn	Si	Cr	W	Fe	Co
1,15	0,9	1,8	28,8	6,5	3,0	balance

Welding instruction

Clean welding area, preheating to 500 - 600° C and very slow cooling. Welding with pushing technique, if possible with pulsed arc and approx. 20 mm wire stickout.

Welding positions

PA

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 13	I 1	EN ISO 544
1,2	DC (+)	x	x	x
1,6	DC (+)	x	x	x
2,0 *	DC (+)	x	x	x
2,4 *	DC (+)	x	x	x

* available on request

Standards :
DIN 8555 : MF 20-GF-55-CSTZ

SK STELKAY 1-G

CoCrW-alloyed MIG flux cored wire for wear corrosion and heat resistant hardfacing

Application field

The metal powder cored wire **SK STELKAY 1-G** is used for hardfacing of parts subject to high abrasion combined with corrosion and temperatures up to 900° C, such as working parts in the chemical industry, running and sealing faces on fittings, valve seats and cones for combustion engines, cutting and shredding tools, highly stressed hot working tools without thermal shock, milling, mixing and drilling tools.

Properties of the weld metal

Excellent gliding characteristics, good polishability, slightly magnetic. Machinable by grinding or with tungsten carbide tools.

Hardness of the pure weld deposit: 54 HRC

Weld metal analysis in %

C	Mn	Si	Cr	W	Fe	Co
2,30	0,9	1,7	26,5	11,5	3,0	balance

Welding instruction

Clean welding area, preheating to 500 - 600° C and very slow cooling. Welding with pushing technique, if possible with pulsed arc and approx. 20 mm wire stickout.

Welding positions

PA

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability
				Spools
		M 13	I 1	EN ISO 544
1,2	DC (+)	x	x	x
1,6	DC (+)	x	x	x

Group 3

Special alloys

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Group 3

Special alloys

Group 3

Special alloys

Stick electrodes

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Solid rods and wires (TIG, MIG / MAG)

UTP 63

Rutile coated, fully austenitic CrNiMn-stick electrode. Universally applicable

Standards :

Material-No..	:	1.4370
DIN 8555	:	E 8-UM-200-KRZ
EN 1600	:	E 18 8 Mn R 32
EN 14700	:	E Fe10

Application field

With the fully austenitic **UTP 63**, non-alloy structural and heat-treatable steels can be welded, also in combination with austenitic CrNi steels. Furthermore scale-resisting steels for operating temperatures up to 850° C as well as higher carbon materials and high manganese steel can be joined, also in combination with other steels, with **UTP 63**. For surfacing on workpieces exposed to impact, pressure and rolling wear, such as curved rails, points, crusher and excavator teeth. Moreover it provides crack-proof buffer layers under hard alloys.

Welding properties and special properties of the weld metal

UTP 63 has good welding properties, stable arc, finely rippled bead appearance. The weld deposit resists to scaling, rust and cracks, work-hardened.

Hardness of the pure weld metal

untreated	:	approx. 200 HB
work-hardened	:	approx. 350 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 350	> 600	> 40	> 60

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,1	0,5	5,5	19,0	8,5	balance

Welding instruction

Clean welding area thoroughly. Pre-heating of thick-walled ferritic parts to 150 - 250° C. Hold stick electrode vertically with a short arc. Re-dry stick electrodes that have got damp for 2 h / 250 - 300° C.

Current type DC (+) / AC

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 350	4,0 x 400	5,0 x 450
Amperage	A	50 – 70	70 – 100	100 – 130	150 – 180

UTP 630

Synthetic rutile coated CrNiMn-stick electrode. Universally applicable.

Standards :

Material-No.	:	1.4370
DIN 8555	:	E 8-UM-200-KRZ
EN 1600	:	E 18 8 Mn R 53
EN 14700	:	E Fe10

Application field

UTP 630 is suited for particularly tough, crack resistant joints and surfacings on steels of higher tensile strength, hard-manganese steel and mixed combinations including heterogeneous joints. Suitable for surfacings on parts subjected to impact, pressure and rolling wear, such as rails, curved rails, switches, rolls etc. and for tough buffer layers under hard alloys. A main application field is for repair and maintenance in the constuctional industry.

Welding characteristics and special properties of the weld metal

UTP 630 is easily weldable with stable arc, homogeneous, finely rippled bead appearance and gives good slag removal. The fully austenitic weld metal is resistant to rust and scale up to 850° C, workhardening.

Hardness of the pure weld metal

untreated	:	approx. 200 HB
work-hardened	:	approx. 350 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 350	> 600	> 40	> 60

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,1	0,8	6,0	19,0	9,0	balance

Welding instruction

Clean welding area thoroughly. Pre-heating of thick-walled ferritic parts to 150 - 250° C. Hold stick electrode vertically with a short arc. Re-dry stick electrodes that have got damp for 2 h / 250 - 300° C.

Current type DC (+) / AC

Welding positions

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 450	4,0 x 450	5,0 x 450
Amperage	A	80 – 100	100 – 130	130 – 180	150 – 200

UTP 6302

Rutile coated CrNiMn-stick electrode. Universally applicable.

Standards :

Material-No.	:	~ 1.4370
DIN 8555	:	E 8-UM-200-KRZ
EN 1600	:	E 18 8 Mn R 32
EN 14700	:	E 1.10

Application field

UTP 6302 is suitable by hardfacings for buffer layers on higher tensile materials, heterogeneous joints, joining hardly weldable steels. Surfacings on parts subjected to impact loads or rolling wear.

Welding characteristics and special properties of the weld metal

UTP 6302 is very easily weldable with stable arc, homogeneous, finely rippled bead appearance and gives very good slag removal. The weld deposit is austenitic, stainless and crack-resistant due to high ductility and elongation.

Hardness of the pure weld metal

approx. 200 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 390	> 580	> 35	> 70

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,1	0,8	3,0	19,0	9,0	balance

Welding instruction

Clean welding area thoroughly. Pre-heating of thick-walled ferritic parts to 150 - 250° C. Hold stick electrode vertically with a short arc. Re-dry stick electrodes that have got damp for 2 – 3 h / 250 – 300° C.

Current type DC (+) / AC

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 350	4,0 x 400
Amperage	A	50 – 70	70 – 100	90 – 130

UTP 65

Rutile coated austenitic-ferritic-special stick electrode with optimal welding and mechanical properties

Standards :

Material-No.	:	~ 1.4337
DIN 8555	:	~ E 9-UM-250-KR
EN 1600	:	~ E 29 9 R 32
EN 14700	:	E 1.11

Application field

UTP 65 is particularly suitable for joinings on hardly weldable steels, when highest demands on the welding seam are made. High crack resistance when joining parent metals of difficult weldability, such as austenitic and ferritic steels, high-manganese steels with alloyed and non-alloyed steels, heat-treatable and tool steels. As cushion layer on these materials it is also ideally suited. UTP 65 finds a variety of applications in the repair and maintenance of machine and drive components as well as in tool repairing.

Welding properties and special properties of the weld metal

UTP 65 is very easily weldable with a smooth and stable arc, homogeneous, finely rippled bead appearance and gives very good slag removal, self-lifting in parts. The austenitic-ferritic weld deposit has highest strength values and high crack resistance. Workhardening, creep resistant and stainless.

Hardness of the pure weld metal

approx. 240 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 620	> 800	> 22

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,1	1,0	1,0	29,0	9,0	balance

Welding instruction

Clean welding area thoroughly. Pre-heating of thick-walled ferritic parts to 150 – 250° C. Keep the arc short up to medium-long. Apply string beads with little weaving. Hold stick electrode as vertically as possible. Re-dry stick electrodes that have got damp for 2 h / 120 – 200° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	1,5 x 250*	2,0 x 250	2,5 x 250	3,2 x 350	4,0 x 350	5,0 x 350
Amperage	A	35 - 50	45 - 65	60 - 80	80 - 130	110 - 150	120 - 200

* available on request

Approvals

DB (No. 82.138.01)

UTP 65 D

Rutile coated austenitic-ferritic special stick electrode with high mechanical properties for joinings and surfacings

Standards :

Material-No.	:	1.4337
DIN 8555	:	~ E 9-UM-250-KR
EN 1600	:	~ E 29 9 R 12
EN 14700	:	E 1.11

Application field

UTP 65 D has been developed to satisfy the highest requirements for joining and surfacing. It is extremely crack-resistant when joining steels of difficult weldability, such as e. g. hard manganese steels, tool steels, spring steels, high speed steels as well as dissimilar metal joints. Due to the good corrosion and abrasion resistance and high tensile strength **UTP 65 D** finds its application particularly in repair and maintenance of machine and drive components, such as gears, cams, shafts, hot cuts, hot trim plates and dies. Also ideally suited as an elastic cushioning layer for very hard surfacings.

Welding characteristics and special properties of the weld metal

UTP 65 D has outstanding welding properties. Stable arc, spatterfree. The finely rippled seam has a homogeneous structure, very good slag removal, self-lifting on parts. Good weldability in awkward positions. Stainless, creep resistant and workhardening.

Hardness of the pure weld metal

approx. 260 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 640	> 800	> 20

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,1	1,0	1,0	30,0	9,5	balance

Welding instruction

Clean the welding zone thoroughly. Prepare X-, V- or U-groove on thickwalled workpieces with an angle of 60 - 80°. Preheat high-C-containing steels and solid workpieces to appr. 250° C. Keep stick electrode vertical and weld with a short arc, use stringer beads or slight weaving, as applicable. Re-dry stick electrodes that have got damp for 2 h / 120 – 200° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	1,5 x 250*	2,0 x 250	2,5 x 250	3,2 x 350	4,0 x 350	5,0 x 350
Amperage	A	35 - 45	45 - 60	55 - 75	75 - 115	100 - 145	120 - 195

* available on request

UTP 651

Synthetic austenitic-ferritic stick electrode for joining and surfacing on hardly weldable steels. 160 % recovery.

Standards :

Material-No.	:	~ 1.4337
DIN 8555	:	E 9-UM-250-KR
EN 1600	:	E 29 9 R 73
EN 14700	:	E 1.11

Application field

UTP 651 is used for joinings and surfacings on high-tensile non- and low-alloyed steels. A special application field is for crack-resistant surfacings on parts in the steel- and construction machinery industries, which are subjected to pressure and impact.

Welding characteristics and special properties of the weld metal

UTP 651 is very easily weldable, spatter-free, fine-rippled bead structure, very good slag removal. The weld deposit is resistant to cracks, rust and scaling. Workhardening.

Hardness of the pure weld metal

approx. 240 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 600	> 750	> 20	> 60

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,05	0,9	0,6	29,0	1,0	9,0	balance

Welding instruction

Clean the welding area carefully. Preheat - depending on form and dimension - high C-containing and solid workpieces to 150 – 250° C. Preheating temperature should be maintained during the welding operation. Keep the arc short to medium-long, use stringer beads or slight weaving, as applicable. Re-dry stick electrodes that have got damp for 2 h / 250 – 300° C.

Current type DC (+) / AC

Welding positions

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 450
Amperage	A	70 – 100	100 – 140	

* available on request

UTP 653

Rutile coated austenitic special stick electrode with high mechanical values and excellent welding properties

Standards :

Material-No.	:	~ 1.4459
DIN 8555	:	E 9-UM-250-CKZ
EN 1600	:	~ E 23 12 2 LR 32
EN 14700	:	E 1.11

Application field

UTP 653 is suitable for joining and surfacing on hardly weldable steels as well as for claddings on non- and low-alloyed carbon steels. Main applications are crack weldings on high-grade constructional -, tempering - and tool steels in the repairing field as well as surfacings on constructional parts subjected to impact, pressure and rolling wear, such as hot working tools.

Welding characteristics and special properties of the weld metal

UTP 653 has good welding properties, smooth and stable arc, homogeneous and finely rippled bead appearance, very good slag removal. The weld deposit is corrosion resistant, creep resistant and workhardening.

Hardness of the pure weld metal

untreated	:	approx. 240 HB
work-hardened	:	approx. 350 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 500	> 700	> 25	> 60

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,12	0,8	1,0	24,0	3,5	13,0	balance

Welding instruction

Clean the welding area carefully. Pre-heating of thick-walled parts to 150 – 400° C. Keep the arc short to medium-long, steeply guided stick electrode. Hammering of the welding joint increases the tensile strength of the weld metal. Re-dry stick electrodes that have got damp for 2 h / 120 – 200° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 450
Amperage	A	50 – 70	70 – 100	100 – 130	150 – 180

* available on request

Approvals

DB (No. 20.138.04)

UTP 68 HH

Basic coated, fully austenitic NiCr-stick electrode, universally applicable.

Standards :

Material-No.	:	2.4648
EN ISO 14172	:	E Ni 6082 (NiCr20Mn3Nb)
AWS A5.11	:	E NiCrFe-3 (mod.)

Application field

UTP 68 HH is suited for joining ferrous alloys, nickel and nickel alloys, copper and copper alloys, also the various groups with each other. The main applications are constructional and repair welds on heat resistant materials, high-strength constructional and tempering steels, tool steels and corrosion resistant steels and nickel alloys.

Welding properties and special characteristics of the weld metal

UTP 68 HH has a good weldability by a steep guidance and a short arc. The weld deposit is resistant to corrosion, scale, creep, cracks and it is very tough. Unsusceptible to embrittlement. No carbon diffusion into the weld metal even at high temperatures, cold-tough. Not to be used in sulphureous medias!

Hardness of the pure weld metal

approx. 180 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 390	> 620	> 35	> 80

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
0,03	0,4	5,0	19,0	balance	2,0	3,0

Welding instruction

Clean welding area to metallic bright. Pre-heating of thick-walled ferritic parts to 150 – 350° C, depending on C-content. Apply string beads - if necessary, with little weaving. Keep a short arc and low amperage setting. Use only dry stick electrodes. Re-drying for 2 – 3 h / 250 – 300° C.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 300	4,0 x 350	5,0 x 400
Amperage	A	40 – 65	70 – 100	100 – 120	130 – 150

* available on request

Approvals

TÜV (No. 00230)

UTP 6218 Mo

Rutile-basic coated NiCrMo high performance stick electrode

Standards :

Material-No..	:	~ 2.4621
EN ISO 14172	:	~ E Ni 6625 (NiCr22Mo9Nb)
EN 14700	:	E 2.2

Application field

The nickel base special stick electrode **UTP 6218 Mo** is particularly suited for joining and surfacing in the repair field. The weld deposit is extremely crack resistant when joining hardly weldable steels, such as manganese hard steel, tool steel, spring steel, high speed steel and when joining parent metals of difficult weldability. **UTP 6218 Mo** is universally applicable.

Welding properties and special characteristics of the weld metal

UTP 6218 Mo is ideally suited for welding in the flat position and for fillet welds. Stable arc, good slag removal. The seam is finely rippled and notch-free. The weld deposit ist resistant to corrosion and heat, highly workhardening.

Hardness of the pure weld metal

untreated	:	approx. 240 HB
work-hardened	:	approx. 450 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 420	> 680	> 35

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Nb	Fe
0,03	0,6	0,6	17,0	7,0	balance	2,5	3,0

Welding instruction

Clean welding area carefully. Use only dry stick electrodes. Re-drying for 2 - 3 h / 250 - 300° C. Guide stick electrode steeply with a short arc and little weaving. Opening angle of 70 - 80°.

Current type DC (+) / AC

Welding positions

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350
Amperage	A	70 – 90	100 – 120	120 – 150

UTP 7015 NK

Basic-coated NiCrFe- high performance stick electrode. 150 % recovery

Standards :

Material-No.	:	~ 2.4807
EN ISO 14172	:	~ E Ni 6182 (NiCr15Fe6Mn)
AWS A5.11	:	E NiCrFe-3

Application field

UTP 7015 NK is suitable for joining heat resistant nickel alloys and cold tough steels, low-alloyed steels with stainless steels as well as hardly weldable steels. Also suited as an elastic cushioning layer for hard surfacings of nickel - or cobalt alloys.

Welding properties and special characteristics of the weld metal

UTP 7015 NK has a stable arc and good slag removal. The seam is finely rippled and notch-free. The fully austenitic weld deposit does not prone to embrittlement either at high or low temperatures. Corrosion resistant and workhardening.

Hardness of the pure weld metal

untreated	:	approx. 180 HB
work-hardened	:	approx. 350 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 380	> 620	> 30	> 80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Nb	Fe
0,08	0,6	4,0	17,0	1,5	balance	2,0	5,0

Welding instruction

Clean the weld area thoroughly to join pore and crack-free. Opening angle of seam 70 - 80°. Weld stick electrode with slight tilt and with a short arc. In order to keep the heat input low, the stick electrode shall be welded with low current settings and in string bead technique. The end crater must be filled properly and the arc drawn away to the side.
Prior to welding, the stick electrodes must be redried for 2 - 3 hours at 250 - 300° C and then welded out of a warm stick electrode carrier.

Current type DC (+)

Welding positions

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400
Amperage	A	60 – 80	80 – 120	120 – 160

UTP 82 AS

Chamfering stick electrode for metallic materials

Application field

The strongly coated chamfering stick electrode **UTP 82 AS** can be used on all steel grades with ferritic and austenitic structure, as well as cast iron, cast steel and all non-ferrous metals. It enables workpieces to be grooved out in a very simple way. **UTP 82 AS** is also suitable for removing corroded metal layers and for fusion-cutting metallic materials.

Welding properties

UTP 82 AS strikes easily and generates a high gas pressure, enabling a clean and smooth cut to be achieved.

Welding instruction

When grooving it is advisable to tilt the plate in the direction of working, so that the molten parent metal can run off better. The stick electrode should be inclined to the parent metal as horizontally as possible (approx. 15°) and kept constantly in contact with it. The working speed is increased by slight pushing movements in the direction of working. Parent metal left on the edge of the groove is easily removed with the slag hammer. Machining the groove down to the bare metal may be advisable, depending on the circumstances.

Current type

= –	~

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 250	3,2 x 350	4,0 x 350	5,0 x 350
Amperage	A	150 – 250	200 – 300	250 – 400	

* available on request

UTP 82 Ko

Carbon stick electrode for arc-air gouging of all industrial metals

Application field

UTP 82 Ko is suited for pointing and cutting of all metals melting in the arc, such as all steels and cast steels, cast iron materials, aluminium-, nickel- and copper alloys.

Special properties

High pointing rate, universally applicable, high economic efficiency.

Welding instruction

High tensile steels susceptible to a hardness increase should be preheated to 150 - 400° C, just as copper.

Compressed air approx. 4,5 bar

Current type : DC (+)

Availability / Current adjustment

Stick electrodes	Ø mm x L	4,0 x 305	8,0 x 305*	9,5 x 305*
Amperage	A	180 - 220	350 – 500	500 – 650

* available on request

Standards :

Material-No. : 1.4370
EN ISO 14343-A : W/G 18 8 Mn
AWS A5.9 : ER 307 (mod.)

UTP A 63

Welding wire for high-tensile joinings

Application field

UTP A 63 is suitable for particularly crack resistant joining and surfacing of high-strength ferritic and austenitic steels, hard manganese steels and cold-tough steels, as cushioning layer under hard alloys, dissimilar metal joints.

Welding properties and special properties of the weld metal

The weld metal of **UTP A 63** is scale resistant up to 850° C, cold-tough to -110° C. Workhardening.

Hardness of the pure weld metal

approx. 200 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 370	> 600	> 30

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,08	0,8	6,5	19,5	9,0	balance

Welding instruction

Clean weld area thoroughly. Thick walled, ferritic elements have to be preheated to approx. 150-250°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,2 *	DC (-)	x			x
1,6	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

* available on request

Approvals

TÜV (No. 04096; 04097), DB (No. 43.138.02)

UTP A 651

CrNi welding wire, austenitic-ferritic

Standards :
Material-No. : 1.4337
EN ISO 14343-A : W/G 29 9

Application field
UTP A 651 is suitable for joining and surfacing of steels of difficult weldability, repair of hot and cold working steels, cushioning layers.

Properties of the weld metal
The weld metal of **UTP A 651 is** scale resistant up to 1150° C. Crack and wear resistant, stainless, creep resistant and workhardening.

Hardness of the pure weld metal
approx. 240 HB

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A_5 %	Impact strength K_v Joule
> 650	> 750	> 25	> 27

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,1	0,4	1,6	30,0	9,0	balance

Welding instruction
Clean weld area thoroughly. High carboned and solid work pieces depending on shape and size have to be preheated up to 150-250°C. Steady guidance during welding process.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability	
					Spools	Rods
		I 1	M 12	M 13	EN ISO 544	EN ISO 544
0,8 *	DC (+)		x	x	x	
1,0 *	DC (+)		x	x	x	
1,2	DC (+)		x	x	x	
1,2	DC (-)	x				x
1,6	DC (-)	x				x
2,0	DC (-)	x				x
2,4	DC (-)	x				x
3,2	DC (-)	x				x

* available on request

Group 4

Welding consumables for cast iron materials

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Welding consumables for cast iron materials

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Welding of cast iron materials

Application fields for cast iron welding are

Repair welding
Production welding
Construction welding

Repair welding is to recondition damaged (cracked, broken or worn out) cast iron parts by welding to ensure further use.

Production welding means that a welding is needed within a production process of a cast iron part to ensure particular properties. Such weldings may be repair of foundry defects, correction of measurements or claddings.

Construction welding is to join cast iron parts to components of other materials in a construction unit. Casting part used in this field are usually made of nodular- or malleable cast iron. Typical weldings are

tubes and flanches made of ductile cast iron

joining of cast iron with un- or high alloyed steel

welding of wear resistant Mn-steel plates on to cast iron

In general 2 methods of cast iron welding are used:

the cold welding with non matching consumables

the hot welding with matching consumables

Hot welding

Hot welding is being done with stick electrodes, gas welding rods or cored wires giving a colour and structure matching deposit.

Hot welding of cast iron needs a high pre-heating temperature of 400 - 650° C, depending on the size and shape of the part to be welded. Due to the high pre-heating and the additional high heat input through the welding process a large welding pool with a slow cooling rate is being made. In consequence, hot welding is only suitable for flat position welding. The slow cooling or eventual post weld heat treatment is giving a crack free weld without any hardness peaks. The mechanical values can, depending on the heat treatment, reach the values of the base material.

Cold welding

For cold welding of cast iron stick electrodes MIG- and TIG-wires on iron-, nickel- and copper base are being used. Parameters and procedures are being selected to prevent excessive heating in the weld area. A temperature of max. 60° C should be maintained to avoid heat stress. Peening of the weld deposit helps to reduce welding stress. The advantages of the cold welding are in a repair welding the possibility of positional welding and the preventing of deformations. In many cases the parts can be welded without having to be desmantled.

Production- and construction welding can be made without long thermal treatments and within a short time span. The heat load on the welder is very small on comparsion to the hot welding.

Groove preparation

For repairs the groove is being made by gouging with the gouging stick electrode UTP 82 AS, by grinding or by chiselling. The gouging stick electrode is preferably used on heavy sections and on dirty, burnt or chemically affected cast iron parts.

The casting skin should be removed in the welding area to prevent binding failures due to impurities and oxides usually in such a skin. Prior to welding, residues of grinding wheels have to be removed carefully. Oily parts can be treated with an oxy-acetylene flame. On bad quality cast iron it may be necessary to remove the first deposit several times again due to poor binding or due to excessive porosity until a sound deposit can be obtained.

The notch effect of cracks can be reduced by drilling holes one each end of a crack. The crack itself has to be prepared in a tulip form with generously rounded edges.

Standards :

EN ISO 1701 : E C Ni-CI 1
AWS A5.15 : E Ni-CI

UTP 8

Graphite-basic coated stick electrode for cast iron cold welding. Universally applicable.

Application field

UTP 8 is for cold welding of grey and malleable cast iron, cast steel and for joining these base metals to steel, copper and copper alloys, especially for repair and maintenance.

Welding properties

UTP 8 has excellent welding properties. The easily controllable flow permits spatterfree welding in all positions and with minimal amperage. The weld deposit and the transition zones are filable. No undercutting. Ideally suited for the combined welding with the ferronickel type UTP 86 FN (buttering with UTP 8 and filling with UTP 86 FN).

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Hardness HB
approx.. 220	approx. 180

Weld metal analysis in %

C	Ni	Fe
1,2	balance	1,0

Welding instruction

Depending on the wall thickness,the preparation is made in U- or double U-form. The casting skin has to be removed on both sides of the welding area. Hold the stick electrode vertically with a short arc. Thin passes are buttered, their width not more than twice the diameter of the core wire. To avoid over-heating, the beads should not be longer than 10 times the stick electrode diameter. Re-move the slag immediately after welding and then peen the deposit carefully. Reignite on the weld deposit and not on the base metal.

Current type DC (–) / AC

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,0 x 300	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	45 - 60	60 – 80	80 – 100	110 – 140

Approvals

DB (No. 62.138.01)

UTP 8 C

Cast iron cold-welding stick electrode with graphite lime-type coating and pure nickel core wire

Standards :

EN ISO 1071	:	E C Ni-CI 1
AWS A5.15	:	E Ni-CI

Application field

UTP 8 C is suited for joining and surfacing of all common cast iron qualities, such as grey cast iron GG 10 – GG 40 including alloyed qualities - nodular cast iron GGG 38 – GGG 60 and for all malleable cast iron qualities. It is also suitable for construction and repair welds. A special application field are electrode pickup coatings and buffer layers on alloyed grey cast iron, especially in the tool welding construction if a further weld with UTP 86 FN is continued. .

Welding characteristics and special properties of the weld metal

UTP 8 C has a very good, stable arc and good deposition efficiency. Therefore, edge welding is easily possible. The controllable and spatter free flow makes out of position welding possible by using minimum current setting. Slag detachability and weld pattern are excellent.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Hardness HB
approx.. 220	approx. 180

Weld metal analysis in %

C	Ni	Fe
0,9	balance	1,0

Welding instructions

Remove casting skin in weld area and clean welding spot. The surface has to be examined for cracks and defects. Weld stick electrode with short arc and steep stick electrode guidance. Use a possibly low current setting and weld short stringer weld beads (approx. 50 mm). Peen the weld deposit straight after welding for the purpose of stress relief. Avoid heat concentration in weld area, if necessary, interpass cooling in still air.

Current type DC (–) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	70 – 90	90 – 130	110 – 160

Approvals

DB (No. 62.138.06)

Standards :

EN ISO 1071	:	E NiCu-2
AWS A5.15	: ~	E NiCu-B

UTP 8 Ko

Graphite-basic coated stick electrode for new iron casting with NiCu-core wire

Application field

UTP 8 Ko is especially suited for production welds on new cast iron parts of grey cast iron, if a similarity in colour to the cast material is needed. The weld metal has good stress relieving properties and can be easily machined with cutting tools.

Welding properties

UTP 8 Ko has an easy pulsed arc and spatter free flow which allows for a very good alloying gradient on cast iron. This stick electrode is also suitable for out of position welding.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Hardness HB
approx. 200	approx. 160

Weld metal analysis in %

C	Ni	Cu	Fe
0,8	balance	30,0	3,0

Welding instruction

Weld area has to be machined to a metallic bright. Defects are machined by milling. If UTP 82 AS is used for gouging, the existing oxides have then to be removed mechanically. Weld **UTP 8 Ko** by using a vertical contact angle and short arc.

Current type DC (–) / AC

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350	4,0 x 350*
Amperage	A	60 – 80	80 – 100	80 – 100

* available on request

Standards :

EN ISO 1071	: E Ni
AWS A5.15	: E Ni-CI

UTP 8 NC

Cast iron cold-welding stick electrode with graphite lime-type non-conductive coating.

Application field

UTP 8 NC is suited for cold welding of all common cast iron sorts and for joining these base metals to steel, copper and copper alloys, mainly for repair and maintenance. It is especially suited for plug welding and for applications where there is danger of the stick electrode coat getting in touch with the work piece.

Welding characteristics and special properties of the weld metal

UTP 8 NC has excellent welding properties, especially by using a.c. current .The controllable flow makes it possible to obtain a spatter free weld in each layer through a minimum ampere adjustment. Free of undercutting. Best suited for the combined weld with ferronickel types such as UTP 84 FN, UTP 85 FN and UTP 86 FN.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Hardness HB
approx. 220	approx.. 180

Weld metal analysis in %

C	Ni	Fe
1,0	balance	1,0

Welding instruction

Remove outer casting skin and clean weld area. Weld stick electrode by using a steep contact angle, short arc and lowest possible weaving. Weld short beads, immediate peening to avoid weld stresses.

Current type DC (–) / AC

Welding positions

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*
Amperage	A	60 – 80	80 – 110

* available on request

Standards :
EN ISO 1071 : E C Ni-CI
AWS A5.15 : E Ni-CI

UTP 88 H

Graphite-basic coated stick electrode with high recovery for cast iron cold welding

Application field

UTP 88 H is suitable above all for filling in pipe cavities and for building-up on worn grey cast iron work pieces, and is applied also as first pass when joining badly oil soiled cast iron parts.

Welding properties

With the special coating, a spatter free and easy flow is achieved even on oil soiled cast iron weldments. Slag is easily removable, low dilution of the deposit.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Hardness HB
approx. 250	approx. 180

Weld metal analysis in %

C	Mn	Ni	Cu	Fe
0,8	0,7	balance	2,0	2,0

Welding instruction

When weld joining, a U butt weld or a double U butt weld has to be prepared, depending on the wall thickness of the work piece. The casting skin of the base metal has to be widely removed. Use vertical stick electrode guidance and a short arc. Weld thin layers, the width should be no larger than twice the diameter of the core wire. Remove the stick electrode immediately and peen the weld deposit carefully.

Current type DC (–) / AC

Welding positions 

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 350*
Amperage	A	90 – 110	110 – 130

* available on request

UTP 888

Graphite-basic pure nickel stick electrode with high recovery

Standards :

EN ISO 1071	: E Ni-CI
AWS A5.15	: E Ni-CI

Application field

UTP 888 is suited for the repair of damaged cast iron weldments, especially if it is an aged cast iron material".

Welding characteristics and special properties of the weld metal

UTP 888 has a smooth and even flow with little penetration.The weld seam is even and has no undercuts. The weld deposit is machinable by using cutting tools.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Hardness HB
approx. 220	approx. 180

Weld metal analysis in %

C	Ni	Fe
0,8	balance	0,5

Welding instruction

Remove outer casting skin and soil from weld area. Cracked cast iron parts have to be tulip-shaped machined and hammered to avoid weld stress. Complicated cast iron weldments have to be preheated entirely.

Current type DC (–) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350
Amperage	A	60 – 80	80 – 110

Standards :
EN ISO 1071 : E C NiFe-11
AWS A5.15 : E NiFe-Cl

UTP 83 FN

Graphite-basic coated ferro-nickel stick electrode with enhanced deposition rate

Application field

UTP 83 FN is suitable for surfacing and joining of all commercial cast iron grades, such as lamellar grey cast iron and nodular cast iron, malleable cast iron and for joining these materials to steel or cast steel. This stick electrode is particularly used where a high deposition rate is needed.

Welding properties

UTP 83 FN has an excellent melting performance and the easily controllable transfer provides a spatter-free deposit of perfect appearance. The weld deposit is easily machinable with cutting tools, tough and crack-resistant.

Hardness of the pure weld metal

approx. 190 HB

Weld metal analysis in %

C	Ni	Fe
1,3	52,0	balance

Welding instruction

The casting skin and impurities have to be removed from the welding area. Weld with low amper-age and short arc. For the purpose of stress relief in case of difficult weldings, peen the weld metal and reduce the heat input by welding short beads.

Current type DC (+) / AC

Welding positions

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	50 – 70	70 – 100	100 – 130

Standards :
EN ISO 1071 : E Ni

UTP 84 FN

Graphite-basic coated ferro-nickel-stick electrode with high deposition rate of 130 %

Application field

UTP 84 FN is particularly suited for repair welds on aged and used oil soiled cast iron materials.The weld deposit is easily machinable with cutting tools.

Welding properties

The iron powder stick electrode **UTP 84 FN** has a good deposit efficiency and a spatter free weld behaviour. The soft, pulsing arc leads to a good stick electrode pickup also regarding aged cast iron with a high crack resistance.

Hardness of the pure weld metal

approx. 180 HB

Weld metal analysis in %

C	Ni	Cu	Fe
1,1	balance	0,5	8,0

Welding instruction

The weld area has to be machined to a metallic bright. Defects are machined by milling. UTP 82 AS is used for grooving out, the developed oxides have then to be mechanically removed. **UTP 84 FN** is welded with a vertical contact angle and a short arc.

Current type DC (–) / AC

Welding positions

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	70 – 100	100 – 130	130 – 150

UTP 85 FN

Graphite-basic coated ferro-nickel stick electrode with high depositon rate

Standards :

EN ISO 1071 : E C NiFe-1 3
AWS A5.15 : E NiFe-CI

Application field

UTP 85 FN is suitable for surfacing and joining of all grades of cast iron, particularly nodular cast iron (GGG 38-60) and for joining these materials with steel and cast steel.

Welding properties

UTP 85 FN has excellent welding properties and a smooth, regular flow, a high deposition rate and a finely rippled bead appearance. Very economic for construciton and production welding on nodular cast iron parts. High current carrying capacity thank to a bimetallic core wire.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Hardness HB
approx. 320	approx. 200

Weld metal analysis in %

C	Ni	Fe
1,2	54,0	balance

Welding instruction

Prior to welding, the casting skin has to be removed from the welding area. Hold the stick electrode vertically and with a short arc. Apply string beads - if necessary, with very little weaving. Peen the deposit after slag removal for the purpose of stress relief. Avoid high heat concentration.

Current type DC (+) / AC

Welding positions

PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350	5,0 x 400
Amperage	A	50 – 70	70 – 100	100 – 130	130 – 160

Standards :

EN ISO 1071 : E C NiFe-13

AWS A5.15 : E NiFe-CI

UTP 86 FN

Graphite-basic coated ferro-nickel stick electrode with high mechanical values for repair and construction

Application field

UTP 86 FN is suitable for joining and surfacing of lamellar grey cast iron GG 10 - GG 40, nodular cast iron (spheroidal cast iron) GGG 40 - GGG 70 and malleable cast iron grades GTS 35 - GTS 65 as well as for joining these materials with each other or with steel and cast steel. Universally applicable for repair, construction and production welding.

Welding properties

UTP 86 FN has excellent buttering characteristics on cast iron. The stick electrode has a stable arc and produces a flat seam structure without undercutting. Particularly for fillet welds an optimal seam structure is achieved (e.g. welding GGG-flanges or sockets to GGG-tubes). Due to the bimetallic core wire, the current carrying capacity and the deposition rate are excellent. The bead appearance is smooth. The weld deposit is highly crack resistant and easily machinable with cutting tools.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Hardness HB
approx. 340	approx. 220

Weld metal analysis in %

C	Ni	Fe
1,2	balance	45,0

Welding instruction

UTP 86 FN is preferably welded on DC (negative polarity) or on AC. When welding on DC (neg. polarity), a deep penetration is reached (advantage for fillet welds). Positional weldings are easier with AC. Prior to welding, remove the casting skin. Hold stick electrode vertically and with short arc. When welding cracksuscepible cast iron grades, the deposit may be peened for the purpose of stress relief.

Current type = – | ~

Welding positions

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	65 – 80	90 – 110	100 – 130

Approvals

DB (No. 62.138.05)

Standards :

EN ISO 1071	: E NiFe-13
AWS A5.15	: E NiFe-CI

UTP GNX-HD

Graphite-basic coated ferro-nickel stick electrode with high mechanical values

Application field

UTP GNX-HD is suited for repair welds, fabrication weld and surfacing work on all cast iron types, especially for cast iron with nodular graphite GGG 40 to GGG 70, grey cast iron GG 18 to GG 25 and mixed joints with steel or nickel alloys. Good alloying pickup behaviour also on bad cast iron.

Welding characteristics and special properties of the weld metal

UTP GNX-HD has excellent welding properties, stable and spatter free arc, even flow with a high deposit efficiency. Because of the bi-metal core wire, a high current carrying capacity is guaranteed.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Hardness HB
approx. 340	approx. 220

Weld metal analysis in %

C	Ni	Fe
1,1	balance	45,0

Welding instruction

Remove outer casting skin in welding area. Apply steep stick electrode guidance and short arc. Choose possibly low current settings. Avoid heat accumulation. Iron cast weldments susceptible to stress should be welded in short beads (approx. 30 mm) and then must be thoroughly hammered.

Current type DC (+) / AC

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	60 – 90	90 – 120	110 – 150

Standards :

EN ISO 1071	:	E C Z Fe-1
~AWS A5.15	:	E St

UTP 81

Ferro-based stick electrode for cast iron of poor weldability

Application field

UTP 81 is especially suited for pickup layers on poorly weldable cast iron (e.g. old cast iron) as a base for a secondary weld with pure nickel or nickel-iron stick electrodes. Wear surfacing can also be performed with a one-pass weld.

Welding properties and special properties of the weld metal deposit

UTP 81 has good welding properties and is welded by applying the stringer bead technique. It has a high deposition efficiency and low penetration. Out of position welding is possible.

Hardness of the pure weld deposit

approx. 350 HB

Weld metal analysis in %

C	Si	Mn	Fe
1,0	0,5	0,5	balance

Welding instruction

Welding area has to be machined to a metallic bright or prepare the welding area by applying the chamfering stick electrode UTP 82 AS to prepare the weld spot. Use a steep stick electrode guidance and a short arc. Avoid heat accumulation and keep the weld interpass temperature to a maximum of 60°C. Additional coating deposit has to be grinded down to the original weld surface in order to continue the weld with UTP 8 C or respectively UTP 86 FN.

Current type DC (+) / AC

Welding positions

PA PB PC PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 300	4,0 x 400
Amperage	A	60 – 80	80 – 100	100 – 120

* available on request

Standards :
EN ISO 1072 : E C Fe-1

UTP 807

Special stick electrode without nickel for machinable surfacings

Application field

UTP 807 is suited for fabrication and maintenance work on lamellar cast iron and nodular cast iron. Depending on the wall thickness ratio it can be welded without preheating or respectively with a preheating temperature of 150 - 250° C. The Fe-based weld metal can be filed already in the first layer. Special application field are repair work on new cast iron parts and on worn cast iron parts, if similarity in colour and postweld machining are required. Because of the special micro structure of the weld metal; **UTP 807** is suited for hard-face welding of wear susceptible areas of grey cast iron parts.

Welding properties

UTP 807 has good welding properties and is welded by applying the stringer bead technique. Little penetration and a good weld build up make out-of-position welding possible.

Mechanical properties of the pure weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB
approx. 400	approx. 500	approx. 10	approx. 180 approx. 230 1 layer on GJL-250 (GG 25)

Weld metal analysis in %

C	Si	Mn	V	Fe
0,05	0,4	0,5	10,0	balance

Welding instruction

Machine the welding area to metallic bright. Use short stick electrode guidance without weaving. Good weld overlapping to avoid heat accumulation (maximum 60° C).

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350*	3,2 x 350	4,0 x 450*
Amperage	A	60 – 80	80 - 120	120 - 160

* available on request

Standards :
EN ISO 1071 : EZ FeC-GF

UTP 5 D

Graphite-basic coated stick electrode for hot welding nodular cast iron

Application field

UTP 5 D is suited for cast iron hot welding (identical in colour and structure) nodular cast iron (GJS) and grey cast iron (GJL). The mechanical properties are obtained by heat treatment in accordance with the base metal being used.

Welding characteristics and special properties of the weld metal

UTP 5 D has a smooth arc and little slag, therefore, slag removal on pipe cavity and repair welds is not necessary.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Hardness HB
approx. 350	approx. 550	approx. 220

Weld metal analysis in %

C	Si	Mn	Fe
3,0	3,0	0,4	balance

Welding instruction

Preheating of weldment to 550 – 650° C. Interpass temperature at a minimum of 550° C. Slow cooling of the weldment (< 30° C / h) or covered cooling.

Current type DC (–) / DC (+) / AC

Welding positions

PA

Availability / Current adjustment

Stick electrodes	Ø mm x L	3,2 x 350*	4,0 x 450*	8,0 x 450*
Amperage	A	75 – 140	110 – 160	250 – 300

* available on request

UTP A 8051 Ti

Standards :
EN ISO 1071 : S C NiFe-2

Ferro-nickel rods and wires for joining and surfacing on cast iron

Application field

UTP A 8051 Ti is particularly suited for MIG/MAG welding of ferritic and austenitic nodular cast iron as well as for joining it with non-alloy and high-alloy steel, copper and nickel alloys. Buildups on grey cast iron qualities are also possible. Special applications are construction welding of ductile centrifugal casting tubes, such as joggles and flange joints, fittings, pumps, and for corrosion resistant claddings.

Properties of the weld metal

The deposit is tough, crack resistant and easily machinable with cutting tools.

Mechanical properties of the pure weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB
> 300	> 500	> 25	approx. 200

Weld metal analysis in %

C	Mn	Ni	Ti	Fe
0,1	3,5	55,0	0,5	balance

Welding instruction

Machine welding area to metallic bright. Preheat massive cast iron pieces to 150 – 250° C. Weld preferably with MIG-pulsed arc, in order to reduce the dilution with the base metal.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I1	M12	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6 *	DC (-)	x			x
2,4 *	DC (-)	x			x

* available on request

UTP A 8058

Ferro-nickel MIG/MAG wire for joining and surfacing on nodular cast iron

Standards :

Material-No.	:	2.4560
EN ISO 1071	:	S C NIFe-1

Application field

UTP A 8058 is particularly suited for joining and surfacing on nodular cast iron as GJS 40 – GJS 70 and for mixed joints with unalloyed and low alloyed steel.

Properties of the weld metal

The weld metal of **UTP A 8058** is of ductile consistence, resistant to cracking and is easily machinable by using cutting tools.

Hardness of the pure weld metal

approx. 130 HB

Weld metal analysis in %

C	Si	Mn	Ni	Fe
< 0,1	0,1	1,0	60,0	balance

Welding instruction

Machine the welding area to metallic bright. Preheating of massive cast iron pieces to 150 – 250° C. Welding procedure: preferably by applying the pulsed current arc process in order to achieve low dilution rates.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		I 1	M 12	EN ISO 544
1,2 *	DC (+)	x	x	x

* available on request

Standards :

EN ISO 1701	:	R FeC-1
AWS A5.15	:	R-CI

UTP 5
UTP Flux 5

Welding rod of the same colour and structure. For grey cast iron.

Application field

UTP 5 is used for oxy-acetylene hot welding of cast iron qualities, when a weld deposit of the same colour and structure is required, e.g. for production welding of new parts (engine blocks, pump housings) and repair welding of stress susceptible cast iron parts. The weld deposit is machinable with cutting tools.

Properties of the weld metal

The weld deposit of UTP 5 is equal in colour and structure as grey cast iron (GJL).

Hardness of the pure weld metal: approx. 200 HB

Weld metal analysis in %

C	Si	Mn	Fe
3,2	3,5	0,6	balance

Welding instruction

Machine welding area to metallic bright, bevel the edges and preheat the casting part right through to 500 – 600° C. Melt the tip of the rod off with neutral flame setting, alloying it with the melting base material. Stir the welding pool by a circular movement of the flame. Slow cooling in an oven or covered with sand or any thermal insulating material.

If additional flux is needed, cover welding area with **UTP Flux 5**, respectively dip hot welding rod into **UTP Flux 5**.

Flame setting

In general neutral, in single cases also oxygen- or acetylene excess in order to avoid porosity.

Availability

Cast blank rods	Ø mm x 500 mm	6,0	8,0	10,0*
Flux (do not paste)	Kg	0,5	-	-

* available on request

SK FNM-G

Ferro-nickel flux cored wire for MAG-welding on cast iron materials

Standards :
EN ISO 1071 : T C NiFe T3-CI

Application field

The MAG flux-cored wire **SK FNM-G** is suited for joining and surfacing on all common cast iron types such as grey cast iron, nodular cast iron and malleable cast iron and also for mixed joints with steel . The main application field is in the repair of cast weldments (surfacing work). The weld metal has high mechanical property values. It is tough and crack resistant, has good corrosion resistance and is machinable by using cutting tools.

Properties of the weld metal

The weld deposit of **SK FNM-G** has high mechanical properties. It is tough and crack-free, has a good resistance and is easily machinable. Austenitic structure.

Hardness of the pure weld metal: 145 HB

Weld metal analysis in %

C	Si	Mn	Ni	Fe
0,2	0,4	12,0	balance	48,0

Welding instruction

Welding area has to be machined to a metallic bright. Preheating of solid cast iron parts to 150 – 250°C. Welding with pushing technique and approx. 20 mm wire stickout.

Welding positions PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability Spools
		M 13	I 1	M 21	EN ISO 544
1,2 *	DC (+)	x	x	x	x
1,6 *	DC (+)	x	x	x	x

* available on request

Group 5

Welding consumables for copper and copper alloys

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Group 5

Welding consumables for copper and copper alloys

Group 5

Welding consumables for copper and copper alloys

Stick electrodes

Solid rods and wires

	EN 14640 AWS A5.7 Material-No.		page
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The welding of copper and copper alloys

Copper

UTP 39, UTP A 381, UTP A 38

For welding jobs, oxygen free copper according to DIN 1787 (e. g. SF–Cu, SW–Cu and OF–Cu) should be selected since these qualities have the best performance. Of particular importance are the high heat conductibility, the high heat expansion, the tendency to attract gases when liquid and to release these gases again when solidifying.

Depending on the size of the part to be welded, the pre-heating temperature of 300 – 700° C may be needed. Such a pre-heating temperature should be maintained during the welding process. The welding with shielding gas is protecting the weld pool better than oxy-acetylene welding and reduces the tendency to porosity.

Peening of the weld deposit while still hot increases the tensile strength and improves the ductility. On multi layer deposits, the oxide skin of the previous layer has to be removed before depositing the next layer.

Copper-Zinc-alloys
(brass, special brass) DIN 17660, DIN 1709

UTP 32 – UTP A 32, UTP 320 – UTP A 320, UTP 34 – UTP A 34, UTP A 34 MR, UTP A 384

Due to zinc evaporation during welding, porosities in the welding deposit are nearly unavoidable.

TIG welding should be done with lowest possible amperage, eventually with a.c. to obtain a cleaning effect.

For brass with Al addition, e. g. CuZn20Al (special brass 76) TIG welding (d. c.) with UTP A 34 MR and for red brass (CuSnZnPb), TIG welding with UTP A 384 is particularly suitable.

Copper-Tin alloys
(tin bronzes) DIN 17662, DIN 1705

UTP 32 – UTP A 32, UTP 320 – UTP A 320

Beside the welding with coated stick electrodes, the MIG/TIG welding is particularly suitable for this alloy group.

The low heat conductibility requests a pre-heating from a wall thickness of > 10 mm only. The tendency to pores is low. Mechanical properties and corrosion resistance correspond with the identical base material.

For joining thick walled parts it is an advantage to weld from both sides simultaneously.

Copper-Aluminium alloys
(aluminium bronzes, complex aluminium bronzes) DIN 17665

UTP 34 – UTP A 34, UTP 34 N – UTP A 34 N, UTP 3422 – UTP A 3422, UTP A 3444, UTP Flux 34 Sp

Regarding welding process, the coated stick electrodes and the MIG/TIG welding are suitable for this alloy group.

When TIG welding with d. c. the UTP Flux 34 Sp is needed to destroy the tough aluminium oxide skin. Due to this it is possible to use a low amperage, which in turn reduces the danger of pores and intercristalline failure.

For wall thickness > 6 mm the MIG welding procedure may be advantageous. The joint area must be metallic blank, to prevent pores and cracks. Pre-heating is needed for wall thickness > 10 mm only.

Copper-Nickel alloys DIN 17658

UTP 389 – UTP A 389, UTP 387 – UTP A 387

Copper-nickel alloys with or without Fe addition are easy weldable.

Welding can be done by coated stick electrode or by MIG/TIG process. A low heat input and, consequently, a small dilution with the base metal is an advantage.

When MIG welding, overheating and heat accumlation have to be avoided. It is an advantage to use MIG pulse procedure with a 1.2 mm wire. Oxides and other impurities must be removed from the weld area.

For mixed joints with steel we recommend to use UTP 80 M* or UTP A 80 M*.

* nickel-copper alloy

UTP 39

Basic coated pure copper stick electrode

Standards :

Material-No.	:	2.1363
DIN 1733	:	EL-CuMn2
AWS A5.6	:	ECu (mod.)

Application field

The pure copper stick electrode **UTP 39** is suitable for joining and surfacing all commercial pure copper grades according to DIN 1787 such as

Material-No.	Short mark
CW008A	Cu-OF
CW021A	Cu-HCP
CW023A	Cu-DLP
CR024A	Cu-DHP

Properties of the weld metal

UTP 39 yields a poreless, well deoxidized crack-proof weld metal. Its corrosion resistance is equal to that of the best commercial copper grades.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Elongation A_5 %	Hardness HB	El. conductivity S · m / mm≈	Melting range ° C
> 200	> 35	approx. 60	approx. 20	1000 - 1050

Weld metal analysis in %

Cu	Mn
> 97	1,5

Welding instruction

Clean welding zone thoroughly. Preheating of copper to 400 – 600° C depending on the wall thickness, and keep temperature during welding. Keep the arc short with steep (vertical up) stick electrode guidance. Choose the biggest possible diameter of the stick electrode . Apply only dry stick electrodes. Rebaking for 2 – 3 h at 150° C.

Current type DC (+)

Welding positions PA PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 450
Amperage	A	60 – 90	80 – 100	110 – 130

* available on request

Standards :

Material-No.	:	2.1027
DIN 1733	:	EL-CuSn13

UTP 320

Basic coated bronze stick electrode with13 % Sn

Application field

UTP 320 is suitable for joining and building up on copper-tin alloys (bronze) with more than 8 % Sn, copper-zinc alloys (brass), copper-zinc-lead alloys as well as for cladding on steel and cast iron.
Tin bronzes:

Standards	Material-No	Short mark
EN 12449	CW453K	CuSn 8
EN 1982	CB491K	CuSn 5 Zn5Pb5-B
EN 1982	CB493K	CuSn 7 Zn4Pb7-B

Welding characteristics and special properties of the weld metal

UTP 320 is easy weldable and the slag removal is also easy. The corrosion resistance is corresponding to identical or similar base metals. Seawater resistant. Very good gliding properties.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range ° C
approx. 350	> 25	approx. 150	approx. 5	825 - 990

Weld metal analysis in %

Cu	Sn
87,0	13,0

Welding instruction

Clean welding area thoroughly. Ignite stick electrode inclined with scratch start. For wall thickness of > 8 mm a preheating of 100 – 250° C is necessary. Hold stick electrode vertically and weave slightly. Use only dry stick electrodes. Re-drying 2 – 3h at 150° C.

Current type DC (+)

Welding positions


PA


PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 450*
Amperage	A	60 – 80	80 – 100	100 – 120

* available on request

UTP 34 N

Basic coated complex aluminium-bronze stick electrode with 13 % Mn

Standards :

Material-No.	:	2.1368
DIN 1733	:	EL-CuMn14Al
AWS A5.6	:	E CuMnNiAl

Application field

UTP 34 N is used for joining and surfacing on complex aluminium-bronzes, especially those with high Mn, as well as steel and grey cast iron. Thanks to its high seawater and corrosion resistance, it is also eminently suited for shipbuilding (marine propellers, pumps and fittings) and in the chemical industry (valves, pumps) above all where chemical attack is accompanied by erosion. Its favourable coefficient of friction makes it ideal for surfacing on shafts, sliding surfaces, bearings, punches and dies of all kinds.

Welding characteristics and special properties of the weld metal

UTP 34 N possesses outstanding welding properties and can be used in all positions, except in vertical down. The weld metal displays high mechanical properties and is tough, poreless and not prone to crakking.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity S · m / mm≈	Melting range ° C
approx. 400	approx. 650	> 20	approx. 220	approx. 3	940 - 980

Weld metal analysis in %

Mn	Ni	Al	Cu	Fe
13,0	2,5	7,0	balance	2,5

Welding instruction

Clean the weld zone thoroughly. Bigger workpieces are preheated to about 150 - 250° C, guide the stick electrode vertically and weave slightly. Use only dry stick electrodes. Re-drying 2 – 3 h at 150° C.

Current type DC (+)

Welding positions


PA


PB

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350
Amperage	A	50 – 70	70 – 90	90 – 110

Approvals

DB (No. 62.138.03)

UTP 387

Basic coated copper-nickel stick electrode 70/30

Standards :

Material-No.	:	2.0837
DIN 1733	:	EL-CuNi30Mn
AWS A5.6	:	E CuNi

Application field

The copper-nickel base stick electrode **UTP 387** is used for joining and surfacing alloys of similar com-positions with up to 30 % nickel, as well as non-ferrous alloys and steels of different nature. The seawater-resistant weld metal enables this special stick electrode to be employed in ship-building, oil refineries, the food industry and in the engineering of corrosion-proof vessels and equipment generally.

Welding characteristics and special properties of the weld metal

UTP 387 can be welded in all positions, except vertical-down, seawater resistant.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Impact strength K_v Joule
> 240	> 390	> 30	> 80

Weld metal analysis in %

C	Si	Mn	Ni	Cu	Fe
0,03	0,3	1,2	30	balance	0,6

Welding instruction

Groove out a V seam with min. 70° and provide a root gap of 2 mm. Remove the oxide skin about 10 mm beside the joint, on the reverse side too. The weld zone must be bare and properly de-greased. Fuse the arc strike point again by bringing the stick electrode back, in order to obtain a good bond. Keep the arc short.

Current type DC (+)

Welding positions

PA PB PC PE PF

Availability / Current adjustment

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350	4,0 x 350*
Amperage	A	60 – 80	80 – 105	110 – 130

* available on request

Approvals

TÜV (No. 01626), GL

UTP 32

Basic-coated tin-bronze stick electrode with 7 % Sn

Standards :

Material-No.	:	2.1025
DIN 1733	:	EL-CuSn7
AWS A5.6	:	E CuSn-C

Application field

UTP 32 is a basic-coated tin-bronze stick electrode for joining and surfacing on copper tin alloys with 6 – 8 % Sn, copper-tin alloys and for weld claddings on cast iron materials and on steel.

Welding properties and special properties of the weld metal

UTP 320 is easy weldable and the slag removal is also easy. The corrosion resistance is corresponding to identical or similar base metals. Seawater resistant. Very good gliding properties.

Mechanical properties of the weld metal

Yield strength R_m MPa	Tenisile strength A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range ° C
approx. 300	> 30	approx. 100	approx. 7	910 - 1040

Weld metal analysis in %

Cu	Sn
balance	7,0

Welding instruction

Clean welding area thoroughly. Ignite stick electrode inclined with scratch start. For wall thickness of > 8 mm a preheating of 100 – 250° C is necessary. Hold stick electrode vertically and weave slightly. Use only dry stick electrodes. Re-drying 2 – 3h at 150° C.

Current type = +

Welding positions PA PB

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	60 – 80	80 – 100	100 – 120

UTP 34

Basic-coated aluminium-bronze stick electrode with 8% Al

Standards :

Material-No.	:	2.0926
DIN 1733	:	EL-CuAl9
AWS A5.6	:	E CuAl-A2

Application field

UTP 34 i a basic-coated aluminium-bronze stick electrode with 8 % Al for joining and surfacing on aluminium-bronzes with 5 - 9 % Al and copper-tin alloys as well as for weld claddings on cast iton materials and steel.

Welding properties and special properties of the weld metal

UTP 34 is easy weldable and the slag removal is also easy. The corrosion resistance is corresponding to identical or similar base metals. Seawater resistant. Very good gliding properties.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range °C
approx. 200	approx. 450	> 20	approx. 130	approx. 6	1030 - 1040

Weld metal analysis in %

Si	Cu	Al	Fe
< 0,7	balance	8,0	1,0

Welding instruction

Clean welding area thoroughly. For wall thickness of > 8 mm a preheating of 100 – 250° C is necessary. Hold stick electrode vertically and weave slightly. Use only dry stick electrodes. Re-drying 2 – 3h at 150° C.

Current type = +

Welding positions

PA PB

Availability / Current adjustments

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 350
Amperage	A	80 – 100	100 – 120

UTP 3422

Basic coated multi-alloyed aluminium-bronze stick electrode, Fe- and Al-alloyed

Standards :

Material-No.	:	2.0930
DIN 1733	:	EL-CuAl9Ni2Fe

Application field

Basic coated multi-alloyed aluminium-bronze stick electrode for joining and surfacing of similar aluminium-bronzes as well as for mixed joints with low alloyed steel. It is mainly used for shipbuilding and plant engineering.

Welding properties and special properties of the weld metal

UTP 3422 has a good weldability and good resistance against cavitation. The weld deposit is resistant to seawater. Good machinable.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	Melting range ° C
400	650	8	approx. 180	1030 - 1050

Weld metal analysis in %

Si	Mn	Ni	Cu	Al	Fe
0,6	1,6	2,7	balance	8,3	1,7

Welding instruction

Clean weld area thoroughly. In a wall thickness above 5 mm grooving with V-seam (90°) is necessary. In a wallthickness above 10 mm preheat to 150-200°C. Vertical guidance of stick electrode in high temperatures in order to avoid overheating. Use dry stick electrodes only. Redrying of stick electrodes 2-3 h at 150 °C.

Current type = +

Welding positions

PA PB

Availability / Current adjustments

Stick electrodes	Ø mm x L	3,2 x 350
Amperage	A	90 - 110

Standards :

DIN 1733	:	E 31-UM-300-CN
AWS A5.6	:	~ E CuAl C

UTP 343

Basic coated bronze build-up stick electrode for surfacings

Application field

Basic coated bronze build-up stick electrode for joining and surfacing for drawing and pressing tool materials and particularly for the weld ductility of corrosion resistant materials. Surfacing on aluminium-bronze and on unalloyed steels.

Properties of the weld metal

The weld deposit of **UTP 343** has good mechanical properties. It is resistant to acid, seawater and erosion.

Weld metal analysis in %

Cu	Al	Fe
balance	12,0	3,0

Welding instruction

Clean weld area thoroughly (metallic bright). Preheating of plates > 15 mm to approx. 200°C. Vertical guidance to the weldment with a short arc, low amperage and high speed welding.

Current type = +

Welding positions

PA PB

Availability / Current adjustments

Stick electrodes	Ø mm x L	3,2 x 350	4,0 x 350
Amperage	A	70 - 90	90 - 110

UTP 389

Standards :

Material-No.	:	2.0877
DIN 1733	:	EL-CuNi10Mn

Basic-coated copper-nickel stick electrode with 10 % Ni

Application field

UTP 389 is a basic-coated copper-nickel stick electrode for joining and surfacing of alloys of similar nature with a nickel content up to 10 %.

Welding properties and special properties of the weld metal

UTP 389 is weldable in all positions except vertical downwards. The weld deposit of **UTP 389** is resistant to seawater.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %
240	320	25

Weld metal analysis in %

C	Si	Mn	Ni	Cu	Ti	Fe
< 0,03	< 0,4	1,5	10,0	balance	< 0,5	1,5

Welding instruction

Use a single V weld with at least an opening angle of 70° and a root gap o approximately 2 mm. Remove oxide skin up to approx. 10 mm to the percussive welding, repeat the same on the backside. Welding area must be metallic bright and thoroughly decreased. Fusing again by leading the stick electrode back to the arc strike, in order to guarantee good fusion. Keep a short arc and use the lowest possible amperage.

In cladding welds on carbon or fine grained steels an intermediate run (interpass) with UTP 80 M is necessary.

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350
Amperage	A	50 - 70	80 - 100

* available on request

Approvals

TÜV (No. 04185)

Standards :

Material-No.	:	2.1211
EN ISO 24373	:	S Cu 1897 (CuAg1)
AWS A5.7	:	ER Cu

UTP A 38

CuAg alloyed inert gas welding wire for oxygen free copper types

Application field

UTP A 38 is used for oxygen free copper types according to DIN 1787 OF-Cu, SE-Cu, SW-Cu, SF-Cu. The main applicational fields are in equipment (machine) construction, pipe lines, conductor rails.

Welding properties

Viscous weld puddle, fine grained structure, high electrical conductivity

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range °C
80	200	20	60	30 - 45	1020 - 1060

Weld metal analysis in %

Mn	Ni	Cu	Ag
< 0,2	< 0,3	balance	1,0

Welding instruction

Clean welding area thoroughly. For wall thickness of > 3 mm a preheating is necessary (max 600°C).

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,0 *	DC (+)	x	x	x	
1,2 *	DC (+)	x	x	x	
1,6 *	DC (+)	x	x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

* available on request

UTP A 381

CuSn-alloyed intert gas welding wire for oxygen free copper types

Standards :

Material-No.	:	2.1006
EN ISO 24373	:	S Cu 1898 (CuSn1)
AWS A5.7	:	ER Cu

Application field

UTP A 381 is used for oxygen free copper types according to DIN 1787 OF-Cu, SE-Cu, SW-Cu, SF-Cu. The main applicational fields are in equipment (machine) construction, pipe lines, conductor rails.

Properties of the weld metal

Fluid weld pool.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range °C
50	200	30	approx. 60	15 - 20	910 - 1025

Weld metal analysis in %

Si	Mn	Ni	Cu	Sn
0,3	0,25	< 0,3	balance	0,8

Welding instruction

Clean weld area thoroughly. For each application field the parameters must be optimized. In a wall thickness > 3 mm, preheating to maximal 600°C is necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,0 *	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6	DC (+)	x	x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

* available on request

Standards :
Special alloy

UTP A 383

CuSiMnSn inert gas welding wire with 1,8 % Si for MIG/TIG-brazing

Application field

UTP A 383 is used for alloys of coated steel plates as in the auto body construction and for corrosion resistant plate constructions. Especially suitable for hot dip galvanized, galvanized and alumetized plates (aluminium coat by spraying)

Properties of the weld metal

The weld deposit of **UTP A 383** is corrosion resistant, has good strength and very good toughness properties. Good wetting ability and gap bridging ability. Little spraying development or burning of the zinc content.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	Melting range ° C
140	280	50	90	1030 - 1050

Weld metal analysis in %

Si	Mn	Cu	Sn
1,8	1,0	balance	< 0,2

Welding instruction

Clean welding area thoroughly. During each prevailing application, the weld parameters must be optimized. Pay attention to a low heat input. (short arc / MIG-pulsed arc)

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
0,8 *	DC (+)	x	x	x	
1,0	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6 *	DC (+)	x	x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

* available on request

UTP A 384

CuSiMn-alloyed welding wire with 3 % Si for MIG-brazing

Standards :

Material-No.	:	2.1461
EN ISO 24373	:	S Cu 6560 (CuSi3Mn1)
AWS A5.7	:	ER CuSi-A

Application field

UTP A 384 is especially suited for joints of coated steel plates according to the MIG welding for repair welding of motor vehicle bodies and plate constructions of all sorts. The alloy is also especially suited for hot galvanized and hot dip galvanized plates. Same joints on copper-silicon and copper-manganese alloys according to DIN 1766, as for example CuSi2Mn, CuSi3Mn, CuMn5, brass and red brass (tombac).

Properties of the weld metal

The low hardness of **UTP A 384** allows a relatively easy machining of the visible weld seam in comparison to the iron base weld metal. The corrosion protection of galvanized surfaces is kept mainly.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range °C
120	350	40	80	3 - 4	965 - 1035

Weld metal analysis in %

Si	Mn	Cu	Sn	Fe
3,0	1,0	balance	< 0,2	< 0,3

Welding instruction

Clean weld area thoroughly. Welding parameters have to be optimised for each usage. Pay attention to a low heat input. (short arc / MIG pulsed arc)

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
0,8 *	DC (+)	x	x	x	
1,0	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6 *	DC (+)	x	x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

* available on request

UTP A 32

CuSn-alloyed inert gas welding wire with 7 % Sn

Standards :

Material-No.	:	2.1022
EN ISO 24373	:	S Cu 5180 A (CuSn 6 P)
AWS A5.7	:	ER CuSn-A (mod.)

Application field

UTP A 32 is used for copper and tin alloys with 6 - 8 % Sn, according to DIN 17662, copper-zinc alloys, copper-tin-zinc-lead alloys. Weld cladding on cast iron materials and steel. It has good gliding properties.

Welding properties

UTP A 32 is a corrosion and overheating resistant alloy. Very good weldability.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range ° C
150	300	20	80	7 - 9	910 - 1040

Weld metal analysis in %

Sn	P	Cu	Fe
7,0	< 0,3	balance	< 0,1

Welding instruction

Clean welding area thoroughly and weld with low amperage. In wall thicknesses above 10 mm preheat to 100 - 250 °C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6	DC (+)	x	x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

UTP A 320

CuSn-alloyed inert gas welding wire with 12 % Sn

Standards :

Material-No.	:	2.1056
EN ISO 24373	:	S Cu 5410 (CuSn12P)

Application field

UTP A 320 is used copper-tin alloys with more than 8 % Sn, copper -zinc alloys, copper-tin-zinc-lead alloys. Weld cladding on cast iron materials and steel. Resistant to seawater.

Properties of the weld metal

The corrosion resistance of **UTP A 320** corresponds to the similar alloying base metals. Good sliding properties and machinability.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range ° C
140	300	25	150	7 - 9	825 - 990

Weld metal analysis in %

Sn	P	Cu	Fe
12,0	< 0,35	balance	< 0,1

Welding instruction

Clean weld area thoroughly. Preheating in wall thicknesses > 8 mm to 100 - 250°C is necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6	DC (+)	x	x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x
4,0	DC (-)	x			x

UTP A 385

CuAlMnNi-alloyed inert gas welding wire with 5 % Al for MIG-brazing

Standards :
Special alloy

Application field

UTP A 385 is suitable for MIG brazing of coated steel plates in the auto body construction and for corrosion resistant constructions with coated plates of all sorts.

Properties of the weld metal

The weld deposit of **UTP A 385** is corrosion resistant and has good strength and very good toughness properties.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	Melting range ° C
190	340	50	100	1043 - 1074

Weld metal analysis in %

Mn	Ni	Cu	Al
0,5	0,5	balance	4,5

Welding instruction

The weld seam area has to be machined to a metallic bright by grinding, sand blasting or pickling in order to avoid crack formation or the development of pores. To avoid oxyd production use flux UTP Flux 34 Sp at TIG welding.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	
1,2	DC (+)	x	x	
1,6	DC (+)	x	x	
1,6	DC (-)	x		x
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x
4,0	DC (-)	x		x

UTP A 34

CuAl-alloyed inert gas welding wire with 8 % Al

Standards :

Material-No.	:	2.0921
EN ISO 24373	:	S Cu 6100 (CuAl7)
AWS A5.7	:	ER CuAl-A 1

Application field

UTP A 34 is used for copper aluminium alloys (aluminium bronzes) with 5 - 9 % Al, copper-zinc alloys (brass and special brass). Weld cladding on cast iron materials and steel.

Properties of the weld metal

The weld deposit of **UTP A 34** is resistant to corrosion and seawater and has good gliding properties metal-metal. **UTP A 34** is easy weldable and obtains a clean weld surface.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range °C
180	400	40	120	8	1030 - 1040

Weld metal analysis in %

Mn	Ni	Cu	Al	Fe
< 0,5	< 0,5	balance	8,0	< 0,5

Welding instruction

The weld seam area has to be machined to a metallic bright by grinding, sand blasting or pickling in order to avoid crack formation or the development of pores. To avoid oxyd production use flux UTP Flux 34 Sp at TIG welding.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
0,8 *	DC (+)	x	x	
1,0	DC (+)	x	x	
1,2	DC (+)	x	x	
1,6	DC (+)	x	x	
1,6	DC (-)	x		x
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x

* available on request

Approvaks

GL

UTP A 3422

CuAlFeNi-alloyed inert gas welding wire for cladding and MIG-brazing

Standards :

Material-No. : 2.0922

EN ISO 24373 : S Cu 6327 (CuAl8Ni2Fe2Mn2)

Application fiield

UTP A 3422 is used for copper-aluminium alloys with Ni and Fe addition. Weld cladding on cast iron materials and steel. Mixed joints of aluminium bronze steel. It is resistant to seawater, and cavitation resistant.

Properies of the weld metal

The weld metal of **UTP A 3422** is resistant to seawater and cavitation. Good suitability for simultaneous stress strain caused by seawater, cavitation and erosion.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range °C
300	650	25	160	5	1030 - 1050

Weld metal analysis in %

Mn	Ni	Cu	Al	Fe
1,8	2,5	balance	8,5	1,5

Welding instruction

The weld seam area has to be machined to a metallic bright by grinding, sand blasting or pickling in order to avoid crack formation or the development of pores. To avoid oxyd production use flux UTP Flux 34 Sp at TIG welding.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I1	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	
1,2	DC (+)	x	x	
1,6	DC (+)	x	x	
2,0	DC (-)	x		x
2,4 *	DC (-)	x		x
3,2	DC (-)	x		x

* available on request

Approvaks

GL

UTP A 3423

CuAlFeNi-alloyed welding wire for MIG-brazing and cladding

Standards :

Material-No. : 2.0922
EN ISO 24373 : S Cu 6327 (CuAl8Ni2Fe2Mn2)

Application field

UTP A 3423 is a CuAlFeNi shielded gas wire for MIG brazing and claddings on copper aluminium wrought alloys according to DIN 17665, and cast multi aluminium bronzes according to DIN 1714, resistant to sea water.

Properties of the weld metal

The weld metal of **UTP A 3423** is resistant to seawater and cavitation. Good suitability for simultaneous stress strain caused by seawater, cavitation and erosion.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range ° C
300	550	25	160	5	1030 - 1050

Weld metal analysis in %

Mn	Ni	Cu	Al	Fe
2,0	2,0	balance	8,0	2,0

Welding instruction

The weld seam area has to be machined to a metallic bright by grinding, sand blasting or pickling in order to avoid crack formation or the development of pores. To avoid oxyd production use flux UTP Flux 34 Sp at TIG welding.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	
1,2	DC (+)	x	x	
1,6	DC (-)	x		x
2,0	DC (-)	x		x
2,4 *	DC (-)	x		x
3,2	DC (-)	x		x

* available on request

UTP A 3444

CuAlNi-alloyed shielded gas wire with 4,5 % Ni for joining and surfacing

Standards :

Material-No.	:	2.0923
EN ISO 24373	:	S Cu 6328 (CuAl9Ni5Fe3Mn2)
AWS A5.7	:	ER CuNiAl

Application field

UTP A 3444 is a copper aluminium multi bronzes with a high Ni and Fe addition. Weld cladding on cast iron materials and steel. Mixed joints with aluminium bronze steel. It is resistant to seawater and cavitation resistant.

Properties of the weld metal

The weld metal of **UTP A 3444** is resistant to seawater and cavitation. Good suitability for simultaneous stress strain caused by seawater, cavitation and erosion.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range ° C
400	700	15	200	4	1015 - 1045

Weld metal analysis in %

Mn	Ni	Cu	Al	Fe
1,0	4,5	balance	9,0	3,5

Welding instruction

The weld seam area has to be machined to a metallic bright by grinding, sand blasting or pickling in order to avoid crack formation or the development of pores. To avoid oxyd production use flux UTP Flux 34 Sp at TIG welding.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	
1,2	DC (+)	x	x	
1,6	DC (+)	x	x	
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x

Approvals

TÜV (Nr. 01896-WIG), GL (WIG)

UTP A 34 N

Manganese multiple material bronze gas-shielded welding wire with 13 % Mn for joining and surfacing

Standards :

Material-No.	:	2.1367
EN ISO 24373	:	S Cu 6338 (CuMn13Al8Fe3Ni2)
AWS A5.7	:	ER CuMnNiAl

Application field

UTP A 34 N is applied in MIG joining and surfacing on complex aluminium bronzes mainly on such materials with a high Mn content as well as on steel and cast steel by using a nodular iron rod. Because of the excellent resistance to seawater and general corrosion resistance, the alloy is excellently suited in the shipbuilding industry (propellers, pumps and armatures) and in the chemical industry (valves, slides, pumps) and is mainly for applications subjected to chemical attacks combined with erosion. Because of the good friction coefficient it is suited for surfacing on waves, gliding surfaces, bearing and matrix of all sorts.

Welding properties and special properties of the weld metal

UTP A 34 N is very good weldable in the MIG pulsing method. The weld deposit has excellent mechanical properties and is tough and crack resistant. Very good chip removal machining, corrosion resistant and non magnetic.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range °C
400	650	20	220	3 - 5	945 - 985

Weld metal analysis in %

Mn	Ni	Cu	Al	Fe
13,0	2,5	balance	7,5	2,5

Welding instruction

Clean weld area thoroughly (metallic bright). Preheating temperature of large weldments to approx. 150°C. Heat-input should be kept low and the interpass temperature sould not exceed 150°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I1	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	
1,2	DC (+)	x	x	
1,6	DC (+)	x	x	
1,6	DC (-)	x		x
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x

Standards :
EN ISO 24373 : S CuZ 6329 (CuAl11Ni6)

UTP A 3436

Multi type aluminium bronzes shielded gas wire for wear resistant surfacing

Application field

UTP A 3436 is a multi type aluminium bronzes for wear resistant surfacing on copper aluminium wrought alloys according to DIN 17665, cast aluminium bronzes according to DIN 1714 and steel.

Mechanical properties of the weld metal

Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$
280	4

Weld metal analysis in %

Mn	Ni	Cu	Al	Fe
1,5	6,0	balance	11,0	3,0

Welding instruction

Keep weld seam area metallic bright by grinding, sand blasting or pickling in order to avoid the formation of pores or the developments of cracks. In a wall thickness > 6 mm preheating to 300 - 700°C is necessary depending on the application case.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Spools
		I1	EN ISO 544
1,2 *	DC (+)	x	x
1,6 *	DC (+)	x	

* available on request

UTP A 387

Copper-nickel alloyed gas shielded wire with 30 % Ni

Standards :

Material-No.	:	2.0837
EN ISO 24373	:	S Cu 7158 (CuNi30Mn1FeTi)
AWS A5.7	:	ER CuNi

Application field

UTP A 387 is used for copper nickel alloys with up to 30 % nickel according to DIN 17664, such as CuNi20Fe (2.0878), CuNi30Fe (2.0882). Chemical industry, seawater desalination plants, ship building, offshore technique.

Properties of the weld metal

The weld metal of **UTP A 387** is resistant to seawater and cavitation.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range °C
> 200	> 360	> 30	120	3	1180 - 1240

Weld metal analysis in %

C	Mn	Ni	Cu	Ti	Fe
< 0,05	0,8	30,0	balance	< 0,05	0,6

Welding instruction

V butt weld with 70° included angle and root gap of 2 mm. Remove oxide skin to approx. 10 mm to the joint groove also on the backside of the weld.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
0,8 *	DC (+)	x	x	
1,0 *	DC (+)	x	x	
1,2	DC (+)	x	x	
1,6 *	DC (+)	x	x	
1,2 *	DC (-)	x		x
1,6	DC (-)	x		x
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x

* available on request

Approvals

TÜV (No. 01626), GL

Standards :

Material-No.	:	2.0873
EN ISO 24373	:	S Cu 7061 (CuNi10)

UTP A 389

Copper-nickel alloyed gas shielded wire with 10 % Ni

Application field

UTP A 389 is used for copper nickel alloys with 5 - 10 % nickel according to DIN 17664, for example CuNi5Fe (2.0862), CuNi10Fe (2.0872). Chemical plant industry, seawater desalination plants, ship building, offshore technique.

Properties of the weld metal

The weld deposit of **UTP A 389** is highly corrosion resistant, for example against non oxidizing, organic acids and salt solutions and seawater.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardnesss HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range °C
> 150	> 300	> 30	100	5	1100 - 1145

Weld metal analysis in %

C	Mn	Ni	Cu	Ti	Fe
< 0,05	0,8	10,0	balance	< 0,05	1,35

Welding instruction

Degrease and clean weld area to metallic bright. Remove oxide skin to 10 mm next to welding groove, also on the backside of the weld. Pay attention to low energy input. The interpass temperature should not exceed 120°C. Preheating and postweld heat treatment is not intended.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability	
			Spools	Rods
		I 1	EN ISO 544	EN ISO 544
1,0 *	DC (+)	x	x	
1,2	DC (+)	x	x	
1,6	DC (-)	x		x
2,0	DC (-)	x		x
2,4	DC (-)	x		x
3,2	DC (-)	x		x

* available on request

Group 6

Welding consumables for welding stainless, acis- and heat resistant steels

Index

- **Stainless and acid resistant welding consumables**
- **Heat resistant welding consumables**

  – stick electrodes
  – solid rods and wires
  – flux cored wires
  – wires and fluxes for submerged arc welding

Group 6

Welding consumables for welding stainless, acis- and heat resistant steels

Group 6

Welding consumables for welding stainless, acis- and heat resistant steels

Stick electrodes for stainless and acid resistant steels

	Standards EN 1600		page
UTP 68	E 19 9 Nb R 3 2	Stabilized stick electrode for CrNi steels	312
UTP 68 LC	E 19 9 L R 3 2	Low carbon stick electrode for CrNi steels	313
UTP 68 Mo	E 19 12 3 Nb R 3 2	Stabilized stick electrode for CrNiMo steels	314
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UTP 6824 LC	E 23 12 L R 3 2	Low carbon CrNi stick electrode for dissimilar metal joints and claddings	316
UTP 66	E 13 B 22	Basic coated stick electrode for 12 - 14 % Cr steels	317
UTP 660	E 17 B 42	Basic coated stick electrode for 17 % Cr steels	318
UTP 6615	EZ 13 1 B 42	Basic coated stick electrode for 13 % Cr 1 % Ni - steels	319
UTP 6635	E 13 4 B 4 2	Basic coated stick electrode for 13 % Cr, 4 % Ni - steels	320
UTP 6655 Mo	EZ 17 5 1 B 4 2	Basic coated stick electrode for 17 % Cr, 5 % Ni - steels	321
UTP 683 LC	E 19 12 3 L R 73	Low-carbon high performance stick electrode for CrNiMo-steels	322

Solid rods and wires for stainless and acid resistant steels

	Standards EN ISO 14343-A Material-No.		page
UTP A 66	G/W 13 Si 1.4009	Rods and wires for 14 % Cr - steels	336
UTP A 660	G/W Z 17 Ti 1.4502	Rods and wires for 17 % Cr-steels	337
UTP A 6635	G/W 13 4 1.4351	Rods and wires for similar martensitic steels	338
UTP A 68	G/W 19 9 Nb Si 1.4551	Rods and wires for stabilized CrNi steels	339
UTP A 68 LC	G/W 19 9 L 1.4316	Rods and wires for CrNi steels	340
UTP A 68 Mo	G/W 19 12 3 Nb Si 1.4576	Rods and wires for stabilized CrNiMo steels	341
UTP A 68 MoLC	G/W 19 12 3 L Si 1.4430	Rods and wires for CrNiMo steels	342
UTP A 6808 Mo	G/W 22 9 3 N L ~1.4462	Rods and wires for Duplex steels	343
UTP A 6824 LC	G/W 23 12 L 1.4332	Rods and wires for heterogeneous joints	344
UTP A 6824 MoLC	G/W 25 13 3 1.4459	CrNiMo rods and wires, austenitic-ferritic	345
UTP A 1817	G/W 18 16 5 N L ~1.4440	Rods and wires for CrNi-steels with high Mo-content	346
UTP A 1915 HST	G/W 20 16 3 Mn L 1.4455	Rods and wires for urea synthesis plants	347
UTP A 1925	G/W 20 25 5 Cu L 1.4519	Rods and wires for CrNiMo steels with high Mo-content	348
UTP A 2522 Mo	G/W 25 22 2 N L	Rods and wires for urea and nitric acid plants	349

Flux cored wires for stainless and acid resistant steels

	Standards EN ISO 14343-A Material No.		page
UTP AF 6635	T 13 4 RM 1.4351	Flux cored wire for soft martensitic steels	350
UTP AF 68 LC	T 19 9 L RM 1.4316	Low carbon CrNi flux cored wire with rutile slag	351
UTP AF 68 MoLC	T 19 12 3 L RM 1.4430	Low carbon austenitic CrNi flux cored wire with rutile slag	352
UTP AF 6824 LC	T 23 12 L RM 1.4332	Low carbon austenitic-ferritic flux cored wire for dissimilar metal joints	353

Combinations of wires and fluxes for submerged-arc welding for stainless and acid resistant steels

	EN ISO 14343-A (wire) DIN EN 760 (flux)		page
UTP UP 68 MoLC **UTP UP Fx 68 MoLC**	S 19 12 3 SA-FB 2 DC	Combination of wire and flux for stainless steel alloys	354
UTP UP 6808 Mo **UTP UP Fx 6808 Mo**	SGX2 CrNiMo 22 8 3 SA-FB 2 DC	Combination of wire and flux for stainless Duplex steel alloys	355

Stick electrodes for heat resistant steels

	Standards EN 1600		page
UTP 68 Kb	E 19 9 B 20 +	Basic coated stick electrode for CrNi steels with a controlled ferrite content	356
UTP 6820	E 19 9 L R 3 2	Rutile coated stick electrode for high temperature resistant CrNi steels (operating temperature: up to 750° C)	357
UTP 6805 Kb	EZ 16 4 Cu B 4 2	Basic coated stick electrode, age-hardenable	358

Solid rods and wires for heat resistant steels

	Standards EN ISO 14343 Material No.		page
UTP A 6820	G/W 19 9 H ~ 1.4302	Rods and wires with a controlled ferrite content for CrNi-steels (operating temperature: up to 700° C)	359

The welding of stainless and heat resistant steels

Welding consumables

High alloyed stainless and heat resistant steels are selected to correspond to the requirements of the workpiece.

The decision of which kind of base material is being used is depending on the working properties, to which also the weldability is accounted, the corrosion resistance to the medias involved, the working temperature and, on oven constructions, the oven atmosphere. The selection of the welding consumable is as important as the selection of the base material.

The welding consumables are in general of an analysis identical to the base metal.

Weldability

Martensitic and ferritic chromium steels

Martensitic and ferritic chromium steels shall only be welded with identical consumables if colour match or identical mechanical properties is required. Otherwise the welding should be done with austenitic-ferritic or fully austenitic consumables. The welding has to be done with a pre-heating and an interpass temperature of 200 – 300° C. This temperature range has to be maintained during the whole welding process. Immediately after welding, a post weld tempering, corresponding to the base metal (700 – 750° C) has to be made. If the welding has been made with a non identical consumable, there may be a danger of embrittlement (Sigma phase occurrence).

Soft martensitic chrome-nickel steels

Soft martensitic chrome-nickel steels are welded with identical consumables. When welding heavy sections, a pre-heating of approx. 100° C is necessary. To improve the toughness, the welding joint should be subjected to a tempering process.

Austenitic chrome-nickel-molybdenum steels

To weld austenitic CrNi- or CrNiMo steels corresponding consumables are being used. To improve the safety against hot cracks, the welding consumable should have a delta ferrite content of 5 – 15 %.

To weld high corrosion resistant, fully austenitic steels, the welding consumable has to be of identical quality.

The interpass temperature has to be limited to 175° C respectively 150° C. A pre-heating is only necessary on parts with heavy sections (100 – 150° C). The welding has to be done with a limited heat input (max. 15 KJ/cm). Also the welding speed is important, the ratio bead width to bead depth should be approx. 1,5 – 2,1.

Welding instruction

Total cleanliness of the joint and its surroundings is of vital importance. Dirt, scale residues, grease and oil should be removed by mechanical or chemical means. Thermally cut bead flanks have to be grinded with inorganic bound grinding discs.

Mechanical cleaning of the welding area has to be done with brushes made of stainless steel.

Austenitic steels, having a very high heat expansion coefficient, must be tac-welded in very short intervals. It is important that the arc is started within the welding area to avoid reduction of the corrosion resistance of the base metal. The welding must be made with a short arc to limit the heat input. Weaving should be limited to 2 – 3 times the diameter of the electrode core wire.

Drying

Prior to the use of the electrodes, they should be stored in the original packets in a dry room. Re-drying is being made at 250 – 300° C during about 2 hours. The re-drying time should not exceed 10 hours. After re-drying and cooling, the electrodes which are not being used immediately should be stored in a warm box at 150 – 200° C.

Treatment of welding beads

Stainless steels and stainless welding deposits will only be stainless again when the oxide skin and the colouring, resulting from welding, are being removed. This can be made by mechanical means or by pickling.

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Stick electrodes	TIG rods / MIG wires	Flux cored wires
1.4000	X 6 Cr 13	UTP 66	UTP A 66	–
1.4002	X 6 CrAl 13	UTP 66	UTP A 66	–
1.4003	X 2 Cr 11	UTP 66	UTP A 66	–
1.4006	(G) X 10 Cr 13	UTP 66	UTP A 66	–
1.4008	G–X 7 CrNiMo 12-1	UTP 6635	UTP A 6635	UTP AF 6635
1.4016	X 6 Cr 17	UTP 660	UTP A 660	–
1.4021	X 20 Cr 13	UTP 66	UTP A 66	–
1.4024	X 15 Cr 13	UTP 66	UTP A 66	–
1.4027	G–X 20 Cr 14	UTP 66	UTP A 66	–
1.4057	X 20 CrNi 17 2	UTP 660	UTP A 660	–
1.4059	G–X 22 CrNi 17	UTP 660	UTP A 660	–
1.4107	G–X 8 CrNi 12	UTP 6635	UTP A 6635	UTP AF 6635
1.4120	G–X 20 CrMo 13	UTP 68	UTP A 68	UTP AF 68 *
1.4122	G–X 35 CrMo 17	UTP 68	UTP A 68	UTP AF 68 *
1.4301	X 5 CrNi 18 10	UTP 68 LC	UTP A 68 LC	UTP AF 68 LC
1.4303	X 4 CrNi 18 12	UTP 68 LC	UTP A 68 LC	UTP AF 68 LC
1.4306	X 2 CrNi 19 11	UTP 68 LC	UTP A 68 LC	UTP AF 68 LC
1.4308	G–X 5 CrNi 19 10	UTP 68 LC	UTP A 68 LC	UTP AF 68 LC
1.4311	X 2 CrNiN 18 10	UTP 68 LC	UTP A 68 LC	UTP AF 68 LC
1.4312	G–X 10 CrNi 18 8	UTP 68 LC	UTP A 68 LC	UTP AF 68 LC
1.4313	X 3 CrNiMo 13 4	UTP 6635	UTP A 6635	UTP AF 6635
1.4313	G–X 5 CrNi 13 4	UTP 6635	UTP A 6635	UTP AF 6635

* Availability on request

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Stick electrodes	TIG rods / MIG wires	Flux cored wires
1.4335	X 1 CrNi 25 21	UTP 2522 Mo	UTP A 2522 Mo	–
1.4340	G–X 40 CrNi 27 4	UTP 6804 *	UTP A 6804	–
1.4347	G–X 6 CrNi 26 7	UTP 6809 MoKb *	UTP A 6808 Mo	–
1.4362	X 2 CrNiN 23 4	UTP 6808 Mo	UTP A 6808 Mo	–
1.4401	X 5 CrNiMo 17 12 2	UTP 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC
1.4404	X 2 CrNiMo 17 13 2	UTP 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC
1.4405	G–X 5 CrNiMo 16 5	UTP 68 MoLCKb *	UTP A 68 MoLC	UTP AF 68 MoLC
1.4406	X 2 CrNiMoN 17 12 2	UTP 1915	UTP A 1915	–
1.4407	G–X 5 CrNiMo 13 4	UTP 6635	UTP A 6635	UTP AF 6635
1.4408	G–X 5 CrNiMo 19 11 2	UTP 68 MoLCKb *	UTP A 68 MoLC	UTP AF 68 MoLC
1.4409	G–X 2 CrNiMoN 18 10	UTP 68 MoLCKb *	UTP A 68 MoLC	UTP AF 68 MoLC
1.4413	X 3 CrNiMo 13 4	UTP 6635	UTP A 6635	UTP AF 6635
1.4414	G–X 4 CrNiMo 13 4	UTP 6635	UTP A 6635	UTP AF 6635
1.4418	X 4 CrNiMo 16 5	UTP 6655 MO	–	–
1.4420	X 5 CrNiMo 18 11	UTP 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC
1.4429	X 2 CrNiMoN 17 13 3	UTP 1915	UTP A 1915	–
1.4435	X 2 CrNiMo 18 14 3	UTP 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC
1.4436	X 5 CrNiMo 17 13 3	UTP 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC
1.4437	G–X 6 CrNiMo 18 12	UTP 68 MoLCKb *	UTP A 68 Mo	UTP AF 68 MoLC
1.4438	X 2 CrNiMo 18 15 4	UTP 1817	UTP A 1817	–
1.4439	X 2 CrNiMoN 1713 5	UTP 1817	UTP A 1817	–
1.4439	G–X 3 CrNiMoN 17 13 5	UTP 1817	UTP A 1817	–

* Availability on request

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Stick electrodes	TIG rods / MIG wires	Flux cored wires
1.4446	G–X 2 CrNiMoN 17 13 4	UTP 1817	UTP A 1817	–
1.4448	G–X 6 CrNiMo 17 13	UTP 1817	UTP A 1817	–
1.4460	X 3 CrNiMoN 27 5 2	UTP 6810 MoKb	UTP A 6810 Mo *	–
1.4462	X 2 CrNiMoN 22 5 3	UTP 6808 Mo	UTP A 6808 Mo	–
1.4463	G–X 6 CrNiMo 24 8 2	UTP 6808 MoKb	UTP A 6808 Mo	–
1.4465	X 1 CrNiMoN 25 25 2	UTP 2522 Mo	UTP A 2522 Mo	–
1.4466	X 1 CrNiMoN 25 22 2	UTP 2522 Mo	UTP A 2522 Mo	–
1.4467	X 2 CrMnNiMoN 26 5 4	UTP 2522 Mo	UTP A 2522 Mo	–
1.4468	G–X 2 CrNiMoN 25 6 3	UTP 6810 MoKb	UTP A 6810 Mo *	–
1.4469	G–X 2 CrNiMoN 26 7 4	UTP 6810 MoKb	UTP A 6810 Mo *	–
1.4500	G–X 7 NiCrMoCuNb 25 20	UTP 1925	UTP A 1925	–
1.4505	X 4 NiCrMoCuNb 20 18 2	UTP 1925	UTP A 1925	–
1.4506	X 5 NiCrMoCuTi 20 18	UTP 1925	UTP A 1925	–
1.4510	X 6 CrTi 17	UTP 660	UTP A 660	–
1.4511	X 6 CrNb 17	UTP 660	UTP A 660	–
1.4512	X 2 CrTi 12	UTP 66	UTP A 66	–
1.4515	G–X 2 CrNiMoCuN 26 6 3	UTP 6807 MoCuKb	–	–
1.4517	G–X 3 CrNiMoCuN 26 6 3 3	UTP 6809 MoCuKb	–	–
1.4520	X 2 CrTi 17	UTP 660	UTP A 660	–
1.4521	X 2 CrMoTi 18 2	UTP 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC

* Availability on request

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Stick electrodes	TIG rods / MIG wires	Flux cored wires
1.4531	G–X 2 NiCrMoCuN 20 18	UTP 1925	UTP A 1925	–
1.4536	G–X 2 NiCrMoCuN 25 20	UTP 1925	UTP A 1925	–
1.4538	G–X 1 NiCrMoCuN 25 20 5	UTP 1925	UTP A 1925	–
1.4539	X 1 NiCrMoCu 25 20 5	UTP 1925	UTP A 1925	–
1.4541	X 6 CrNiTi 18 10	UTP 68	UTP A 68	–
1.4546	X 5 CrNiNb 18 10	UTP 68	UTP A 68	–
1.4550	X 6 CrNiNb 18 10	UTP 68	UTP A 68	–
1.4552	G–X 5 CrNiNb 19 11	UTP 68 NbKb *	UTP A 68	–
1.4558	X 2 NiCrAlTi 32 20	UTP 2133 Mn	UTP A 2133 Mn	–
1.4571	X 6 CrNiMoT1 17 12 2	UTP 68 Mo	UTP A 68 Mo	–
1.4577	X 3 CrNiMoTi 25 25	UTP 2522 Mo	UTP A 2522 Mo	–
1.4580	X 6 CrNiMoNb 17 12 2	UTP 68 Mo	UTP A 68Mo	–
1.4581	G–X 5 CrNiMoNb 19 11 2	UTP 68 MoNbKb *	UTP A 68 Mo	–
1.4583	X 10 CrNiMoNb 18 12	UTP 68 Mo	UTP A 68 Mo	–
1.4585	G–X 7 CrNiMoCuNb 18 18	UTP 1925	UTP A 1925	–
1.4586	X 5 NiCrMoCuNb 22 18	UTP 1925	UTP A 1925	–
1.4589	X 5 CrNiMoTi 15 2	UTP 68 Mo	UTP A 68 Mo	–
1.4710	G–X 30 CrSi 6	UTP 68 HKb *	UTP A 68 H	–
1.4712	X 10 CrSi 6	UTP 68 H	UTP A 68 H	–
1.4713	X 10 CrAl 7	UTP 68 H	UTP A 68 H	–
1.4720	X 7 CrTi 12	UTP 68 H	UTP A 68 H	–

* Availability on request

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Stick electrodes	TIG rods / MIG wires	Flux cored wires
1.4724	X 10 CrAl 13	UTP 68 H	UTP A 68 H	–
1.4729	G–X 40 CrSi 13	UTP 68 HKb *	UTP A 68 H	–
1.4740	G–X 40 CrSi 17	UTP 68 H	UTP A 68 H	–
1.4742	X 10 CrAl 18	UTP 68 H	UTP A 68 H	–
1.4745	G–X 40 CrSi 23	UTP 68 HKb *	UTP A 68 H	–
1.4746	X 8 CrTi 25	UTP 68 H	UTP A 68 H	–
1.4749	X 18 CrN 28	UTP 68 H	UTP A 68 H	–
1.4762	X 10 CrAl 24	UTP 68 H	UTP A 68 H	–
1.4776	G–X 40 CrSi 29	UTP 68 HKb *	UTP A 68 H	–
1.4815	G–X 8 CrNi 19 10	UTP 6820	UTP A 6820	–
1.4821	X 20 CrNiSi 25 4	UTP 6804 *	UTP A 6804	–
1.4822	G–X 40 CrNi 24 5	UTP 6804 *	UTP A 6804	–
1.4823	G–X 40 CrNiSi 27 4	UTP 6804 *	UTP A 6804	–
1.4825	G–X 25 CrNiSi 18 9	UTP 68 HKb *	UTP A 68 H	–
1.4826	G–X 40 CrNiSi 22 9	UTP 68 HKb *	UTP A 68 H	–
1.4827	G–X 8 CrNiNb 19 10	UTP 68 HKb *	UTP A 68 H	–
1.4828	X 15 CrNiSi 20 12	UTP 68 H	UTP A 68 H	–
1.4832	G–X 25 CrNiSi 20 14	UTP 68 HKb *	UTP A 68 H	–
1.4833	X 7 CrNi 23 14	UTP 68 H	UTP A 68 H	–
1.4835	X 10 CrNiSiN 21 11	UTP 68 H	UTP A 68 H	–
1.4837	G–X 40 CrNiSi 25 12	UTP 2535 Nb	UTP A 2535 Nb	–
1.4840	G–X 15 CrNi 25 20	UTP 68 HKb *	UTP A 68 H	–

* Availability on request

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Stick electrodes	TIG rods / MIG wires	Flux cored wires
1.4841	X 15 CrNiSi 25 20	UTP 68 H	UTP A 68 H	–
1.4842	X 12 CrNi 25 20	UTP 68 H	UTP A 68 H	–
1.4845	X 12 CrNi 25 21	UTP 68 H	UTP A 68 H	–
1.4847	X 8 CrNiAlTi 20 20	UTP 68 H	UTP A 68 H	–
1.4848	G–X 40 CrNiSi 25 20	UTP 2535 Nb	UTP A 2535 Nb	–
1.4849	G–X 40 NiCrSiNb 38 18	UTP 2535 Nb	UTP A 2535 Nb	–
1.4852	G–X 40 NiCrSiNb 35 25	UTP 2535 Nb	UTP A 2535 Nb	–
1.4855	G–X 30 CrNiSiNb 24 24	UTP 2535 Nb	UTP A 2535 Nb	–
1.4857	G–X 40 NiCrSi 35 25	UTP 2535 Nb	UTP A 2535 Nb	–
1.4859	G–X 10 NiCrNb 32 20	UTP 2133 Mn	UTP A 2133 Mn	–
1.4861	X 10 NiCr 32 20	UTP 2133 Mn	UTP A 2133 Mn	–
1.4862	X 8 NiCrSi 38 18	UTP 068 HH	UTP A 068 HH	UTP AF 068 HH
1.4864	X 12 NiCrSi 36 16	UTP 2133 Mn	UTP A 2133 Mn	–
1.4865	G–X 40 NiCrSi 38 18	UTP 2535 Nb	UTP A 2535 Nb	–
1.4876	X 10 NiCrAlTi 32 20	UTP 2133 Mn	UTP A 2133 Mn	–
1.4878	X 12 CrNiTi 18 9	UTP 6820	UTP A 6820	–
1.4941	X 8 CrNiTi 18 10	UTP 6820	UTP A 6820	–
1.4943	X 4 NICrTI 25 15	UTP 68 H	UTP A 68 H	–
1.4948	X 6 CrNi 18 11	UTP 6820	UTP A 6820	–
1.4949	X 3 CrNiN 18 11	UTP 6820	UTP A 6820	–
1.4958	X 5 NiCrAlTi 31 20	UTP 2133 Mn	UTP A 2133 Mn	–
1.4959	X 8 NiCrAlTi 32 21	UTP 2133 Mn	UTP A 2133 Mn	–

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Stick electrodes	TIG rods / MIG wires	Flux cored wires
1.6901	G–X 8 CrNi 18 10	UTP 68 Kb	UTP A 68	–
1.6902	G–X 6 CrNi 18 10	UTP 68 Kb	UTP A 68	–
1.6905	G–X 5 CrNiNb 18 10	UTP 68 NbKb *	UTP A 68	–
1.6907	X 3 CrNiN 18 10	UTP 68 Kb	UTP A 68	–
1.6909	X 5 CrMnNiN 18 9	UTP 1915	UTP A 1915	–
1.6967	X 3 CrNiMoN 18 14	UTP 1915	UTP A 1915	–
1.6982	G–X 3 CrNi 13 4	UTP 6635	UTP A 6635	UTP AF 6635
1.6983	G–X 3 CrNiMo 16 5	UTP 6655 Mo	–	–

* Availability on request

UTP

UTP 68

Stabilized stick electrode for CrNi-steels

Standards :

Material-No.	:	1.4551
EN 1600	:	E 19 9 Nb R 3 2
AWS A5.4	:	E 347-17

Application field

The rutile coated welding stick electrode **UTP 68** is suitable for joining and surfacing of stabilized and non stabilized CrNi steels and CrNi cast steels. The deposit is IC resistant with stabilized base material up to + 400°C working temperature. The stick electrode is also applicable for the 2nd layer on cladded CrNi steels.

Base materials

1.4301, 1.4312, 1.4541, 1.4550, 1.4552

Welding characteristics and special properties of the weld metal

The stick electrode is weldable in all positions except vertical down. It has a stable arc and is spatter free. Easy ignition and re-ignition, self detaching slag. Clean and finely wrippled bead without undercutting.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 380	> 590	> 30	> 47

Weld metal analysis in %

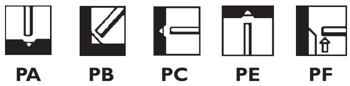
C	Si	Mn	Cr	Ni	Nb	Fe
0,03	0,8	0,5	19,0	10,0	0,25	balance

Welding instruction

Weld stick electrode slightly inclined with a short arc. Re-drying 2 hours at 120 – 200° C.

Current type DC (+) / AC

Welding positions



Availability / Current adjustments

Stick electrodes	Ø mm x L	2,0 x 300	2,5 x 350	3,2 x 350	4,0 x 350
Amperage	A	40 – 60	50 – 90	80 – 110	110 – 140

Approvals

TÜV (No. 02592), ABS, GL

UTP 68 LC

Low carbon stick electrode for CrNi steels

Standards :

Material-No.	:	1.4316
EN 1600	:	E 19 9 L R 3 2
AWS A5.4	:	E 308 L - 17

Application field

The rutile coated stick electrode **UTP 68 LC**, with a low carbon content, is used for joining and building up of identical low carbon, austenitic CrNi steels and CrNi cast steels. Due to the low C-content the deposit is highly resistant to intercristaline corrosion and can be used for working tem-peratures up to + 350° C.

Base materials

1.4301, 1.4306, 1.4311, 1.4312 1.4541

Welding characteristics and special properties of the weld metal

The stick electrode is weldable in all positions except vertical down. It has a smooth drop transfer and the deposit is finely rippled and without undercut. Slag removal is easy and without residues.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 350	> 520	> 35	> 47

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,025	0,8	0,5	19,0	10,0	balance

Welding instruction

The stick electrode should be welded slightly inclined and with a short arc. Re-drying 2 hours at 120 – 200° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,0 x 300	2,5 x 350	3,2 x 350	4,0 x 350	5,0 x 450
Amperage	A	40 - 60	50 - 90	80 - 120	110 - 160	140 - 200

Approvals

TÜV (No. 00100), ABS, GL

UTP 68 Mo

Stabilized stick electrode for CrNiMo steels

Standards :

Material-No.	:	1.4576
EN 1600	:	E 19 12 3 Nb R 3 2
AWS A5.4	:	E 318 - 16

Application field

The rutile coated stick electrode **UTP 68 Mo** is used for joining and surfacing of stabilized and non stabilized CrNiMo steels and CrNiMo cast steels. The deposit is IC resistant with stabilized base material up to + 400°C working temperature.

Base materials

1.4401, 1.4404, 1.4408, 1.4436, 1.4571, 1.4580, 1.4581, 1.4583

Welding characteristics and special properties of the weld metal

The stick electrode is weldable in all positions except vertical down. Even flow, very easy slag removal. Smooth, notch-free seam surface.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
380	560	30	55

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Nb	Fe
0,025	0,8	0,6	18,0	2,7	12,0	0,25	balance

Welding instruction

Clean the weld zone and above all degrease it. Keep a short arc. Weld with dry stick electrodes. Re-dry for 2 h at 120 – 200° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	1,5 x 250	2,0 x 300	2,5 x 350	3,2 x 350	4,0 x 350	5,0 x 450
Amperage	Ø	25 - 40	40 - 60	50 - 90	80 - 120	120 - 160	140 - 200

Approvals

TÜV (No. 02593)

UTP 68 MoLC

Low carbon stick electrode for CrNiMo steels

Standards :

Material-No.	:	1.4430
EN 1600	:	E 19 12 3 L R 3 2
AWS A5.4	:	E 316 L-17

Application field

The rutile coated stick electrode **UTP 68 MoLC**, with a low C content, is used for joining and surfacing of identical, low carbon, austenitic CrNiMo steels and CrNiMo cast steels. The weld deposit has, due to the low C content, a high resistance to intercristalline corrosion and can be used for working temperatures up to + 400°C.

Base materials

1.4401, 1.4404, 1.4436, 1.4571, 1.4573, 1.4580, 1.4583

Welding characteristics and special properties of the weld metal

The stick electrode is weldable in all positions except vertical down. The weld deposit is smooth and fine rippled. Slag removal is very easy and without residues.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
380	560	30	60

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
0,025	0,8	0,5	18,0	12,0	2,8	balance

Welding instruction

The stick electrode should be welded slightly inclined and with a short arc. Re-drying 2 hours at 120 – 200° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	1,5 x 250	2,0 x 300	2,5 x 350	3,2 x 350	4,0 x 350	5,0 x 450
Amperage	Ø	25 - 40	40 - 60	50 - 90	80 - 120	120 - 160	140 - 200

Approvals

TÜV (No. 00101), ABS, DB (No. 30.138.03), GL, DNV

UTP 6824 LC

Low carbon CrNi-stick electrode for dissimilar metal joints and claddings

Standards :

Material-No.	:	~ 1.4332
EN 1600	:	E 23 12 L R 3 2
AWS A5.4	:	E 309 L-17

Application field

The rutile coated stick electrode **UTP 6824 LC** is used for joining and surfacing of stainless and heat resistant steels / cast steels as well as for dissimilar metal joints (heterogeneous joints) and for buffer layers on corrosion - or wear resistant claddings on C-steels. The weld deposit is scale resistant up to + 1000° C.

Base materials

1.4541, 1.4550, 1.4583, 1.4712, 1.4724, 1.4742, 1.4825, 1.4826, 1.4828
Joining these materials with unalloyed and low-alloyed steels is possible.

Welding characteristics and special properties of the weld metal

The stick electrode is weldable in all positions except vertical-down. It is distinguished by a stable arc, minimal spatter, and very good slag removal. The weld seam is regularly marked and free of pores.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 390	> 550	> 30	> 47

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,025	0,8	0,8	22,5	12,5	balance

Welding instruction

Weld the stick electrode slightly inclined with a short arc. For claddings, the pre-heating and interpass temperature should be adjusted according to the base material. Re-drying 2 h at 120 – 200° C.

Current type DC (+) / AC

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350	5,0 x 450*
Amperage	A	60 – 80	80 – 110	110 – 140	140 – 180

* available on request

Approvals

TÜV (No. 04074), GL, DNV

Standards :

Material-No.	:	1.4009
EN 1600	:	E 13 B 22
AWS A5.4	:	~ E 410-15

UTP 66

Basic coated stick electrode for12 - 14 % Cr- steels

Application field

Basic coated stick electrode for joining and surfacing on martensitic, ferritic 12 – 14 % Cr-steels. Operating temperature up to 450° C, scale resistant up to 850° C

Base materials

1.4000, 1.4001, 1.4002, 1.4006, 1.4008, 1.4021, 1.4024, 1.4027

Properties of the weld metal

The weld deposit of **UTP 66** is stainless and similar to 13 %-Cr steels / cast steels.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Hardness HB
450	650	25	360

Weld metal analysis in %

C	Si	Mn	Cr	Fe
< 0,5	0,5	0,5	13,0	balance

Welding instructions

Preheating ins necessary. The interpass temperature and post weld heat treatment must be adjusted to the current wall thickness. In joint welds on ferritic steels preheating to 200-300°C is necessary, martensitic steels to 300-400°C. Re-drying 2 h at 120 – 200° C.

Current type = +

Welding positions PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 450*
Amperage	A	60 – 80	80 – 110	110 – 140	140 – 180

* available on request

UTP 660

Basic coated stick electrode for17 % Cr- steels

Standards :

Material-No.	:	1.4015
EN 1600	:	E 17 B 42
AWS A5.4	:	E 430-15

Application field

UTP 660 is a basic coated stick electrode for joining and surfacing on martensitic, ferritic 17 % Cr-steels of the same nature. Particularly for tight surfaces on gas, water and steam fittings.

Base materials

1.4510, 1.4057

Properties of the weld metal

The weld deposit of **UTP 660** is stainlesss and corrosion resistant as similar 17%-Cr-steels, free of scale in air and oxidizing combustion gas up to 950°C. Suited especially in sulphureous combustion gas in high temperatures.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Hardness HB
350	550	20	260

Weld metal analysis in %

C	Si	Mn	Cr	Fe
0,08	0,4	0,6	17,0	balance

Welding instructions

Preheating, interpass temperature and postweld heat treatment must be adjusted to the prevailing base metal and wall thickness. In joints and surfacings of similar ferritic Cr-steels, keep heat input very low because ferritic 17%-Cr-steels tend to embrittlement by coarse-grained development. Re-drying 2 - 3 h at 250 – 300° C.

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 250*	3,2 x 350*	4,0 x 400*
Amperage	A	60 – 80	90 – 110	110 – 140

* available on request

UTP 6615

Basic coated stick electrode for13 % Cr-, 1 % Ni steels

Standards :

Material-No.	:	1.4018
EN 1600	:	E Z 13 1 B 4 2
AWS A5.4	:	~ E 410-15

Application field

UTP 6615 is a basic coated stick electrode for joining and surfacing on martensitic-ferritic 13 % Cr/ 1 % Ni steels of the same nature. High resistance to erosion, cavitation and wear.

Base materials

1.4008, 1.4027, 1.4003

Properties of the weld metal

The weld deposit of **UTP 6615** is stainless and similar to 13 %-Cr steels / cast steels.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
550	720	15	50

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,05	0,3	0,8	13,0	1,0	balance

Welding instructions

Preheating ins necessary. The interpass temperature and post weld heat treatment must be adjusted to the current wall thickness. In joint welds on ferritic steels preheating to 200-300°C is necessary, martensitic steels to 300-400°C. Re-drying 2 h at 120 – 200° C.

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 350*	3,2 x 350*	4,0 x 450*
Amperage	A	60 – 100	100 - 130	120 - 150

* available on request

UTP 6635

Basic coated stick electrode for13 % Cr-, 4 % Ni steels

Standards :

Material-No.	:	1.4351
EN 1600	:	E 13 4 B 4 2
AWS A5.4	:	E 410 NiMo

Application field

UTP 6635 is a basic-coated stick electrode for joinings and surfacings on corrosion resistant martensitic CrNi-steels and corresponding cast steels.The application field is in the armatures- and power station construction. The weld deposit has an increased resistance to cavitaion and erosion also at working temperatures up to 350°C.

Base materials

1.4313, 1.4407, 1.4413, 1.4414

Welding properties

UTP 6635 is weldable in all positions, except vertical-down. Easy slag removal, smooth and notch-free welding surface. Recovery: 130 %.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
650	760	15	55

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
0,03	0,25	0,8	13,0	4,0	0,45	balance

Welding instructions

Weld stick electrode slightly inclined with a short arc. For a wall thickness > 10 mm, a preheating of max. 150°C is recommended. Re-drying 2 - 3 h at 250 – 350° C.

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 450	5,0 x 450
Amperage	A	60 – 80	70 – 100	110 – 160	150 – 190

Approvals

TÜV (No. 05067)

UTP 6655 Mo

Basic coated stick electrode for17 % Cr-, 5 % Ni steels

Standards :
EN 1600 : EZ 17 5 1 B 4 2

Application field

UTP 6655 Mo is a basic coated stick electrode for joining and surfacing on Cr-steels / cast steels with 16 % Cr, 5 % Ni, 1 % Mo, used in the water turbine - and pump construction

Base materials

1.4405, 1.4418

Properties of the weld metal

The weld deposit of **UTP 6655 Mo** is stainless as resistant to corrosion as similar 17%-Ni steels. It has a high resistance to corrosion and vibratory corrosion.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
700	900	15	40

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
0,03	0,3	0,6	17,0	5,0	1,0	balance

Welding instructions

For similar and sissimilar steels up to a 10 mm wall thickness, preheating of 100-150 °C has to be kept. Above 10 mm 150 - 200 °C. Re-drying 2 h at 250-300° C.

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 400*
Amperage	A	60 – 80	90 - 110	110 - 140

* available on request

UTP 683 LC

Low-carbon high efficiency stick electrode for CrNiMo-steels

Standards :

Material-No.	:	1.4430
EN 1600	:	E 19 12 3 LR 7 3
AWS A5.4	:	E 316 L-26

Application field

UTP 683 LC is a rutile coated, synthetic high performance stick electrode for joining and surfacing on stainless austenitic CrNiMo steels and dissimilar metal joints of austenitic and ferritic steels.

Base materials

1.4401, 1.4571, 14550, 14580

Welding properties

The weld deposit of **UTP 683 LC** is IC-resistant in welded joints with austenitic CrNiMo steels up to temperatures to 400°C. **UTP 683 LC** has excellent welding properteis. Smooth and notch free surfaces. Slag removal is easily and without residuces. Good current capacity and good stretch length, high deposit efficiency. 180 % recovery.

Mechanical properties of the weld metal

Yield strenth $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
370	550	35	50

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
0,025	0,8	0,6	19,0	12,0	2,6	balance

Welding instructions

Weld stick electrode slightly tipped and with short arc. Re-drying 2 h at 250-350° C.

Current type = + | ~

Welding positions

PA PB

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,0 x 300	2,5 x 350	3,2 x 350	4,0 x 450
Amperage	A	50 – 80	70 – 120	110 - 160	140 - 220

Approvals

DB (No. 30.138.02)

UTP 68 TiMo

Low-carbon high efficiency stick electrode for CrNiMo-steels

Standards :

Material-No.	:	1.4430
EN 1600	:	E 19 12 3 LR 7 3
AWS A5.4	:	E 316 L-26

Application field

UTP 68 TiMo is a rutile coated synthetic high performance stick electrode for joining and surfacing on stainless austenitic CrNiMo steels and dissimilar metal joints of austenitic and ferritic steels.

Base material

1.4401, 1.4571, 14550, 14580

Properties of the weld metal

The weld deposit of **UTP 68 TiMo** is stainless, IC-resistant (wet corrosion up to 400°C). It is corrosion resistant as similar, low carboned and stabilized, austenitic 18/8 CrNiMo steels.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
370	550	35	50

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
0,025	0,8	0,6	19,0	12,0	2,6	balance

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Current type

= +	~

Welding positions

PA PB

Availability / Current adjustments

Stick electrodes	Ø mm x L	1,6 x 250	2,0 x 300	2,5 x 350	3,2 x 350	4,0 x 450
Amperage	A	40 - 60	50 - 80	70 - 120	110 - 160	140 - 220

Approvals

TÜV (No. 00099)

UTP 684 MoLC

Stick electrode for vertical-down welding of stainless and chemical resistant CrNiMo-steels

Standards :

Material-No.	:	1.4430
EN 1600	:	E 19 12 3 LR 15
AWS A5.4	:	E 316 L-17

Application field

UTP 684 MoLC is a stick electrode for welding on low-carbon and chemical resistant CrNiMo steels of the same nature in vertical-down position.

Base materials

1.4401, 1.4404, 1.4435, 1.4436, 1.4571, 1.4573, 1.4580, 1.4583

Properties of the weld metal

The weld deposit of **UTP 684 MoLC** is stainless, IC-resistant (wet corrosion up to 400°C). It is corrosion resistant as similar, low carboned and stabilized, austenitic 18/8 CrNiMo steels.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 350	> 540	> 25	> 47

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
0,025	0,8	0,9	19,0	12,0	2,8	balance

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Current type = +

Welding positions PG

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 300
Amperage	A	75 - 85	105 - 115

Approvals

TÜV (No. 06726), GL, DNV

UTP 6807 MoCuKb

Basic-coated stick electrode for Cu-alloyed Super-Duplex-steels

Standards :
EN 1600 : E 25 9 3 Cu N LB 42

Application field

UTP 6807 MoCuKb is a basic coated stick electrode with austenitic/ferritic deposit for joining and building up on corrosion resistant Duplex steels and cast steels with addition of Cu.Applicable in Offshore technology.

Base materials

1.4515

Properties of the weld metal

The weld deposit of **UTP 6807 MoCuKb** is highly resistant to stress corrosion cracking and against crevice corrosion in high chloride containing medias (halogenides).

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
700	850	25	60

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Cu	Fe
0,03	0,5	1,2	25,0	3,0	10,0	0,25	1,0	balance

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Current type = +

Welding positions PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 400*
Amperage	A	50 - 75	70 - 110	90 - 150

* available on request

UTP 6808 Mo

Rutil-basic coated stick electrode for duplex steels

Standards :

EN 1600	:	E 22 9 3 N LR 3 2
AWS A5.4	:	E 22 09-17

Application field

UTP 6808 Mo is a rutile basic coated stick electrode for joining and surfacing on corrosion resistant steels / cast steels with an austenitic-ferritic structure (Duplex steels). The deposit is highly resistant to pitting, gap- and stress corrosion in chloride containing media. Applicable in temperatures up to 250°C.

Base materials

1.4347, 1.4460, 1.4462, 1.4463

Welding properties

UTP 6808 Mo is weldable in all positions except vertical-down. Stable arc, very good slag removal, finely rippled and a notch free weld seam.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v /Joule + 20°C	Impact strength K_v /Joule - 40°C
> 540	> 680	> 22	47	45

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Cu	Fe
0,025	0,9	0,9	22,5	3,0	9,5	0,2	0,8	balance

Welding instruction

Weld stick electrode slightly inclined and with short arc. Thick walled materials have to be preheated to 100 °C. Re-drying 2 h at 250-350° C.

Current type = + | ~

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 350*	3,2 x 350	4,0 x 350	5,0 x 450
Amperage	A	40 - 75	70 - 120	110 - 150	130 - 200

* available on request

Approvals

TÜV (No. 06000)

UTP 6809 Mo

Rutil-basic coated austenitic-ferritic stick electrode with low C-content

Standards :
EN 1600 : E 22 9 3 Cu N LR 3 2

Application field

UTP 6809 Mo is a rutile basic coated stick electrode forjoining and surfacing on corrosion resistant steels and cast steels with an austenitic-ferritic structure (Duplex-steels).

Base materials

1.4460, 1.4462

Welding properties

UTP 6809 Mo is weldable in all positions except vertical-down. Stable arc, very good slag removal, finely rippled and a notch free weld seam. The deposit is especially resistant to pitting, gap- and stress corrosion cracking in chloride containing media (e.g. seawater)

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
570	740	> 25	50

Weld metal analysis in %

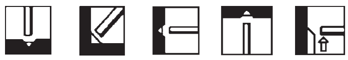
C	Si	Mn	Cr	Mo	Ni	N	Cu	Fe
< 0,03	0,85	0,8	23,0	3,0	9,0	0,12	2,0	balance

Welding instruction

Weld stick electrode slightly tipped and with short arc. Thick walled materials have to be preheated to 100 °C. Re-drying 2 h at 250-350° C.

Current type = + | ~

Welding positions



PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 450
Amperage	A	50 - 75	70 - 110	90 - 150	130 - 200

Approvals

TÜV (No. 06679)

UTP 6809 MoCuKb

Basic-coated stick electrode for Super Duplex steels

Standards :
EN 1600 : E 25 9 3 Cu N LB 42

Application field
UTP 6809 MoCuKb is a basic coated stick electrode with austenitic/ ferritic deposit for joining and building up on corrosion resistant Super Duplex steels and cast steels with Cu addition. The deposit is highly resistant to crevice corrosion and stress corrosion cracking in high chloride containing medias.

Base materials
1.4517

Properties of the weld metal
The weld deposit of **UTP 6809 MoCuKb** is stainless, IK-resistant (wet corrosion 250 °C), has a good resistance to stress corrosion cracking in chloride- and phosphor-containing media. Due to its high Cr- and Mo-content, it is also resistant to pitting.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
650	850	25	45

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Cu	Fe
0,025	0,5	1,2	25,0	3,0	9,5	0,2	3,0	balance

Welding instruction
Welding area must be degreased and thoroughly cleaned to metallic bright. Preheating and post weld heat treatment of similar materials are usually not necessary. If requested a solution heat treatment at 1120°C may be carried out.

Current type = +

Welding positions PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400
Amperage	A	50 - 75	70 - 110	90 - 150

Standards :

EN 1600	:	E 25 9 4 N LB 42
AWS A5.4	:	E 2594-15

UTP 6810 MoKb

Basic-coated low carbon stick electrode for Super Duplex steels

Application field

UTP 6810 MoKb is a basic coated low-carbon stick electrode for joining and surfacing on high corrosion resistant steels and cast steels with austenitic-ferritic structure (Super-Duplex steels).The weld deposit has a very good resistance in high chloride containing media.

Base materials

1.4460, 1.4463, 1.4468, 1.4469

Welding properties

UTP 6810 MoKb is weldable in all positions except vertical-down. Fine droplet.The weld seam is smooth and finely rippled, easy and residue-free slag removal.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v /Joule + 20°C	- 50°C
720	850	22	> 70	45

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Fe
0,03	0,55	1,5	25,5	4,3	9,5	0,25	balance

Welding instruction

Weld stick electrode slightly inclined with short arc.Thick walled parts must be preheated to approx. 100°C. Re-drying 2 - 3 h at 250-300° C.

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 450*
Amperage	A	50 - 75	70 - 110	90 - 150	130 - 200

* available on request

UTP 6824 MoLC

Low carbon stick electrode for dissimilar metal joints and claddings

Standards :

EN 1600	:	E 23 12 2 L R 3 2
AWS A5.4	:	~ E 309 MoL-17

Application field

UTP A 6824 MoLC is a low-carbon CrNiMo-stick electrode for dissimilar metal joints and claddings on the following base materials.

Base materials

1.4401, 1.4404, 1.4580, 1.4571

Properties of the weld metal

The weld deposit of **UTP 6824 MoLC** is stainless, IK-resistant (wet corrosion up to 350°C) and is suited for austenitic ferritic joints (maximum application temperature at 300°C).

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 490	> 670	> 25	> 47

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,03	0,8	1,5	23,0	2,8	12,0	balance

Welding instruction

Weld area must be thoroughly cleaned and degreased. Preheating and post heat treatment have to be adjusted to the base metal. Re-drying 2 h at 120 - 200° C.

Current type = + | ~

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,0 x 300	2,5 x 350	3,2 x 350	4,0 x 350
Amperage	A	40 - 60	60 - 80	80 - 120	100 - 160

UTP 1817

Low carbon stick electrode for CrNiMo-steels

Standards :

Material-No.	:	1.4440
EN 1600	:	E 18 16 5 N LR 3 2
AWS A5.4	:	~ E 317 L-16

Application field

UTP 1817 is a rutile coated stick electrode for joining and surfacing on stainless steels.

Base materials

1.4401, 1.4404, 1.4406, 1.4429, 1.4435, 1.4436, 1.4438, 1.4439, 1.4446, 1.4448

Properties of the weld metal

The weld deposit of **UTP 1817** is stainless and IK-resistant (wet corrosion up to 400°C). Due to its high Mo-content it has increased resistance to chloride containing media and pitting. Not magnetizeable.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
350	550	35	80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Fe
0,025	0,8	1,0	18,0	4,0	17,0	0,1	balance

Welding instruction

Welding area must be degreased and thoroughly cleaned to metallic bright. Preheating is usually not necessary. If requested a solution heat treatment at 1050°C may be carried out.

Current type = + | ~

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*
Amperage	A	40 - 80

* available on request

Approvals

TÜV (No. 03192)

UTP 1915

Basic-coated stick electrode with 0 % ferrit for urea synthesis plants

Standards :

Material-No.	:	1.4455
EN 1600	:	E 20 16 3 Mn L B 42
AWS A5.4	:	E 316 LMn-15

Application field
UTP 1915 is a basic coated stick electrode for joining and surfacing on corrosion resistant CrNiMo-steels/ cast steels and cold tough steels. The weld deposit is corrosion resistant up to 300° C service temperature. Special application field: urea synthesis plants. Joining and surfacing on non- and low-alloyed steels are possible.

Base materials
1.3952, 1.4404, 1.4406, 1.4429, 1.4435, 1.5637, 1.5680, 1.5681, 1.5638.

Properties of the weld metal
The weld deposit of **UTP 1915** is stainless, IK-resistant and corrosion resistant as low-carbon CrNiMo(Mn,N9)-steels. It is resistant to seawater and nitric acid.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
450	640	30	80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Fe
0,025	0,4	5,7	21,0	3,0	16,0	0,18	balance

Welding instruction
Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350	4,0 x 400*
Amperage	A	50 - 75	70 - 110	80 - 120

* available on request

Approvals
GL

UTP 1925

Rutile basic coated stick electrode with high corrosion resistance

Standards :

Material-No.	:	1.4519
EN 1600	:	E 20 25 5 Cu N L R 3 2
AWS A5.4	:	~ E 385-16

Application field

UTP 1925 is a rutile basic coated stick electrode for joining and surfacing on stainless steels and cast steels with high corrosion resistance to reducing media.

Base material

1.4500, 1.4505, 1.4506, 1.4539

Properties of the weld metal

The weld dposit of **UTP 1925** is stainless and IK-resistant up to 350°C.Good corrosion properties in reducing medias resp. similar steels.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	580	30	70

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Cu	Fe
0,025	0,08	1,5	20,0	4,5	25,0	1,5	balance

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Current type | = + | ~ |

Welding positions PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 450
Amperage	A	60 - 80	80 - 120	100 - 160	

Approvals

TÜV (No. 04186)

UTP 2522 Mo

Basic coated stick electrode with high corrosion resistance

Standards :

EN 1600 : E 25 22 2 N LB 4 2

Application field

UTP 2522 Mo is used for joining and surfacing of high corrosion resistant CrNiMo-steels and cast steels. Highly resistant to cracking and intercristaline corrosion, in oxidizing and reducing media. Application fields are urea and nitric acid plants.

Base materials

1.4465, 1.4577

Joining these materials with unalloyed and low-alloyed steels is possible.

Properties of the weld metal

The weld deposit of **UTP 2522 Mo** is stainless, IK-resistant (wet corrosion up to 350°C). Good resistance to chloride-containing media, pitting and nitric acid.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	620	30	80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Fe
0,03	0,25	5,5	25,0	2,5	22,0	0,15	balance

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 250*	3,2 x 350*	4,0 x 400*
Amperage	A	60 - 80	80 - 120	100 - 160

* available on request

UTP 3320 LC

Rutil-basic coated stick electrode with high corrosion resistance

Standards :
AWS A5.4 : 320 LR-15

Application field
UTP 3320 LC Rutile coated stick electrode. It is suited for joining and surfacing on the same type and similar composition of high corrosion resistant roll - and cast iron materials.

Base materials
2.4660

Properties of the weld metal
The weld deposit of **UTP 3320 LC** is stainless and IK-resistant. It has a high corrosion resistant, mainly in reducing media.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 350	> 520	> 30	> 50

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Nb	Cu	Fe
< 0,03	< 0,3	< 1,5	20,0	2,5	34,0	< 0,4	3,5	balance

Welding instruction
Weld area must be degreased and thoroughly cleaned to metallic bright. Preheating and post weld heat treatment usually not necessary. If requested a solution heat treatment at 1120°C can be carried out.

Current type = + | ~

Welding positions PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*
Amperage	A	50 - 70	70 - 90

* available on request

Standards :

Material-No.	:	1.4009
EN ISO 14343	:	G(W) 13 (Si)
AWS A5.9	:	~ ER 410

UTP A 66

Gas shielded welding wire for 14 % Cr-steels

Application field

UTP A 66 is used for stainless steels with 13 – 14 % Cr, e. g. X 7 Cr 13, X 10 Cr 13, X 20 Cr 13, X 15 Cr 13, X 10 CrAl 13. Surfacing of contact surfaces on non-alloy and low-alloy steels and cast steel grades for working temperatures up to 450° C.

Properties of the weld metal

The weld deposit of **UTP A 66** is stainless and corrosion resistant as similar 13%-Cr-steels / cast steels.

Base materials

1.4006	X12Cr13
1.4021	X20Cr13

Hardness of the pure weld metal

280 - 360 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
450	650	15

Weld metal analysis in %

C	Si	Mn	Cr	Fe
0,1	0,8	0,8	14,5	balance

Welding instruction

Preheating, interpass temperature and post weld heat treatment has to be adjusted to the prevailing base metal and wall thickness. In joint welding on ferritic steels preheat to 300°C, martensitic steels to 300 - 400°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability Spools
		M 11	M 13	M 21	EN ISO 544
1,2 *	DC (+)	x	x	x	x

* available on request

UTP A 660

MIG/MAG gas shielded welding wire for 17 % Cr-steels

Standards :

Material-No.	:	1.4502
EN ISO 14343	:	G(W) Z 17 Ti
AWS A5.9	:	~ ER 430

Application field

UTP A 660 Stainless steels with 13 – 18 % Cr, e. g. X 7 Cr 14, X 7 CrAl 13, X 8 Cr 17, X 8 CrTi 17. Surfacing of contact surfaces on non-alloy and low-alloy steels and cast steel grades for working temperatures up to + 450° C. Seawater resistant, scale resistant up to + 900° C.

Properties of the weld metal

The weld deposit of **UTP A 660** is stainless and corrosion resistant as similar 17%-Cr-steels, scale resistant in air and oxidizing combustion gas up to 950°C. Suited especially in sulphureous combustion gas in high temperatures.

Base materials

1.4510 X3 CrTi17
AISi 430Ti; AISi 431

Hardness of the pure weld metal	approx. 200 - 280 HB
Hardness bei 500 °C	approx. 120 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 340	> 540	> 20

Weld metal analysis in %

C	Si	Mn	Cr	Ti	Fe
0,06	0,5	0,5	17,5	0,5	balance

Welding instruction

Preheating, interpass temperature and postweld heat treatment must be adjusted to the prevailing base metal and wall thickness. In joints and surfacings of similar ferritic Cr-steels the heat-input has to be very low because 17% ferritic Cr-steels tend to embrittlement by coarse-grained development.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175					Availability	
							Spools	Rods
		I 1	M 12	M 13	M 21	C 1	EN ISO 544	EN ISO 544
1,2 *	DC (+)		x	x	x	x	x	
1,6	DC (-)	x						x

* available on request

UTP A 6635

MIG/MAG gas shielded welding wire for martensitic steels

Standards :

Material-No.	:	1.4351
EN ISO 14343-A	:	G(W) 13 4 (Si)
AWS A5.9	:	~ ER 410 NiMo

Application field

UTP A 6635 is used for joining and building up on identical and similar martensitic CrNi cast steels for the water turbine- and compressor construction with steels.

Properties of the weld metal

The weld deposit of **UTP A 6635** is stainless and corrosion resistant as 13%-Cu(Ni)-steels. It presents a high resistance to corrosion fatigue.

Base materials

1.4317	G-X4 CrNi 13-4
1.4313	X3 CrNiMo 13-4
1.4351	X3 CrNi 13-4
1.4414	G-X4 CrNiMo 13-4

ACI Gr. CA6NM

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
600	800	15	40

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,03	0,7	0,7	13,5	0,55	4,5	balance

Welding instruction

For similar materials up to 10 mm wall thickness, preheating is not necessary. From 10 mm wall thickness and up, preheating at 100 - 150°C should be provided.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M12	EN ISO 544	EN ISO 544
1,2	DC (+)		x	x	
2,0 *	DC (-)	x			x
2,4 *	DC (-)	x			x

* available on request

Approvals

TÜV (No. 10434)

UTP A 68

MIG/MAG gas shielded welding wire for CrNi steels

Standards :

Material-No.	:	1.4551
EN ISO 14343-A	:	G/W 19 9 Nb Si
AWS A5.9	:	ER 347 (Si)

Application field

UTP A 68 is suitable for joining and surfacing in chem. apparatus and vessel construction for working temperatures of –196° C up to 400° C.

Base materials

1.4550	X6 CrNiNb 18-10
1.4541	X6CrNiTi 18-10
1.4552	G-X5 CrNiNb 18-10
1.4311	X2 CrNiN 18-10
1.4306	X2 CrNi 19-11

AISi 347, 321, 302, 304, 3046, 304LN
ASTM A 296 Gr. CF 8 C, A 157 Gr. C 9

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
420	600	30	100

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Fe
0,05	0,4*	1,5	19,5	9,5	0,55	balance

* MIG/MAG wire with Si-content of 0,65 - 1,0

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	
1,0	DC (+)		x	x	
1,0 *	DC (-)	x			x
1,2	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2 *	DC (-)	x			x

Approvals

TÜV (No. 04865; 04866)

UTP A 68 LC

MIG/MAG gas shielded welding wire for CrNi-steels

Standards :

Material-No.	:	1.4316
EN ISO 14343-A	:	G/W 19 9 L
AWS A5.9	:	ER 308 L (Si)

Application field

UTP A 68 LC is suitable for joining and surfacing in chem. apparatus and vessel construction for working temperatures of –196° C up to 400° C.

Base materials

1.4301	X5 CrNiNi 18-10
1.4306	X2 CrNi 19-11
1.4311	X2 CrNiN 18-10
1.4312	G-X10 CrNi 18-8
1.4541	X6 CrNiTi 18-10
1.4546	X5 CrNiNb 18-10
1.4550	X6 CrNINb 18-10

AISi 304; 304L; 302; 321; 347
ASTM A 1576 Gr. C 9; A 320 Gr. B 8 C oder D

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	600	35	100

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,02	0,4*	1,5	20,0	10,0	balance

* MIG/MAG wire with Si-content of 0,65 - 1,0

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	
1,0	DC (+)		x	x	
1,0 *	DC (-)	x			x
1,2	DC (+)		x	x	
1,2 *	DC (-)	x			x
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

* available on request

Approvals

TÜV (No. 00184; 05831)

UTP A 68 Mo

MIG/MAG gas shielded welding wire for CrNi-steels with high Mo content

Standards :

Material-No.	:	1.4576
EN ISO 14343-A	:	G/W 19 12 3 Nb
AWS A5.9	:	ER 318 (Si)

Application field

UTP A 68 Mo is aplicable for joinings and surfacings of stabilized, corrosion resistant CrNiMo steels of similar nature in the construction of chemical apparatus and vessels up to working temperatures of 120° C up to 400° C.

Base materials

1.4401	X5 CrNiMo 17-12-2
1.4404	X2 CrNiMo 17-12-2
1.4435	X2 CrNiMo 18-14-3
1.4436	X3 CrNiMo 17-13-3
1.4571	X6 CrNiMoTi 17-17-7
1.4580	X6 CrNiMoNb 17-12-2
1.4583	X10 CrNiMoNb 18-12
1.4409	G-X2 CrNiMo 19-112

UNS S31653; AISi 361L; 316Ti; 316Cb

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
460	680	35	100

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Nb	Fe
0,03	0,4*	1,5	19,0	2,8	11,5	0,55	balance

* MIG/MAG wire with Si-content of 0,65 - 1,0

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x
4,0 *	DC (-)	x			x

* available on request

Approvals

TÜV (No. 04867; 04868)

UTP A 68 MoLC

MIG/MAG gas shielded welding wire for CrNiMo-steels

Standards :

Material-No.	:	1.4430
EN ISO 14343-A	:	G/W 19 12 3 L
AWS A5.9	:	ER 316 L (Si)

Application field

UTP A 68 MoLC is used for joining and surfacing of low-carbon, corrosion resistant CrNiMo steels exposed to high corrosion for working temperatures up to + 350° C. Application fields are chemical apparatus and vessels.

Base materials

Material-No.	EN Symbol
1.4401	X5 CrNiMo 17-12-2
1.4404	X2 CrNiMo 17-12-2
1.4435	X2 CrNiMo 18-14-3
1.4436	X3 CrNiMo 17-13-3
1.4571	X6 CrNiMoTi 17-12-2
1.4580	X6 CrNiMoNb 17-12-2
1.4583	X10 CrNiMoNb 18-12
1.4409	GX2 CrNiMo 19-11-2
	S31653, AISi 316 L, 316 Ti, 316 Cb

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
420	600	35	100

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,02	0,4*	1,5	18,5	2,8	12,0	balance

* MIG/MAG wire with Si-content of 0,65 - 1,0

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
0,8	DC (+)		x	x	
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x
4,0 *	DC (-)	x			x

Approvals

TÜV (No. 00188; 05832), GL

UTP

UTP A 6808 Mo

MIG/MAG gas shielded welding wire for Duplex steels

Standards :

Material-No.	:	~ 1.4462
EN ISO 14343-A	:	G/W 22 9 3 N L
AWS A5.9	:	ER 22 9

Application field

UTP A 6808 Mo is used for joining and surfacing of corrosion resistant steels as well as cast steel with austenitic-ferritic structure (Duplex steel). Working temperature: up to 250° C

Welding properties and special properties of the weld metal

The weld deposit of **UTP A 6808 Mo** has an excellence resistance against pitting and stress corrosion cracking next to high strength- and toughness-properties. Very good weld- and flow characteristics.

Base materials

1.4462	X2 CrNiMoN 22-5-3		
1.4362	X2 CrNiN 23-4		
1.4462	X2 CrNiMoN 22-5-3 mit	1.4583	X10 CrNiMoNb 18-12
1.4462	X2 CrNiMoN 22-5-3 mit	P2356H/ P265GH/ S255H/ P2956H/ S355N/ 16Mo3	

UNS S31803; S32205

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
600	800	30	80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Fe
0,015	0,25	1,5	22,8	3,0	9,2	0,14	balance

Welding instruction

Welding area must be thoroughly cleaned to metallic bright and degreased. Preheating and post heat treatment are usually not necessary. The interpass temperature should exceed 150°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

Approvals

TÜV (No. 05551; 05550), GL

Standards :

Material-No.	:	1.4332
EN ISO 14343-A	:	GW 23 12 L
AWS A5.9	:	ER 309 L (Si)

UTP A 6824 LC

Gas shielded welding wire for stainless steels

Application field

UTP A 6824 LC ist used for joining and surfacing in chem. apparatus and vessel construction for working temperatures up to + 350° C. Weld cladding of non- and low-alloyed base materials. Dissimilar joints.

Base materials

1.4306	X2 CrNi 19-11
1.4401	X5 CrNiMo 17-12-2
1.4404	X2 CrNiMo 17-13-2
1.4541	X6 CrNiTi 18-10
1.4550	X6 CrNiNb 18-10
1.4571	X6 CrNiMoTi 17-12-2
1.4580	X6 CrNiMoNb 17-12-2

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	590	30	140

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,02	0,4*	1,8	23,0	13,5	balance

* MIG/MAG wire with Si-content of 0,65 - 1,0

Welding instruction

Welding area must be thoroughly cleaned to metallic bright and degreased. Heat-resistant Cr-steels or cast steels have to be preheated according to the base metal. No preheating for similar austenitic steels.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
0,8 *	DC (+)		x	x	
1,0	DC (+)		x	x	
1,2	DC (+)		x	x	
1,6	DC (-)	x			x
2,0	DC (-)	x			x
2,4	DC (-)	x			x
3,2	DC (-)	x			x

* available on request

Approvals

TÜV (No. 05391; 05392), GL

UTP A 6824 MoLC

Austenitic-ferritic CrNiMo gas shielded welding wire

Standards :

Material-No.	:	1.4459
EN ISO 14343-A	:	G/W Z 25 13 3
AWS A5.9	:	~ER 309 L Mo

Application field

UTP A 6824 MoLC is joining and surfacing of steels of difficult weldability, claddings, cushion layers, repairs on hot working tools. The deposit is hot- and cold workhardening.

Base materials

1.4306	X2 CrNi 19-10
1.4308	G-X5 CrNi19-10
1.4311	X2 CrNiN 18-10
1.4401	X5 CrNiMo 17-12-2
1.4404	X2 CrNiMo 17-13-2
1.4408	G-X5 CrNiMo 19-11-2
1.4435	X2 CrNiMo 18-14-3
1.4436	X3 CrNiMo 17-13-3
1.4541	X6 CrNiTi 18-10
1.4550	X6 CrNiNb 18-10
1.4552	G-X5 CrNiNb 19-11
1.4571	X6 CrNiMoTi 17-12-2
1.4580	X6 CrNiMoNb 17-12-2

3Cr12-steels among each other or with unalloyed or low alloyed steels.

Hardness of the pure weld metal approx. 220 HB

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 500	> 700	> 25	> 60

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,02	0,4*	1,5	22,0	2,5	14,5	balance

Welding instruction

Welding area must be thoroughly cleaned to metallic bright and degreased. Heat-resistant Cr-steels or cast steels have to be preheated according to the base metal. No preheating for similar austenitic steels.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
1,2 *	DC (+)		x	x	
2,4	DC (-)	x			x

* available on request

Approvals

TÜV (No. 09178; 09179)

UTP A 1817

Gas shielded welding wire for CrNi-steels with high Mo-content

Standards :

Material-No. : ~ 1.4440
EN ISO 14343-A : GW 18 16 5 N L

Application field

UTP A 1817 is used for joining in the construction of chemical equipment and containers. Fully austenitic weld metal with excellent resistance to pitting, crevice and stress corrosion cracking. For working temperatures up to 350° C.

Properties of the weld metal

The weld metal of **UTP A 1817** is stainless and IK-resistant (wet corrosion up to 400°C). Due to the high Mo-content it has a high resistance against chloride-containing media and pitting. Not magetizeable.

Base materials

1.4436 X3 CrNiMo 17-13-3
1.4439 X2 CrNiMoN 17-13-5
1.4429 X2 CrNiMoN 17-13-3
1.4438 X2 CrNiMo 18-15-4
1.4583 X10 CrNiMoNb 18-12
AISi: 316Cb; 316LN; 317L
UNS S31726

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
450	650	35	120

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Fe
0,02	0,4*	3,8	19,0	4,2	16,5	0,15	balance

* MIG/MAG wire with Si-content of 0,65 - 1,0

Welding instruction

Welding area must be cleanded to metallic bright and degreased. Preheating usually not necessary. If requested a solution heat treatment at 1050°C can be carried out.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
1,0 *	DC (+)		x	x	
1,2 *	DC (+)		x	x	
1,6 *	DC (-)	x			x

* available on request

Approvals

TÜV (No. 03157 + No. 04251)

UTP A 1915

Gas shielded welding wire for urea synthesis plants

Standards :

Material-No.	:	1.4455
EN ISO 14343-A	:	GW 20 16 3 Mn L
AWS A5.9	:	ER 316 LMn

Application field

UTP A 1915 is used for joining and surfacing in the chemical apparatus construction where a low-carbon, austenitic CrNiMo weld deposit with less than 0,5 % ferrite is required. Special application field: urea synthesis plants.

Properties of the weld metal

The weld deposit of **UTP A 1915** is stainless, IK-resistant and corrosion resistant as low-carbon CrNiMo(Mn,N)-steels. It is resistant to seawater and has a good resistance to nitric acids.

Base materials

Material-No.	EN
1.4429	X2 CrNiMo 17-13-3
1.4315	X5 CrNiN 19-9
1.4561	X1 CrNiMoTi 18-13-2
1.6903	X10 CrNiTi 18-10

as well as cold-tough 3,5 - 5,0 % Ni-steels

1.5662 X8 Ni9

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
450	650	30	100

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Fe
0,02	0,55	7,5	19,5	2,8	15,5	0,15	balance

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
1,0 *	DC (+)		x	x	
2,0 *	DC (-)	x			x
2,4 *	DC (-)	x			x

Approvals

GL (TIG)

* available on request

UTP A 1925

Gas shielded welding wire for CrNiMo-steels with high Mo-content

Standards :

Material-No.	:	1.4519
EN ISO 14343-A	:	G/W 20 25 5 Cu N L
AWS A5.9	:	ER 385

Application field

UTP A 1925 is used for joining and surfacing of corrosion resistant and austenitic CrNi and CrNiMo steels of the same and of similar nature, e.g. 1.4500, 1.4505, 1.4506, 1.4538 and 1.4539. For working temperatures of –196° C up to 400° C. Joining and surfacing on non- and low-alloyed steels are possible.

Properties of the weld metal

The weld deposit of **UTP A 1925** is stainless, IK-resistant (wet corrosion up to 350°C). Good corrosion resistance in reducing media, resp. similar steels as base metal.

Base materials

Material-No.	EN
1.4539	X1 NiCrMoCu 25-20-5
1.4439	X2 CrNiMoN 17-13-5
1.4537	X1 CrNiMoCuN 25-25-5
	UNS N 08904, S131726

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	600	35	100

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Cu	Fe
0,02	0,5	1,7	20,0	4,5	25,0	1,5	balance

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	M 12	EN ISO 544	EN ISO 544
1,0 *	DC (+)		x	x	
1,2 *	DC (+)		x	x	
1,6 *	DC (-)	x			x
2,0	DC (-)	x			x

* available on request

Approvals

TÜV (No. 04205; 04206)

Standards :

EN ISO 14343-A : G/W 25 22 2 N L
AWS A5.9 : ER 310 (mod.)

UTP A 2522 Mo

Fully austenitic welding welding wire for high corrosion resistant steels.

Application field

UTP A 2522 Mo is suitable for joinings and surfacings on corrosion resistant CrNiMo-steels. Main application fields are hard stressed steels, urea- and nitric acid plants as for example material-no. 1.4465 (X 2CrNiMoN 25 25) and other corrosion resistant steels with a fully austenitic structure.

Properties of the weld metal

Due to the special chemical composition **UTP A 2522 Mo** is hot crack resistant and highly resistant to intercristalline corrosion. Besides it is resistant to oxidizing and reducing media due to the high chromium and nickel contents.

Base materials

Material-No.	EN
1.4577	X3 CrNiMoTi 25 25
1.4578	X4 CrNiMoTi 25 25
1.4588	G-X7 CrNiMoNb 25 25
1.4465	X 2CrNiMoN 25 25

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
420	620	30	80

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Fe
0,02	0,3	5,0	25,0	2,5	21,5	0,15	balance

Welding instruction

Degrease and clean weld area thoroughly (metallic bright). Preheating and post heat treatment are usually not necessary.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	L (mm)
2,0 *	DC (-)	x	1000
2,4 *	DC (-)	x	1000

* available on request

Approvals

TÜV (No. 07065-TIG)

UTP AF 6635

MAG flux-cored-wire for soft martensitic steels

Standards :

Material-No. : 1.4351
EN 12073 : T 13 4 RM

Application field

UTP AF 6635 is a low carbon, gas shielded cored wire without slag for joining and surfacing on soft martensitic Cr and CrNi steels and cast steels used mainly in water turbines and in power stations such as material No. 1.4313.

Welding properties

UTP AF 6635 is weldable in all positions except vertical-down. Easy slag removal, smooth and notch-free surface. Recovery 130 %.

Base materials

Material-No.	EN
1.4317	G X4 CrNi 13-4
1.4313	X3 CrNiMo 13-4
1.4351	X3 CrNi 13-4
1.4414	G X4 CrNiMo 13-4

ACIGr. CA6 NM, S 41500

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
700	850	13	35

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,025	0,5	1,0	13,0	0,5	4,5	balance

Welding instruction

Preheat parts with wall thicknesses > 10 mm to 150° C.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability
			Spools
		M 12	EN ISO 544
1,2 *	DC (+)	x	x

* available on request

UTP AF 68 LC

Low carbon austenitic CrNi-flux cored wire with rutile slag

Standards :

Material-No.	:	1.4316
EN 17633-A	:	T 19 9 L RM3 - T 19 9 L RC3
AWS A5.22	:	E 308 LT-0-1 / E 308 LT-0-4

Application field

UTP AF 68 LC is a low carbon, CrNi flux-cored wire with rutile slag used for joint-welding of alloyed CrNi-steels and cast steels.

Properties of the weld metal

The weld metal shows sufficient grain stability up to 350° C and is scaling resistant up to 800° C.

Base materials

Material-No.55AISI		UNS	EN Symbol
1.4300	302	S30200	X12 CrNi 18 8
1.4301	304	S30400	X5 CrNi 18 10
1.4306	304 L	S30403	X2 CrNi19 11
1.4311	304 LN	S30453	X2 CrNiN 18 10
1.4312	305	J92701	GX10 CrNi 18 8
1.4303	308	S30800	X4 CrNi 18 12
1.4541	321	S32100	X6 CrNiTi 18 10
1.4550	347	S34700	X6 CrNiNb 18 10

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
380	560	35	70

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,025	0,6	1,5	19,5	10,0	balance

Welding instruction

Clean weld area thoroughly. Welding torch should be held slightly inclined, using the pushing technique. Possibly weaving.

Welding positions

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability Spools
		C 1	M 20	M 21	EN ISO 544
0,9 *	DC (+)	x	x	x	x
1,2	DC (+)	x	x	x	x
1,6 *	DC (+)	x	x	x	x

* available on request

Approvals

TÜV (No. 06365)

UTP AF 68 MoLC

Low-carbon austenitic CrNi-flux-cores wire with rutile slag

Standards :

Material-No.	:	1.4430
EN 17633-A	:	T 19 12 3 L RM3
		T 19 12 3 L RC3
AWS A5.22	:	E 316 LT0-1 / E 316 LT0-4

Application field

UTP AF 68 LC is a low carbon, CrNi flux-cored wire with rutile slag for joining and surfacing of CrNi-steels and cast steel.

Properties of the weld metal

The weld metal shows sufficient grain stability up to 350° C and is scaling resistant up to 800° C.

Base materials

Material-No.	AISI	UNS	EN
1.4401	316	S31600	X5 CrNiMo 17-12-2
1.4404	316L	S31603	X2 CrNiMo 17-12-2
1.4406	316LN	S31653	X2 CrNiMoN 17-12-2
1.4571	316Ti	S31635	X6 CrNiMoTi 17-12-2
1.4583	318	S31640	X10 CrNiMoNb 18-12

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	560	35	55

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,025	0,6	1,5	19,5	2,7	12,5	balance

Welding instruction

Clean weld area thoroughly. Welding torch should be held slightly inclined, using the pushing technique. Possibly weaving.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 21	C 1	EN ISO 544
0,9 *	DC (+)	x	x	x
1,2	DC (+)	x	x	x
1,6 *	DC (+)	x	x	x

* available on request

Approvals

TÜV (No. 06366)

UTP AF 6824 LC

Low carbon austenitic flux-cored wire

Standards :

Material-No.	:	1.4332
EN ISO 17633-A	:	T 23 12 L RM3 - T 23 12 L RC3
ASME II C SFA 5.22	:	E 309 LT 0-1 / E 309 LT 0-4

Application field

UTP AF 6824 LC is a low-carbon flux-cored wire with rutile slag used for joint-welding of alloyed CrNi-steels among ach other or with other unalloyed or low alloyed steels / cast steels. (b+w joining).

Properties of the weld metal

The weld metal shows sufficient grain stability up to 350° C and is scaling resistant up to 800° C.

Base materials

Material-No.	AISI	UNS	EN Symbol
1.4301	304	S 30400	X5 CrNi 18 10
1.4306	304 L	S 30403	X2 CrNi 19 11
1.4311	304 LN	S 30453	X2 CrNiN 18 10
1.4401	316	S 31600	X5 CrNiMo 17 12 2
1.4404	316 L	S 31603	X2 CrNiMo 17 13 2
1.4541	308	S 30800	X6 CrNiTi 18 10
1.4550	347	S 34700	X6 CrNiNb 18 10
1.4571	316 Ti	S 31635	X6 CrNiMoTi 17 12 2
1.4583	318	S 31640	G-X5 CrNiNb 19 11

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	550	35	60

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,025	0,6	1,5	24,0	12,0	balance

Welding instruction

Clean weld area thoroughly. Welding torch should be held slightly inclined, using the pushing technique. Possibly weaving.

Welding positions

PA PB

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175			Availability Spools
		C 1	M 20	M 21	EN ISO 544
0,9 *	DC (+)	x	x	x	x
1,2	DC (+)	x	x	x	x
1,6 *	DC (+)	x	x	x	x

* available on request

Approvals

TÜV (No. 06364)

UTP UP 68 MoLC
UTP UP FX 68 MoLC

Wire flux combination for stainless steel alloys

Standards

Wire :

Material-No.	:	1.4430
EN ISO 14343-A	:	S 19 12 3 Nb (Si)
AWS A5.9	:	ER 316 L (Si)

Flux :

EN 760	:	SA FB 2 DC

Application field

UTP UP 68 MoLC in combination with **UTP UP FX 68 MoLC** is applied for joining and cladding of stainless steel alloys type e. g. 316 L using the submerged arc welding process.

Base materials

Material-No.	Alloy	UNS	EN
1.4401	316	S31600	X5 CrNiMo 17-12-2
1.4404	316L	S31603	X2 CrNiMo 17-12-2
1.4406	316LN	S31653	X2 CrNiMoN 17-12-2
1.4571	316Ti	S31635	X6 CrNiMoTi 17-12-2
1.4583	318	S31640	X10 CrNiMoNb 18-12

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
420	600	35	95

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,02	0,6	1,2	18,0	2,6	11,6	balance

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire EN ISO 544	Flux
2,4 *	350 - 450	28 - 30	30 - 50	B 450	25 kg

* available on request

UTP UP 6808 Mo
UTP UP FX 6808 Mo

Wire flux combination for stainless Duplex-steel-alloys

Standards

Wire :

Material-No.	:	~ 1.4462
EN ISO 14343-A	:	S 22 9 3 NL
AWS A5.9	:	ER 22 09

Flux :

EN 760	:	SA FB 2 DC

Application field

UTP UP 6808 Mo in combination with **UTP UP FX 6808 Mo** are applied for joining and cladding of duplex stainless steel alloys type 1.4462, 1.4460 and 1.4347 using the submerged arc welding process.

Base materials

Material-No.	UNS	EN
1.4462	S31803	X2 CrNiMoN 22-5-3
1.4462	S32205	
1.4362	S32304	X2 CrNiN 23 4

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
570	780	32	130

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	N	Fe
0,015	0,25	1,5	22,8	3,0	9,2	0,14	balance

Welding procedure and availability

Ø (mm)	Welding data			Availability	
	I (A)	U (V)	V (cm/min)	Wire EN ISO 544	Flux
3,0 *	370 - 420	28 - 30	30 - 50	B 450	25 kg

* available on request

UTP 68 Kb

Basic-coated stick electrode for CrNi-steels with controlled ferrit-content

Standards :

Material-No.	:	1.4302
AWS A5.4	:	E 308 H-15

Application field

UTP 68 Kb is a basic coated stick electrode for joining and surfacing on corrosion- and heat resistant CrNi steels / cast steels. The weld metal with controlled delta-ferrite enables the use in oxidizing gases up to 800° C and for corrosion applications up to 300° C.

Base materials

1.4948, 1.4878, 1.6901, 1.6902, 1.6905, 1.6907.

Properties of the weld metal

The weld deposit of **UTP 68 Kb** is resistant to intercristalline attack with similar base metals at working temperatures up to 300°C.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
350	550	35	70

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,05	0,3	1,5	19,5	9,5	balance

Welding instruction

Welding area must be thoroughly cleaned and degreased. Keep a short arc during the welding process. Before welding dry stick electrodes 2 - 3 h and then weld out of a heated quiver.

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 400*
Amperage	A	50 - 80	90 - 110	100 - 130

* available on request

UTP 6820

Rutiel coated stick electrode for CrNi-steels for working temperatures up to 750 °C

Standards :

Material-No.	:	1.4302
EN 1600	:	E 19 9 R 32
AWS A5.4	:	E 308 H-16

Application field

UTP 6820 is a rutile coated stick electrode for joining and surfacing of heat resistant CrNi steels / cast steels. The deposit is resistant to air and oxidizing gases for working temparatures up to 750° C.

Base materials

1.4301, 1.4948, 1.6901, 1.6902

Welding properties

UTP 6820 is weldable in all positions except vertical-down. It has a stable arc and is spatter-free. Easy ignition and reignition. Very easy slag removal. Clean, finely rippled surface, free of undercuts.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
380	560	35	60

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,05	0,8	0,9	19,0	9,0	balance

Welding instruction

Clean weld area thoroughly and keep a short arc during the welding process. Re-drying 2 h at 250-300° C.

Current type | = + | ~ |

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 400*
Amperage	A	50 - 90	80 - 110	100 - 140

* available on request

UTP 6805 Kb

Basic-coated stick electrode. Work-hardenable weld deposit.

Standards :

Material-No.	:	1.4540
EN 1600	:	EZ 16 4 Cu B 4 2
AWS A5.4	:	E 630-15

Application field

UTP 6805 Kb is a basic-coated stick electrode for joinigs and surfacings of valve seats and sealing surfaces.

Base materials

1.4540

Welding properties and special properties of the weld metal

UTP 6805 Kb is weldable in all positions except vertical-down. Easy slag removal. The weld deposit is hot hardenable.

Hardness of the pure weld metal

untreated	approx. 35 HRC
hot-aged 4 h / 480°C	approx. 45 HRC

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
440	800	4	30 - 40

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Nb	Cu	Fe
0,04	0,4	0,4	16,5	4,5	0,2	3,5	balance

Welding instruction

Clean welding area thoroughly by brushing or grinding. Vertical guidance of stick electrode and short arc. Preheating is usually not necessary. Re-drying 2 - 3 h at 250-300° C

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrode	Ø mm x L	2,5 x 300*
Amperage	A	50 - 75

* available on request

UTP A 6820

Standards :

Material-No.	:	~ 1.4302
EN ISO 14343-A	:	G/W 19 9 H
AWS A5.9	:	ER 308 H

Gas shielded welding wire with controlled ferrit-content for CrNi-steels for working temperatures up to 700°C

Application field

UTP A 6820 TIG rods and MIG wires for joining and surfacing of heat resistant CrNi steels / cast steels.

Base materials

1.4541, 1.4550, 1.4948, 1.4949.

Properties of the weld metal

The welding deposit has a controlled delta ferrite content and can therefore be used for working temperatures up to 700° C. Scale resistant up to 800 °C

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
400	580	35	70

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
0,05	0,6	1,5	20,0	9,5	balance

Welding instruction

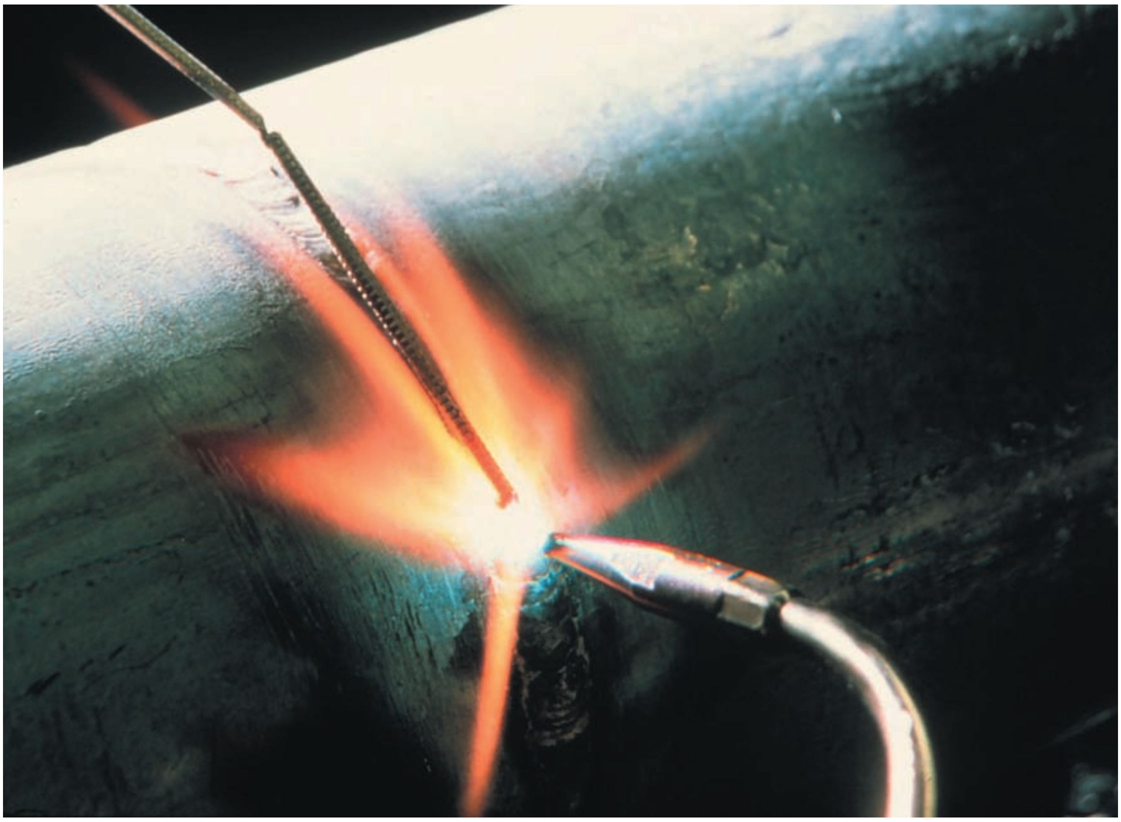
Cleane weld area thoroughly. No preheating nor post heat treatment. Pay attention to low heat input. The interpass temperature should not exceed 180 °C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	EN ISO 544
2,4	DC (-)	x	x
3,2	DC (-)	x	x

Approvals

TÜV (No. 10982;10981)



Group 7

Silver solders, brazing alloys, soft solders, fluxes

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- **Soft solders**
- **Fluxes**
- **Various products**

Group 7

Silver solders, brazing alloys, soft solders, fluxes

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Silver solders, brazing alloys, soft solders, fluxes

Silver solders

	DIN EN 1044 DIN 8513		
UTP 3046 **UTP 3046 M**	AG 104 L-Ag 45 Sn	Silver alloy with 45 % Ag, cadmium-free	378
UTP 306 **UTP 306 M**	AG 102 L-Ag 55 Sn	High-strength silver alloy with 55 % Ag, cadmium-free	379
UTP Trifolie	AG 502 L-Ag 49	Laminated solder with 49 % Ag and copper-middle layer for hard metals, cadmium-free	380

Brazing alloys

	DIN EN 1044 DIN 8513		page
UTP 37	CP 201 L-Cu 8 P	Copper-phosphor brazing alloy with 8 % P	381
UTP 3706	CP 203 L-Cu 6 P	Copper-phosphor brazing alloy with 6 % P	382
UTP 1 **UTP 1 M** **UTP 1 MR**	CU 304 L-CuZn39Sn	Brass type special ductile alloy, particularly for joining hot galvanized steel tubes	383
UTP 2 **UTP 2 M** **UTP 2 MR**	CU 305 L-CuNi10Zn42	Ni-containing brass type special brazing alloy for high-strength joinings	384
UTP 6 **UTP 6 M** **UTP 6 MR**	Special alloys with 1 % Ag	Ag-containing copper-nickel-zinc brazing alloy for high-strength joinings on non- and low-alloyed steels	385
UTP 4	AL 104 L-AlSi 12	AlSi-brazing alloy with low melting point	386

Soft solders and soldering pastes

Fluxes and various products

	DIN EN 1045 / 29454* DIN 8511		page
Fluxes for brazing alloys			
UTP Flux HLP	FH 21 F–SH 2	powder	392
UTP Flux HLS	FH 21 F–SH 2	paste	392
UTP Flux HLS–B	FH 21 F–SH 2	paste	392
UTP Flux 4 Mg	FL 10 F–LH 1	powder	392
Fluxes for welding alloys			
UTP Flux 5	special type	powder for hot welding of cast iron	393
UTP Flux 34 Sp	special type	paste for TIG-welding of CuAl-alloys	393
Fluxes for soft solders			
UTP Flux 570	3.1.1.A* F–SW 11	liquid	393
UTP Flux 570 F	3.1.1.A* F–SW 12	liquid	393
UTP Flux 570 Zn	special type	liquid	393
Various products			
UTP Beizpaste CF	–	Pickling paste for the removal of oxidation colours on austenitic steels	393

Brazing with UTP silver solders, brazing alloys and solders

Basics

According to DIN 8505 brazing is a method to join 2 metals by means of another molten metal (brazing rod) under additional use of flux or shielding gas. The melting temperature of the brazing rod is below the one of the metals to join. These metals are brought to sweat without being molten. The brazing temperature is the same as the melting temperature of the brazing rod.

The working temperature is the lowest surface temperature at which the brazing rod can melt, flow and bind the base metal. To achieve this, the brazing rod does not always have to be completely molten. Very often the working temperature is between the solidus* and the Liquidus**, which is within the melting interval. The working temperature is, however, always higher than the solidus temperature of the brazing rod.

Depending on the working temperature, the methods are called soldering with soft solder (below 450° C) and brazing with brazing filler metals (above 450° C). The term brazing temperature is also used, meaning the actual temperature on the surface of the work piece at the moment of the actual brazing. The brazing temperature has to be as a minimum as low as the working temperature and as a maximum at a peak which is not damaging the brazing rod, the base metal or the flux.

* Solidus temperature = border temperature, below is no molten metal
** Liquidus temperature = border temperature, above is only molten metal

The Function and Properties of Fluxes

The chief purpose of the flux is to dissolve the oxide layers formed continuously with the heating of the workpiece, and quite generally to shield the joint against all detrimental outside influences.

The composition of the flux must be matched to the type of parent metal. It should be liquid and capillary-active about 100° C below the working temperature of the solder, so that the joint to be soldered is thouroughly wetted and the surface tension of the solder is reduced.

Some UTP fluxes are available to the user both in **powder** and **paste** form (e. g. for silver brazing filler metal AGX powder of AGF paste). Paste fluxes are handier to use, because they adhere in any position and not just on horizontal surfaces. They can also be applied to the cold workpiece to protect the surface from oxidation during preheating, whereas powder would be blown away in part by the torch flame. Compared with pastes mixed by the user, pastes supplied ready for use by the maker possess superior homogeneity and higher efficiency.

The UTP material data sheets indicate the particular fluxes which according to our experience have acquitted themselves best for all-round duty. For general soldering operations therefore, the flux types quoted on the material data sheet for the solder are quite adequate. Often however problems arise in connection with awkward soldering positions, post-treatments, workpiece dimensions, special heating sources (e. g. high-frequency induction), batch production etc., calling for the use of special fluxes.

Application

After cleaning the brazing zone down to the bright metal and degreasing with tri- or tetra-chloroethylene for difficult joints, the correct amount of flux is applied. Too much flux or too little will result in difficulty when removing the residues. In addition unsufficient flux means inadequate oxidation protection during soldering, moreover the oxides will not be dissolved completely.

Gap width

This must be chosen so that sufficient flux can get into the soldering gap to dissolve the oxides formed there. Experience indicates an optimal gap width of about 0,05 - 0,1 mm for silver solders. For brazing metals it is about 0,2 mm, for aluminium up to 0,5 mm, for soft solders about 0,1 mm.

Diluting the fluxes

The brazing and silver soldering fluxes may generally be mixed to a paste with distilled water, or if necessary diluted. The best wetting ability is obtained by mixing or diluting with HERKUL.

Removing flux residues

Flux type	mechanically	chemically
for silver brazing filler metals	brushing, grinding	A B C E
for aluminium solders	or sandblasting,	A D E
for brazing filler metals based on Cu	hammering, knocking	
brass, German silver and bronze	or machining	A B C E
for soft solders	–	A

A	hot H_2O	(water)	D	10 % NaOH	(caustic soda)
B	10 % H_2SO_4	(sulphuric acid)	E	bis 40 % HNO_3	(nitric acid)
C	10 % HCl	(hydrochloric soda)			

The choice of acid or lye concentration depends an the parent metal employed. As corrosion-proof materials, stainless steels for instance are pickled with highly concentrated nitric acid (E).

The soldering and pickling agents must be removed afterwards by rinsing with water, which may be neutralized, in particular with sodium bicarbonate solution ($NaHCO_3$) for aluminium.

UTP 36

Copper-silver-phosphor brazing alloy with 2 % Ag

Standards :

EN 1044	:	CP 105
DIN 8513	:	L-Ag 2 P
EN ISO 3677	:	BCu92PAg645-825

Application field

UTP 36 is a thin-flowing, silver containing phosphor brazing alloy used for copper without flux. If UTP FLUX AGX is used also suited for nickel-free copper materials, e. g. brass, red brass and bronzes. Not to be used for ferrous- and nickel alloys.
UTP 36 is used in the electrical engineering industry, water systems with copper pipes and heating and refrigeration techniques - for working temperatures up to 150° C

Heating sources

Acetylene, oven, HF-induction

Technical data

Working temperature ° C	Tensile strength DIN 8525 an Cu MPa	El. conductivity $\frac{S \cdot m}{mm^2}$
710	250	5

Weld metal analysis in %

P	Cu	Ag
2,0	92,0	2,0

Instructions

Clean solder joint thoroughly. If necessary apply UTP Flux AGX on solder joint. Heat weldment to dark red broadly and constantly. Melt off rod tip and pull weld deposit with the flame along the groove. Keep burning distance of 10 - 15 mm.

Flame adjustment

neutral (neither gas nor excess of oxygen)

Availability

Rods	Ø mm x 500 mm	1,5	2,0	3,0

Special types available on request

Fluxes

UTP Flux AGX for joints of Ni-free copper alloys
No flux required for joints of copper.

UTP 35

Copper-silver-phosphor brazing alloy with 5 % Ag

Standards :

EN 1044	:	CP 104
DIN 8513	:	L-Ag 5 P
EN ISO 3677	:	BCu89PAg645-815

Application field

UTP 35 is a thin-flowing, silver containing phosphor brazing alloy for joining copper and copper alloys. Suitable on copper without flux. Not to be used for ferrous- and nickel alloys. Application field: electrical motors, apparatus construction, ship building and copper pipes.

Heating sources

Acetylene, oven, HF-induction

Technical data

Working temperature ° C	Tensile strength DIN 8525 an Cu MPa	El. conductivity $\frac{S \cdot m}{mm^2}$
710	250	5

Weld metal analysis in %

P	Cu	Ag
6,0	89,0	5,0

Instructions

Clean solder joint thoroughly. If necessary apply UTP Flux AGX on solder joint. Heat weldment to dark red broadly and constantly. Melt off rod tip and pull weld deposit with the flame along the groove. Keep burning distance of 10 - 15 mm.

Flame adjustment

neutral (neither gas nor excess of oxygen)

Availability

Rods	Ø mm x 500 mm	1,5	2,0	3,0	4,0

Special types available on request

Fluxes

UTP Flux AGX for joints of Ni-free copper alloys
No flux required for joints of copper.

Standards :

EN 1044	:	CP 102
DIN 8513	:	L-Ag 15 P
EN ISO 3677	:	BCu80PAg645-800
AWS A5.8	:	BCu P-5

UTP 3515
UTP 3515 F

Copper-silver-phosphor brazing alloy with 15 % Ag

Application field

UTP 3515 is a phosphore-brazing alloy with a high Ag-content suited for joining copper and copper alloys (working temperatures to 150°C). It is applicable on copper without flux. Not to be used for ferrous and nickel alloys. Application field: highly stressed copper-copper alloys in the apparatus construction, electrical apparatus and pipe construction, thermal industry, refrigeration technique and for joints which are subjected to very low temperatures, e.g. vibration equipment and strong thermic changes of electrique wires (line systems).

Heating sources

Acetylene, oven, HF-induction

Technical data

Working temperature °C	Tensile strength DIN 8525 an Cu MPa	El. conductivity $\frac{S \cdot m}{mm^2}$
700	250	7

Weld metal analysis in %

P	Cu	Ag
5,0	80,0	15,0

Instructions

Clean solder joint thoroughly. If necessary apply UTP Flux AGX on solder joint. Heat weldment to dark red broadly and constantly. Melt off rod tip and pull weld deposit with the flame along the groove. Keep burning distance of 10 - 15 mm.

Flame adjustment

neutral (neither gas nor excess of oxygen)

Availability

Rods	Ø mm x 500 mm	1,5	2,0	3,0

Special types available on request.
Also available as brazing foil UTP 3515 F

Fluxes

UTP Flux AGX for joints of Ni-free copper alloys
No flux required for joints of copper.

Standards :

EN 1044	:	AG 206
DIN 8513	:	L-Ag 20
EN ISO 3677	:	BCu44Zn Ag690-810

UTP 7
UTP 7 M

Cadmium-free silver alloy with 20 % Ag

Application field

UTP 7 / UTP 7 M ia a very economic silver alloy with good capillary action. Suited for joining steels, stainless steels, nickel and nickel-alloys, copper and copper-alloys, hard metals, diamonds as well as for joining these materials with each other. Application field: Sanitary installations, apparatus construction, precision mechanics, tool manufacture. It is frequently applied for armatures, fittings, copper nippels as well as in repair and maintenance. Due to its good flux properties, porosity-free and brass colour equality, UTP 7 / UTP 7 M is ideally suited for the brass series production (e.g. lightning engineering).

Heating sources

Acetylene, HF-induction

Technical data

Working temperature °C	Tensile strength R_m MPa
810	450 (St 50)

Weld metal analysis in %

Cu	Zn	Ag
45,0	balance	20,0

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Rods	Ø mm x 500 mm	1,5	2,0	3,0

Special types available on request

Fluxes

UTP Flux AGF-S	Universal silver-solder-flux in paste form
UTP Flux AGX	Universal silver-solder-flux in powder form
UTP Flux 3 W	Universal silver-solder-flux in powder form with increased resistance to high temperatures

M = flux coated rod
MR = flux coated rod with a minimum amount of flux
MD = flux coated rod with a minimum amount of flux

UTP 31 N
UTP 31 NM

Cadmium-containing silver alloy with 30 % Ag

Standards :

EN 1044	:	AG 306
DIN 8513	:	L-Ag 30 Cd
EN ISO 3677	:	BAg30CuCdZn600-690

Application field

The deeply melting silver solder **UTP 31 N / UTP 31 NM** is suitable for joining steels, copper and copper-alloys, nickel and nickel-alloys as well as for mixed joints. Universal applicable in the series production as well as in repair & maintenance

Heating sources

Acetylene, HF-induction

Technical data

Working temperature ° C	Tensile strength R_m MPa
680	470 (St 50)

Weld metal analysis in %

Cu	Ag	Zn	Cd
28,0	30,0	balance	21,0

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Rods	Ø mm x 500 mm	1,5	2,0	3,0*

* available on request

Special types available on request

Fluxes

UTP Flux AGF-S Universal silver-solder-flux in paste form
UTP Flux AGX Universal silver-solder-flux in powder form

Standards :

EN 1044	:	AG 106
DIN 8513	:	L-Ag 34 Sn
EN ISO 3677	:	BCu36AgZnSn630-730

UTP 3034
UTP 3034 M
UTP 3034 MD

Cadmium-free silver alloy with 34% Ag

Application field

UTP 3034 / M / MD is a silver-containing brazing alloy with good flowing characteristics and is suited for soldering jonts up tp 200°C working temperature. It is suited for joints on steels, copper and copper-alloys as well as nickel and nickel-alloys, especially in the food industry. Special applications fields are joints in the apparatus construction, breweries, creameries, household goods an in copper pipe installations.

Heating sources

Acetylene, HF-induction

Technical data

Working temperature ° C	Tensile strength R_m MPa	
710	360 (St 37)	480 (St 50)

Weld metal analysis in %

Cu	Ag	Zn	Sn
36,0	34,0	balance	2,5

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Rods	Ø mm x 500 mm	1,5*	2,0*	3,0*

* available on request

Special types available on request

Fluxes

UTP Flux AGF-S	Universal silver-solder-flux in paste form
UTP Flux AGX	Universal silver-solder-flux in powder form
UTP Flux 3 W	Universal silver-solder-flux in powder form with increased resistance to high temperatures

M	=	flux coated rod
MR	=	flux coated rod with a minimum amount of flux
MD	=	flux coated rod with a minimum amount of flux

Standards :

EN 1044	:	AG 105
DIN 8513	:	L-Ag 40 Sn
EN ISO 3677	:	BAg40CuZnSn650-710

UTP 3040
UTP 3040 M
UTP 3040 MD

Cadmium-free silver alloy with 40% Ag

Application field

UTP 3040 / M / MD is a high silver-containing brazing alloy with good flowing characteristics. It is suited for solder joints on steel, stainless steels, nickel and nickel-alloys as well as copper and copper-alloys, mainly in the food industry (cadmium-free) where good corrosion resistance is required. Special application fields are solder joints on household goods, cooling units (refrigerator plants), distilling plants, winepress equipment, dishes, jewellery and pipe construction.

Heating sources

Acetylene, HF-induction

Technical data

Working temperature ° C	Tensile strength R_m MPa
690	430 (St 50)

Weld metal analysis in %

Cu	Sn	Ag	Zn
30,0	2,0	40,0	balance

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Rods	Ø mm x 500 mm	1,5	2,0	3,0

Special types available on request

Fluxes

UTP Flux AGF-S	Universal silver-solder-flux in paste form
UTP Flux AGX	Universal silver-solder-flux in powder form
UTP Flux 3 W	Universal silver-solder-flux in powder form with increased resistance to high temperatures

M = flux coated rod
MR = flux coated rod with a minimum amount of flux
MD = flux coated rod with a minimum amount of flux

Standards :

EN 1044	:	AG 304
DIN 8513	:	L-Ag 40 Cd
EN ISO 3677	:	BAg40ZnCdCu595-630

UTP 3
UTP 3 M

Cadmium-free silver alloy with 40 % Ag and low working temperature

Application field

The silver-solder **UTP 3 / UTP 3 M** is suited for solder joints on steels, stainless steels, copper and copper-alloys, nickel and nickel-alloys. Universally applicable in series production and repair and maintenance. Very low viscosity with very good capillary action.

Heating sources

Acetylene torch, propane torch, HF-induction

Technical data

Working temperature ° C	Tensile strength R_m MPa
610	510 (St 50)

Weld metal analysis in %

Cu	Zn	Cd	Ag
19,0	balance	20,0	40,0

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Rods	Ø mm x 500 mm	1,5	2,0	3,0*

* available on request

Special types available on request

Fluxes

UTP Flux AGF-S Universal silver-solder-flux in paste form
UTP Flux AGX Universal silver-solder-flux in powder form

M = flux coated rod
MR = flux coated rod with a minimum amount of flux
MD = flux coated rod with a minimum amount of flux

UTP 3044
UTP 3044 M

Cadmium-free silver alloy with 44 % Ag

Standards :

EN 1044	:	AG 203
DIN 8513	:	L-Ag 44
EN ISO 3677	:	BAg44CuZn675-735

Application field

UTP 3044 / UTP 3044 M is a high silver-containing cadmium-free brazing alloy with good flowing characteristis suited for solder joints up to 300°C working temperature. It is suited for solder joints on steel, stainless steels, copper and copper-alloys as well as nickel and nickel-alloys, mainly in the food industry (cadmium-free) where good corrosion resistance is requested. Seawater resistant. Recommended by the Germans plumbers union. Special applications are solder joints in the apparatus construction, copper pipe installations, breweries, creameries, household goods, precision mechanics and precision tool construction.

Heating sources

Acetylene torch, HF-induction

Technical data

Working temperature ° C	Tensile strength R_m MPa	
730	400 (St 37)	480 (St 50)

Weld metal analysis in %

Cu	Zn	Ag
30,0	balance	44,0

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Rods	Ø mm x 500 mm	1,5*	2,0*	3,0*

* avaiable on request

Special types available on request

Fluxes

UTP Flux AGF-S	Universal silver-solder-flux in paste form
UTP Flux AGX	Universal silver-solder-flux in powder form
UTP Flux 3 W	Universal silver-solder-flux in powder form with increased resistance to high temperatures

M	=	flux coated rod
MR	=	flux coated rod with a minimum amount of flux
MD	=	flux coated rod with a minimum amount of flux

Standards :

EN 1044	:	AG 104
DIN 8513	:	L-Ag 45 Sn
EN ISO 3677	:	BAg45CuZnSn640-680

UTP 3046
UTP 3046 M

Cadmium-free silver alloy with 45 % Ag

Application field

UTP 3046 / UTP 3046 M is suited for gap brazing of steels, stainless steels, copper and copper-alloys as well as for nickel and nickel alloys up to 300°C working temperature. Seawater resistant.

Heating sources

Acetylene torch, HF-induction

Technical data

Working temperature °C	Tensile strength R_m MPa	
670	350 (St 37)	430 (St 50)

Weld metal analysis in %

Cu	Zn	Sn	Ag
27,0	balance	2,5	45,0

Instructions

Clean soldering joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Rods	Ø mm x 500 mm	1,5*	2,0*	3,0*

* available on request

Special types available on request

Fluxes

UTP Flux AGF-S	Universal silver-solder-flux in paste form
UTP Flux AGX	Universal silver-solder-flux in powder form
UTP Flux 3 W	Universal silver-solder-flux in powder form with increased resistance to high temperatures

M = flux coated rod
MR = flux coated rod with a minimum amount of flux
MD = flux coated rod with a minimum amount of flux

Standards :

EN 1044	:	AG 103
DIN 8513	:	L-Ag 55 Sn
EN ISO 3677	:	BAg55CuZnSn620-655

UTP 306
UTP 306 M

Cadmium-free high-strength silver solder with 56 % Ag

Application field

UTP 306 / UTP 306 M is a cadmium-free high-strength silver-solder with excellent mechanical properties. It is suited for joining steels, stainless steels, nickel and nickel-alloys, hard metals as well as joints of these materials with each other. This special alloy is particulary used for applications of stainless steels (mechanical properties), for seawater resistant non-ferrous alloys (corrosion-proof) in the food industry (cadmium-free) and in high vaccuum-technology.

Heating sources

Acetylene torch, propane torch, HF-induction

Technical data

Working temperature °C	Tensile strength R_m MPa
650	430 (St 50)

Weld metal analysis in %

Cu	Zn	Sn	Ag
21,0	balance	2,0	56,0

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

UTP 306	Rods	Ø mm x 500 mm	1,5	2,0	3,0
UTP 306 M	Rods	Ø mm x 500 mm	1,5	2,0	3,0

Special types available on request

Fluxes

UTP Flux AGF-S	Universal silver-solder-flux in paste form
UTP Flux AGX	Universal silver-solder-flux in powder form
UTP Flux 3 W	Universal silver-solder-flux in powder form with increased resistance to high temperatures

M = flux coated rod
MR = flux coated rod with a minimum amount of flux
MD = flux coated rod with a minimum amount of flux

UTP Trifolie

Laminated solder with 49 % Ag and copper-middle layer for hardmetals, cadmium-free

Standards :

EN 1044	:	AG 502
DIN 8513	:	L-Ag 49
EN ISO 3677	:	BAg49ZnCuMnNi680-705

Application field

UTP Trifolie is a laminated high silver containing solder for brazing of wear-resistant sheets on unalloyed steel, especially for stress-sensitive tools. Good wettability.

Heating sources

Acetylene torch, oven, HF-induction

Technical data

Working temperature ° C	Shear strength R_m MPa
690	150 - 300

The shear strength depends on the Co-content of the hard metal.

Weld metal analysis in %

Mn	Ni	Cu	Zn	Ag
2,5	0,5	25,0	balance	49,0

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Brazing foil	Ø mm x 70,0 mm	0,2*	0,3*	0,4*

* available on request

Fluxes

UTP Flux AGF-S	Universal silver-solder-flux in paste form
UTP Flux AGX	Universal silver-solder-flux in powder form
UTP Flux 3 W	Universal silver-solder-flux in powder form with increased resistance to high temperatures

UTP 37

Copper-phosphor brazing rod with 8 % P

Standards :

EN 1044	:	CP 201
DIN 8513	:	L-Cu8P
EN ISO 3677	:	BCu92P710-770

Application field

UTP 37 is suited for joining copper to copper without flux. With flux it can also be used for joining brass and bronze and red brass. Not suitable for steel and nickel alloys.

Heating sources

Acetylene torch, HF-induction

Technical data

Working temperature ° C	Tensile strength R_m MPa
710	250 (an Cu)

Weld metal analysis in %

P	Cu
8,0	balance

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Rods	Ø mm x 500 mm	2,0	3,0

Special types available on request

Fluxes

UTP Flux AGX   Universal silver-solder-flux in powder form
UTP Flux 3 W   Universal silver-solder-flux in powder form

UTP 3706

Copper-phosphor brazing rod with 6 % P

Standards :

EN 1044	:	CP 203
DIN 8513	:	L-Cu6P
EN ISO 3677	:	BCu94P710-890

Application field

UTP 3706 is a copper-phosphor solder with a high melting range for joining copper to copper without using flux. With flux it can also be used for brass, bronze, and red brass. Not suitable for steel and nickel-alloys.

Heating sources

Acetylene torch, HF-induction

Technical data

Working temperature ° C	Tensile strength R_m MPa
710	250 (an Cu)

Weld metal analysis in %

P	Cu
6,0	balance

Instructions

Clean solder joint thoroughly, apply UTP flux on solder joint. Large weldments must be preheated right through until flux flows like water. Place rod onto groove, melting off a small droplet which is spread out or drawn along with the flame.

Flame adjustment

Acetylene torch (excess fuel gas)

Availability

Rods	Ø mm x 500 mm	1,5	2,0

Special types available on request

Fluxes

UTP Flux AGX Universal silver-solder-flux in powder form
UTP Flux 3 W Universal silver-solder-flux in powder form

Standards :

EN 1044	:	CU 304
DIN 8513	:	L-CuZn39Sn
EN ISO 3677	:	BCu60Zn(Sn)870-900

UTP I
UTP I M
UTP I MR

Special brass brazing alloy, mainly for hot-dip galvanized pipes

Application field

The special alloy **UTP I / M / MR** is suited for joints and surfacings on steel, copper, brass, bronzes and grey cast iron. It allows for even coloured pore-free joints of brass. It is ideally suited for joining many non-ferrous metals, pipe constructions (tube structures), sanitary installations, locksmith work and repair work. Working temperature up to 300°C

Heating sources

Acetylene torch, HF-induction

Technical data

Working temperature °C	Tensile strength R_m MPa
890	420 (St 50)

Weld metal analysis in %

Si	Cu	Sn	Zn
0,35	60,5	0,5	balance

Instructions

Clean solder joint thoroughly and apply flux. Large weldments must be preheated right through and over a wide area. Melt off drog wise upon reaching working temperature.

Flame adjustment

For brass, bronze and galvanized steels	slight oxygen excess
For copper and steels	neutral (neither gas nor oxygen excess)

Availability

UTP I	Rods	Ø mm x 500 mm	1,5*	2,0	3,0
UTP I M	Rods	Ø mm x 500 mm	-	2,0	3,0
UTP I MR	Rods	Ø mm x 500 mm	-	-	3,2

* available on request

Special types available on request

Fluxes

UTP Flux HLS	Universal flux in paste form
UTP Flux HLP	Universal flux in powder form
UTP Flux HLS-B	Special flux in paste form for hot-galvanized work pieces (weld brazing)

Approvals

GL

M	=	flux coated rod
MR	=	flux coated rod with a minimum amount of flux
MD	=	flux coated rod with a minimum amount of flux

UTP 2
UTP 2 M

Ni-containing brass type special brazing alloy for high strength-joinings

Standards :

EN 1044	:	CU 305
DIN 8513	:	L-CuNi10Zn42
EN ISO 3677	:	BCu48ZnNi890-920

Application field

UTP 2 / M is a brazing alloy for build-ups on steel, grey cast iron and melleable cast iron against gliding wear, wear and corrosion resistant.

Heating sources

Acetylene torch, HF-induction

Technical data

Working temperature ° C	Tensile strength R_m MPa
910	690 (S 355)

Weld metal analysis in %

Si	Ni	Cu	Zn
0,2	10,0	48,0	balance

Instructions

Clean solder joint thoroughly. Chamfer the edges. Coat rods and brazing area with UTP Flux HLS, preheat the whole work piece right through over a wide area. Set tip of rod onto joint. Melt off drops and spread out with flame. Due to its thin flowing and if used sparingly finishing is not necessary. It is very important not to overheat, in order to achieve the optimal strength values.

Flame adjustments

Neutral (neither gas nor oxygen excess)

Availability

UTP 2	Rods	Ø mm x 500 mm	1,5	2,0	3,0*	-
UTP 2 M	Rods	Ø mm x 500 mm	-	2,0	3,0	5,0

* available on request

Special types available on request

Fluxes

UTP Flux HLS	Universal flux in paste form
UTP Flux HLP	Universal flux in powder form

M	=	flux coated rod
MR	=	flux coated rod with a minimum amount of flux
MD	=	flux coated rod with a minimum amount of flux

Standards :

EN 1044 : CU 305 (mod.)
DIN 8513 : L-CuNi10Zn42+Ag

UTP 6
UTP 6 M

Silver containing copper nickel zinc brazing alloy for high strength brazing joints on unalloyed and low alloyed steels

Application field

UTP 6 / M is a thin flowing special alloy for brazing joints on steel, malleable cast iron, nickel and nickel-alloys exposed to serve mechanical loads. A special application field is the brazing of butt joints on heavily stressed components, and sleeveless pipe construction assembling in vehicle construction. The brazing alloy has a quick flow and gives clean, pore-free joints with highest strength values for operating temperatures up to 500°C

Heating sources

Acetyelene torch, HF-induction

Technical data

Working temperature ° C	Tensile strength R_m MPa
890	785*

* depends on the base metal

Weld metal analysis in %

Si	Ni	Cu	Zn	Ag
0,3	10,0	47,0	balance	1,0

Instructions

Clean solder joint thoroughly. Chamfer the edges. Coat rods and brazing area with UTP Flux HLS, preheat the whole work piece right through over a wide area. Set tip of rod onto joint. Melt off drops and spread out with flame. Due to its thin flowing and if used sparingly finishing is not necessary. It is very important not to overheat, in order to achieve the optimal strength values.

Flame adjustments

Neutral (neither gas nor oxygen excess)

Availability

UTP 6	Rods	Ø mm x 500 mm	1,5	2,0	3,0
UTP 6 M	Rods	Ø mm x 500 mm	-	2,0	3,0

Special types available on request

Fluxes

UTP Flux HLS Universal flux in paste form
UTP Flux HLP Universal flux in powder form

M = flux coated rod
MR = flux coated rod with a minimum amount of flux
MD = flux coated rod with a minimum amount of flux

UTP 4

AlSi-brazing alloy with low melting point

Standards :

EN 1044	:	AL 104
DIN 8513	:	L-AlSi 12
EN ISO 3677	:	BAl88Si575-585

Application field

UTP 4 is a thin flowing aluminium alloy of high strength for brazing all commercial aluminium casting and forging alloys, except alloys with more than 3% Mg contents. It has good corrosion resistance. The alloy has a clean, fast flow and needs no post machining. Application fields: Vehicle engineering, vessel fabrication, lightning fittings, light metal furniture, windows and shop window frames, sheets, pipes, and profiles. **UTP 4** is free of heavy metals, and therefore suitable for the food industry (containers, cans, tablewear). Widely used in repair and maintenance.

Heating sources

Acetylene torch

Technical data

Working temperature ° C	Tensile strength R_m MPa
590	100

Weld metal analysis in %

Si	Al
12,0	88,0

Instructions

Clean solder joint thoroughly and remove oxide skin. Big work pieces must be preheated right over a wide area. Dip preheated rod tip in UTP flux and deposit 2 or 3 flux check points close to the solder joint. As soon as they become liquid from the heat of the work piece, the working temperature is reached. Place heated rod tip on the solder joint and melt off, spreading or drawing along with the flame. Remove the flux, eventually neutralize with 10 % caustic soda solution.

Flame adjustment

Sof t flame with acetylene excess

Availability

Rods	Ø mm	1,6*	2,0	3,0

* available on request

Special types available on request

Fluxes

UTP Flux 4 Mg

Standards :

EN 29453	:	5 S-Pb60Sn40
DIN 8513	:	L-PbSn40(Sb)
EN ISO 3677	:	BPb60Sn183-235

UTP 57
UTP 57 K
UTP 57 Pa 12

PbSn alloy 60/40, universal applicable

Application field

Lead-containing soft solder for joining and tinning ferrous and non-ferrous metals. Main application fields are the electrical (lightning) industry, apparatus manufacture, precision machanics, jewellery-, and toy industry, armatures and fittings. It is also applied in the repair and maintenance sector (Not to be used in the food industry).

Heating sources

Acetylene torch, air-gas-torch, solder iron

Technical data

Working temperature ° C	Tensile strength R_m MPa
230	27,5

Weld metal analysis in %

Sn	Sb	Pb
40,0	0,2	balance

Instructions

Clean work piece. Using **UTP 57** apply UTP Flux 57. By using a soft flame, preheat to the melting point of the flux. If **UTP 57 K** (flux-cored) is applied only preheating is necessary. Put solder on the groove and spread flame broadly.
Tinning with **UTP 57 Pa**: After preheating of the prepared work piece, rub paste with asbestos cloth on the base metal. Flux residues can be easily removed with a moist cloth.

Flame adjustment

Sof t flame with acetylene excess

Availability

UTP 57	Wire	Ø mm Endless	3,0*	-
UTP 57 K	Wire	Ø mm Endless	3,0*	-
UTP 57 Pa 12	Paste	Kg	0,5*	1,0*

* available on request

UTP 57 Solid wire continious ring shaped, universally applicable
UTP 57 K flux-cored solder wire
UTP 57 Pa 12 ready usable solder paste

Fluxes

UTP Flux 570

Dangerous goods

UTP 57 Pa 12	UN 1759, 8, III
UTP Flux 570	UN 1840, 8, III

Standards :

EN 29453	:	29 S-Sn97Ag3
DIN 8513	:	L-SnAg5
EN ISO 3677	:	BSn96Ag221

UTP 570
UTP 570 K
UTP 570 Pa 12 / 21

Tin-silver alloy 96/4 for the food industry

Application field

UTP 570 is a Ag-containing silver-solder (lead-, cadmium- and zinc-free) with excellent properties for all non-ferrous and ferrous metals, above all for stainless steels. It has a low working temperaure, is fast flowing and has a good wettability. Post machining is not necessary. Because of its high electrical conductivity it is suitable for high precision soldering in electrical engineering. Due to its capillary activity it is also suited for the vacuum technology. **UTP 570** is non-poisenous and therefore suited also for the food industry.

Technical data

Working temperature ° C	Shear strength MPa
230	30 (Cu)

Weld metal analysis in %

Sn	Ag
balance	4,0

Instructions

Clean solder joint thoroughly. Apply UTP Flux 570 (if stainless steel is being aplied, use UTP Flux 570 F) and preheat work piece with a soft flame right through to the melting point of the flux. Melt off in droplets and draw along the groove.

Flammeneinstellung

Sof t flame with acetylene excess

Availability

UTP 570	Rods	Ø mm x 500 mm	1,5	2,0	3,0
UTP 570 K	Wire	Ø mm Endless	1,2*	-	-
UTP 570 Pa 12 / 21	Paste	Kg	1,0	-	-

* available on request

Fluxes

UTP Flux 570
UTP Flux 570 F

Dangerous goods

UTP 570 Pa 12/21	UN 1759, 8, III
UTP Flux 570	UN 1840, 8, III
UTP Flux 570 F	UN 1760, 8, III

Standards :

EN 29453	:	24 S-Sn97Cu3
DIN 8513	:	L-SnCu3

UTP 573
UTP 573 Pa 21

SnCu special soft solder 97/3 for installations technique

Application field

UTP 573 / Pa is a copper-containing special soft solder for copper tubes in drinking water installations Recommended by the Germans plumbers union.

Technical data

Working temperature ° C	Shear strength MPa
230 - 250	30 (Cu)

Weld metal analysis in %

Sn	Cu
balance	3,0

Instructions

Clean weld solder joint, spread with UTP Flux 573 and preheat work piece with soft flame up to the melting point of the flux. Then melt off solder by droplets and draw along the groove.

Flame adjustment

Sof t flame with acetylene excess

Availability

Rods	Ø mm	3,0*
Paste	Kg	1,0*

* available on request

Fluxes

UTP Flux 570

Dangerous goods

UTP 573 Pa 21	UN 1759, 8, III
UTP Flux 570	UN 1840, 8, III

Standards :

EN 1044	:	25SSn60Pb38Cu2
DIN 8513	:	L-Sn60Pb(Cu)
EN ISO 3677	:	BSn60Pb(Cu)183-190

UTP 576
UTP 576/60 Pa 12

SnPb alloy with low working temperature

Application field

UTP 576 is a soft solder with low working temperature for precision soldering of galvanized fine steels. Applied in the electrical industry and electro-tinning.

Technical data

Working temperature ° C	Shear strength MPa	
183 - 190	30 (Cu)	50 (S355)

Weld metal analysis in %

Sn	Pb
60,0	balance

Instructions

Clean solder joint thoroughly.Apply UTP Flux 570 (if stainless steel is being aplied, use UTP Flux 570 F) and preheat work piece with a soft flame right through to the melting point of the flux. Melt off in droplets and draw along the groove.

Flame adjustment

Sof t flame with acetylene excess

Availability

Rods	Ø mm x 400	10,0*
Paste	Kg	1,0*

* available on request

Fluxes

UTP Flux 570
UTP Flux 570 F

Dangerous goods

UTP 576/60 Pa 12	UN 1759, 8, III
UTP Flux 570	UN 1840, 8, III
UTP Flux 570 F	UN 1760, 8, III

UTP 548

Standards :
EN ISO 3677 : SZn97Al3430-450

SnAl alloy with low working temperature

Application field

UTP 548 is a low melting soft solder for joints on aluminium and aluminium-alloys and is suited for aluminium-copper joints in the refrigeration industry and air conditioning industry.

Heating sources

HF-induction, flame

Technical data

Working temperature ° C	Shear strength MPa
430 - 450	-

Weld metal analysis in %

Al	Zn
3,0	97,0

Instructions

Clean solder joint thoroughly directly before start of the solder process. Coat work piece with the right flux by brushing. Preheat work piece with a propane torch or acetylene torch with soft flame (slight excess gas). Because aluminium is non-tarnishing the surfaced flux can be seen as a temperatur indicator which means if the flux is aqueous clear the work piece has reached the working temperature of the solder and is now applicable.

Flame adjustment

Sof t flame with acetylene excess

Availability

Rods	Ø mm x 500	2,0*

* available on request

Fluxes

UTP Flux 570 Zn

UTP Fluxes

UTP Flux	Group DIN 8511	Groups DIN EN 1045 DIN EN 29 454	Effective temperature range° C	Applications	Availability 1/2 and 1/1 boxes
Fluxes for silver solders					
UTP Flux AGF-S	F–SH 1 (silver solders)	FH 10	500 – 800	Universal silver solder flux	Paste
UTP Flux AGX				Universal silver solder flux	Powder
UTP Flux 3 W				Universal silver solder flux	Powder
UTP Flux HF	F–SH 1	FH 12	650 – 1000	Silver solder flux for high-frequency induction soldering	Paste
Fluxes for brazing alloys					
UTP Flux HLP	F–SH 2 (brazing alloys)	FH 21	700 – 950	Universal brazing alloy flux	Powder
UTP Flux HLS				Universal brazing alloy flux	Paste
UTP Flux HLS–B				Special flux for brazing with UTP 1/ UTP 1 MR	Paste
UTP Flux 4 Mg	F–LH 1 (aluminium)	FL 10	500 – 700	Universal flux for aluminium casting and forging alloys	Powder

* available on request

UTP Fluxes

UTP Flux	Group DIN 8511	Groups DIN EN 1045 DIN EN 29 454	Effective temperature range °C	Applications	Availability 1/2 und 1/1 boxes
Fluxes for welding alloys					
UTP Flux 5*	special type		800 – 1300	Special flux for oxyacetylene cast iron welding	Powder
UTP Flux 34 Sp*	special type		–	Special flux for TIG welding of CuAl-alloys	Paste
Fluxes for soft solders					
UTP Flux 570	F–SW 12	3.1.1.A*	150 – 450	Universal soft solder flux for stainless steels	Liquid (viscous)
UTP Flux 570 F*	(soft solders)		150 – 450	Universal soft solder flux for stainless steels	Liquid
UTP Flux 570 Zn	special type		400 – 500	Special flux for aluminium solders and aluminium alloys	Paste
Various products					
UTP Beizpaste CF	Picking paste for the removal of oxidation colours on austenitic steels. Content: 2 kg				Paste

* available on request

Group 8

Welding consumables for aluminium, Al-, Mg- and Ti-alloys

Index

- **Aluminium and aluminium alloys**
- **Magnesium alloys**
- **Titanium alloys**

  - **Stick electrodes**
  - **Solid rods and wires**

Group 8

Welding consumables for aluminium, Al-, Mg- and Ti-alloys

Group 8

Welding consumables for aluminium, Al-, Mg- and Ti-alloys

Stick electrodes for aluminium and aluminium alloys

	Standards DIN 1732		page
UTP 47	EL-Al 99,8	Pure aluminium stick electrode	400
UTP 49	EL-AlMn 1	Aluminium stick electrode with 1,5 % Mn and with a special coating	401
UTP 485	EL-AlSi 5	Aluminium stick electrode with 5 % Si and with a special coating	402
UTP 48	EL-AlSi 12	Aluminium stick electrode with 12 % Si and with a special coating	403

Solid rods and wires for aluminium and aluminium alloys

	Standards EN ISO 18273 Material-No.		page
UTP A 47	S Al Z (Al99,5) 3.0259	Pure aluminium 99,5 %	404
UTP A 47 Ti	S Al 1450 (Al99,5Ti) 3.0805	Pure aluminium, titanium alloyed	405
UTP A 485	S Al 4043 (AlSi5) 3.2245	Aluminium-silicon 5 %	406
UTP A 48	S Al 4047A (AlSi12(A)) 3.2585	Aluminium-silicon 12 %	407

	Standards EN ISO 18273 Material-No.		page
UTP A 493	S Al 5754 (AlMg3) 3.3536	Aluminium-magnesium 3 %	408
UTP A 495	S Al 5356A (AlMg5Cr(A)) 3.3556	Aluminium-magnesium 5 %	409
UTP A 495 Mn	S Al 5183A (AlMg4,5Mn0,7(A)) –	Aluminium-magnesium 4,5 % + Mn	410
UTP A 495 MnZr	S Al 5087 (AlMg4,5MnZr) 3.3546	Aluminium-magnesium 4,5 % + Mn and Zr alloyed	411

Solid rods and wires for magnesium alloys

	Standards		page
UTP A 403	Special alloy	Magnesium alloy	412
UTP A 404	Special alloy	Magnesium alloy	413

Solid rods for titanium alloys

	Material-No.		page
UTP A 902 Ti	3.7035	Titanium alloy Grade II	414

The welding of Aluminium and Aluminium alloys

The suitable welding processes are

TIG, MIG, manual stick electrode and gas welding

The TIG welding with argon as shielding gas is done with AC, since DC negative polarity is not aggressive enough to destroy the oxide skin and DC positive polaritiy is giving a too high thermal load. The welding is done in the forehand method and the melting end of the welding rod should not be moved out of the shielding gas cover. Heavy sections have to be pre-heated to 150 – 200°C.

MIG welding is made with argon as shielding gas on DC with the negative polarity on the working piece. The positive polaritiy on the electrode wire is giving the required high thermal load and in conclusion a higher deposition rate. MIG Puls welding can be used for wall thickness up to 2 mm.

The coated electrode is welded with DC on the positive polarity. The coating contains flux as well as arc stabilizing additions. The slag has to be removed thoroughly.

Gas welding is made with an oxyacetylene flame. Additional flux such as UTP Flux 4 will destroy the oxide skin on chemical base and prevent the building of a new skin during the welding process. In addition, the flux is the indicator of the welding temperature.

UTP 47

Pure aluminium stick electrode

Standard :

Material-No.	:	3.0286
DIN 1732	:	EL-Al99,8
AWS A5.3	:	~ E 1100

Application field

UTP 47 is a pure aluminium stick electrode with a special coating for joining and surfacing

Welding properties

UTP 47 is good weldable on sheets with > 2 mm wall-thickness. The soft flow produces a flat, finely rippled weld seam. Good slag removal.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A5 %
> 40	80	30

Weld metal analysis in %

Al	Others
99,8	0,2 (max.)

Welding instruction

Weld stick electrode in the vertical position with a short arc. Preheat bigger work pieces with wall thicknesses > 6 mm to 100 - 250°C in order to contain a good fusion with the base metal. Raised weld seams indicate to low preheating temperatures. Re-drying: 1 - 1,5 h at 100°C.

Current type = +

Welding positions

PA PB PC PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5* x 355	3,2* x 355
Amperage	A	50 - 70	80 - 100

* available on request

Available in 2,0 kg boxes

UTP 49

Aluminium stick electrode with1,5 % Si and special coating

Standard :

Material-No.	:	3.0516
DIN 1732	:	EL-AlMn1
AWS A5.3	:	E 3003

Application field

UTP 49 is a aluminium stick electrode with 1,5 % Mn and a special coating for joining and surfacing on aluminium-manganese alloys and aluminium-magnesium alloys with a Mg content of approx. 3 % according to DIN 1725, e.g.

3.0506	AlMn0,6
3.0515	AlMn1
3.0525	AlMn1Mg0,5
3.0526	AlMn1Mg1
3.3535	AlMg3

Welding properties

UTP 49 is good weldable on sheets with > 2 mm wall-thickness. The soft flow produces a flat, finely rippled weld seam. Good slag removal.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A5 %	Melting range ° C
40	110	20	648 - 657

Weld metal analysis in %

Mn	Al	Mg
1,5	balance	0,2

Welding instruction

Weld stick electrode in the vertical position with a short arc. Preheat bigger work pieces with wall thicknesses > 6 mm to 100 - 250°C in order to contain a good fusion with the base metal. Raised weld seams indicate to low preheating temperatures. Re-drying: 1 - 1,5 h at 100°C.

Current type = +

Welding positions

PA PB PC PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5* x 355	3,2* x 355
Amperage	A	50 - 70	80 - 100

* available on request

Available in 2,0 kg boxes

UTP 485

Aluminium stick electrode with 5 % Si and special coating

Standard :

Material-No.	:	3.2245
DIN 1732	:	EL-AlSi 5
AWS A5.3	:	E 4043

Application field

UTP 485 is a aluminium stick electrode with 5 % Si and a special coating for joining and surfacing aluminium-silicon alloys with a Si content of up to 7 % Si and for joining different Al alloys, e. g.

3.3206	AlMgSi0,5
3.3210	AlMgSi0,7
3.2315	AlMgSi1
3.3211	AlMg1SiCu
3.2371	G- AlSi7Mg
3.2341	G- AlSi5Mg
3.2151	G- AlSi6Cu4

Welding properties

UTP 485 is good weldable on sheets with > 2 mm wall-thickness. The soft flow produces a flat, finely rippled weld seam. Good slag removal.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A5 %	Melting range ° C
90	160	15	573 - 625

Weld metal analysis in %

Si	Al
5,0	95,0

Welding instruction

Weld stick electrode in the vertical position with a short arc. Preheat bigger work pieces with wall thicknesses > 6 mm to 100 - 250°C in order to contain a good fusion with the base metal. Raised weld seams indicate to low preheating temperatures. Re-drying: 1 - 1,5 h at 100°C.

Current type = +

Welding positions

PA PB PC PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 355*	3,2 x 355*	4,0 x 350
Amperage	A	50 - 70	80 - 100	90 - 130

* available on request

Standard :

Material-No. : 3.2585
DIN 1732 : EL-AlSi12

UTP 48

Aluminium stick electrode with 12 % Si and special coating

Application field

UTP 48 is a aluminium stick electrode with 12 % Si and a special coating for joining and surfacing on aluminium-silicon casting alloys with a Si-content up to 12 % Si according to DIN 1725 e.g.

3.2581	G- AlSi12
3.2583	G- AlSi12(Cu)
3.2383	G- AlSi10Mg(Cu)
3.2381	G- AlSi10Mg
3.2373	G- AlSi9Mg

Welding properties

UTP 48 is good weldable on sheets with > 2 mm wall-thickness. The soft flow produces a flat, finely rippled weld seam. Good slag removal.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Melting range ° C
80	180	5	573 - 585

Weld metal analysis in %

Si	Al
12,0	88,0

Welding instruction

Weld stick electrode in the vertical position with a short arc. Preheat bigger work pieces with wall thicknesses > 6 mm to 100 - 250°C in order to contain a good fusion with the base metal. Raised weld seams indicate to low preheating temperatures. Re-drying: 1 - 1,5 h at 100°C.

Current type = +

Welding positions

PA PB PC PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 355*	3,2 x 355*	4,0 x 355*
Amperage	A	50 - 70	80 - 100	90 - 130

* available on request

UTP A 47

Pure aluminium welding wire with 99,5 % Al

Standard :

Material-No.	:	3.0259
EN ISO 18273	:	S Al Z (Al 99,5)
AWS A5.10	:	ER 1100

Application field

UTP A 47 is a pure aluminium welding wire for pure aluminium materials according to DIN 1712, e. g.

3.0255	Al99,5
3.0275	Al99,7
3.0285	Al99,8
3.0257	E Al
3.0205	Al99,0

as well as aluminium alloys with a Mg-content up to approx. 2 % and a Si-content of 0,5 %.

Welding properties

Good flowing aluminium welding wire. Weldable in all positions.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Melting range ° C
40	80	30	647 - 658

Weld metal analysis in %

Si	Al	Fe
< 0,3	99,5	< 0,4

Welding instruction

Clean weld area thoroughly. Thick walled weldments > 15 mm must be preheated up to 200°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,6 *	DC (+)	x	x	x	
2,4 *	AC	x			x
3,2 *	AC	x			x

* available on request

UTP A 47 Ti

Ti-alloyed pure aluminium welding wire

Standard :

Material-No.	:	3.0805
DIN 1732	:	SG Al99,5Ti

Application field

UTP A 47 Ti is a pure aluminium welding wire for joining and surfacing of aluminium materials according to DIN 1712, e.g.

3.0255	Al99,5
3.0275	Al99,7
3.0285	Al99,8
	Al Mn
	E Al Mg Si

Welding properties

UTP A 47 Ti is a welding consumable with Ti for grain refinement. Weldable in all positions.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Melting range ° C
> 40	> 70	> 30	674 - 658

Weld metal analysis in %

Si	Al + Ti	Fe
< 0,3	99,5	< 0,4

Welding instruction

Clean weld area thoroughly. Thick walled weldments > 15 mm must be preheated to 200°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,0 *	DC (+)	x	x	x	
1,2 *	DC (+)	x	x	x	
1,6 *	AC	x			x
2,0 *	AC	x			x
3,2 *	AC	x			x

* available on request

Approvals

TÜV (No. 00913;00914), DB (No. 61.138.01)

UTP A 485

Aluminium-silicon welding wire with 5% Si

Standard :

Material-No.	:	3.2245
EN ISO 18273	:	S Al4043 (AlSi5)
AWS A5.10	:	ER 4043

Application field

UTP A 485 is a aluminium-silicon alloy with a Si-content up to 7 % Si also for joining different Al-alloys, e. g.

3.3206 AlMgSi0,5
3.3210 AlMgSi1,0
3.2371 G-AlSi7Mg
3.2341 G-AlSi5Mg

Welding properties

During welding of hardened AlMgSi1,0 the strength of the base metal next to the weld seam is decreasing. Weld seams should not be put in high stressed areas. Not applicable for eloxal materials because of the weld metals discoloration.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Melting range ° C
100	160	15	573 - 625

Weld metal analysis in %

Si	Mn	Al	Fe
5,0	< 0,2	balance	< 0,4

Welding instruction

Clean weld area thoroughly. Thick walled weldments > 15 mm must be preheated to 150°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,2	DC (+)	x	x	x	
1,6 *	DC (+)	x	x	x	
1,6 *	AC	x			x
2,0	AC	x			x
2,4	AC	x			x
3,2	AC	x			x

* available on request

Approvals

DB (No. 61.138.03)

UTP A 48

Aluminium-silicon casting alloy with 7 % Si

Standard :

Material-No.	:	3.2585
EN ISO 18273	:	S Al 4047 A (AlSi12(A))
AWS A5.10	:	ER 4047

Application field

UTP A 48 is used for aluminium-silicon casting alloy with a Si-content up to 7 %, e. g.

3.2581	G-AlSi12
3.2383	G-AlSi10Mg(Cu)
3.2373	G-AlSi5Mg

Welding properties

Good flowing Al-alloy. Not suited for eloxal materials because of discoloration of the weld metal.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Melting range ° C
80	170	8	573 - 585

Weld metal analysis in %

Si	Mn	Al	Fe
12,0	< 0,3	balance	< 0,5

Welding instruction

Clean weld area thoroughly. Thick walled weldments > 15 mm must be preheated to 150 - 200°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,0	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6	DC (+)	x	x	x	
1,6 *	AC	x			x
2,0	AC	x			x
2,4	AC	x			x
3,2	AC	x			x
4,0 *	AC	x			x

* available on request

Approvals

DB (No. 61.138.02)

UTP A 493

Aluminium-magnesium alloy with 3 % Mg

Standard :

Material-No.	:	3.3536
EN ISO 18273	:	S Al 5754 (AlMg3)
AWS A5.10	:	~ ER 5554

Application field

UTP A 493 is used for aluminium-magnesium alloys with a Mg-content of 3 % according to DIN 1725, e.g.

3.3315	AlMg1
3.3523	AlMg2,5
3.3535	AlMg3
3.3537	AlMg2,7Mn
3.3206	AlMgSi0,5

Welding properties

Corrosion and seawater resistant alloy. Weldable in all positions. Good eloxadizing ability.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Melting range ° C
100	200	20	610 - 642

Weld metal analysis in %

Si	Mn	Al	Fe	Mg
< 0,25	0,3	balance	< 0,4	3,0

Welding instruction

Clean weld area thoroughly. Thick walled weldments > 15 mm must be preheated to 150°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,0 *	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6 *	AC	x			x
2,0 *	AC	x			x
2,4	AC	x			x
3,2 *	AC	x			x

* available on request

Approvals

TÜV (No. 07362; 07363), DB (No. 61.138.04)

UTP A 495

Aluminium-magnesium alloy with 5 % Mg

Standard :

Material-No.	:	3.3556
EN ISO 18273	:	S Al 5356A (AlMg5Cr(A))
AWS A5.10	:	ER 5356

Application field

UTP A 495 isused for aluminium-magnesium alloys with a Mg-content up to 3 % according to DIN 1725, e. g.

3.3555	AlMg5
3.3345	AlMg4,5

also for highly loaded joints of lower alloyed Al-Mg-alloys.

Welding properties

Corrosion and seawater resistant alloy. Weldable in all positions. Good eloxadizing ability.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Melting range ° C
120	250	25	575 - 633

Weld metal analysis in %

Si	Mn	Al	Fe	Mg
< 0,25	0,3	balance	< 0,4	5,0

Welding instruction

Clean weld area thoroughly. Thick walled weldments > 15 mm must be preheated to 150°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
0,8 *	DC (+)	x	x	x	
1,0	DC (+)	x	x	x	
1,2	DC (+)	x	x	x	
1,6	DC (+)	x			x
1,6	AC	x	x		x
2,0	AC	x			x
2,4	AC	x			x
3,2	AC	x			x

* available on request

Approvals

TÜV (No. 00915; 00916), DB (No. 61.138.05)

UTP A 495 Mn

Aluminium-magnesium alloy with 4,5 % Mg + Mn

Standard :

Material-No.	:	3.3548
EN ISO 18273	:	S Al 5183 A (AlMg4,5Mn0,7(A))
AWS A5.10	:	ER 5183

Application field

UTP A 495 Mn is used for high strength aluminium-magnesium alloys, e. g.

3.3547 AlMg4,5Mn
3.3545 AlMg4Mn
3.3261 G-AlMg5Si

Welding properties

Good resistance against climatic conditions and seawater. For joints with high demands on strength resistance.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Melting range ° C
140	300	20	574 - 638

Weld metal analysis in %

Si	Mn	Al	Fe	Mg
< 0,25	0,8	balance	< 0,4	4,5

Welding instruction

Clean weld area thoroughly. Thick walled weldments > 15 mm must be preheated to 150°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability	
				Spools	Rods
		I 1	I 3	EN ISO 544	EN ISO 544
1,2	DC (+)	x	x	x	
2,4 *	AC	x			x
3,2 *	AC	x			x

* available on request

Approvals

TÜV (No. 00917; 00918), DB (No. 61.138.06), DNV

UTP A 495 MnZr

Aluminium- magnesium alloy with 4,5 % Mg + Mn, Zr-alloyed

Standard :

Material-No.	:	3.3546
EN ISO 18273	:	S Al 5087 (AlMg4,5MnZr)
AWS A5.10	:	ER 5087

Application field

UTP A 495 MnZr is used for aluminium-magnesium alloys with high strength properties for welding

3.3547	AlMg4,5Mn
3.3545	AlMg4Mn
3.3261	G-AlMg5Si

Welding properties

Good resistance against climatic conditions and seawater. Zirconium increases the hot chracking resistance.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %
125	275	17

Weld metal analysis in %

Mn	Cr	Zr	Al	Mg
0,8	0,25	0,2	balance	4,5

Welding instruction

Clean weld area thoroughly. Thick walled weldments > 10 mm must be preheated to min. 200°C.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	EN ISO 544
2,0 *	AC	x	x
2,4 *	AC	x	x
3,2 *	AC	x	x

* available on request

Approvals

DB (No. 61.138.07), DNV

Standard :
Sonderlegierung

UTP A 403

Magnesium welding wire

Application field

UTP A 403 is used for maintenance and repair of weldments consisting of magnesium and magnesium alloys

Welding properties

UTP A 403 has a good weldability. The fusion will be obtained without partial melting of the base metal. The weld deposit is crack- and pore-free, corrosion resistant and has equal colours as Mg-alloys.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %
150	230	7

Weld metal analysis in %

Mn	Al	Mg	Zn
0,6	3,0	balance	1,0

Welding instruction

Clean weld area thoroughly. Thick walled weldments must be preheated.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	EN ISO 544
2,5	AC	x	x

Standard :
Special alloy

UTP A 404

Magnesium welding wire

Application field

UTP A 404 is used for maintenance and repair of weldments consisting of magnesium and magnesium alloys

Welding properties

UTP A 404 has a good weldability. The fusion will be obtained without partial melting of the base metal. The weld deposit is crack- and pore-free, corrosion resistant and has equal colours as Mg-alloys.

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %
120	230	10

Weld metal analysis in %

Mn	Al	Mg	Zn
0,4	5,0	balance	0,2

Welding instruction

Clean weld area thoroughly. Thick walled weldments must be preheated.

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	EN ISO 544
2,5	AC	x	x

UTP A 902 Ti

Titanium-alloy grade 2

Standard :
Material-No. : 3.7035
AWS A5.16 : ER Ti2

Application field
UTP A 902 Ti is used for titanium grade 2

Weld metal analysis in %

C	N	Ti	Fe	O	H
0,03	0,002	balance	0,2	< 0,1	< 0,008

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175	Availability Rods
		I 1	EN ISO 544
2,0 *	DC (-)	x	x
2,5 *	DC (-)	x	x
3,0 *	DC (-)	x	x

* available on request

Gruppe 9

Welding consumables for low-alloyed steels

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Welding consumables for low-alloyed steels

Gruppe 9

Welding consumables for low-alloyed steels

Stick electrodes for low-alloyed steels

Solid rods and wires for low-alloyed steels

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UTP 611

Rutile, strongly coated stick electrode, universal applicable

Standard :
EN ISO 2560-A : E 38 0 RR 12
AWS A5.1 : ~ E 6013

Application field

UTP 611 is a strongly coated stick electrode for joining and surfacing on all kind of steel constructions. It is used in autobody- and wagon industry, boiler construction and shipbuilding.

Base materials

Construction steel	St 34 - St 52
Boiler steels	H I - H II, WStE 255, 17 Mn 4
Tube steels	St 35 , St 45, St 35.8, St 45.8, StE 210.7 - StE 360.7

Welding properties

UTP 611 is very easy weldable in all positions except vertical down. It possesses excellent welding properties. Very easy slag removal. Smooth, finely rippled weld seam surface. The stick electrode can be applied within a wide amperage range.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 380	> 510	> 22	> 47

Weld metal analysis in %

C	Si	Mn	Fe
0,07	0,5	0,6	balance

Welding instruction

UTP 611 is welded with a short to medium-long arc with slight weaving. It is also very good suited as contact electrode for string beads. The stick electrode should be held at a slight angle to the base material. Re-drying: 2 - 3 h at 250 - 300°C.

Current type | = - | ~ |

Welding positions

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,0 x 300	2,5 x 350	3,2 x 350	3,2 x 450	4,0 x 450	5,0 x 450
Amperage	A	40 - 70	60 - 90	90 - 140	90 - 140	140 - 190	190 - 230

Approvals

TÜV (No. 02180), DB (No. 10.138.08),DNV

UTP 612

Standard :

EN ISO 2560-A : E 38 0 RC 11
AWS A5.1 : ~ E 6013

Thin rutile-coated stick electrode, especially suited for vertical down welding

Application field

Thin rutile-coated stick electrode **UTP 612** is suited for steel construction of all kinds and particulary for welding jobs at poorly accessible points and badly prepared seams.

Base materials:

Construction steels	St 34 - St 52
Boiler steels	H I - H II, WStE 255
Tube steels	St 35 , St 45, St 52, St 34.4, St 35.8, St 45.8
Shipbuilding steels	Steel A - D

Welding properties

UTP 612 is good weldable in all positions, and is particulary suited for vertical-down welding. Tough weld deposit, therefore it possesses a good gap bridging. Easy slag removal.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 390	> 510	> 22	> 47

Weld metal analysis in %

C	Si	Mn	Fe
0,05	0,4	0,4	balance

Welding instruction

The arc should be kept medium-long. For vertical-down welds, the stick electrode must be used with 10% higher amperage and very short arc.

Current type = - | ~

Welding positions

PA PB PC PE PF PG

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350
Amperage	A	60 - 90	90 - 130	130 - 170

Approvals

TÜV (No. 00975), DB (No. 10.138.01), ABS, BV, DNV

UTP 613 Kb

Basic coated stick electrode for highly-stressed joints on steel constructions

Standard :

EN ISO 2560-A	:	E 42 5 B42 H5
AWS A5.1	:	~ E 7018-1 H4 R

Application field

UTP 613 Kb is a basis-coated stick electrode for construction-, boiler-, tube- and fine-grained steels as well as for steels with up to 0,35% C-content. It is recommended especially for the following base metal.

Base materials:

Construction steels	St 34 - St 60
Fine-grained-steels	St E 255 - 355
Boiler steels	H I - H II, 17 Mn 4
Tube steels	St 35 - St 55, St 35.8, St 45.8
Cast steels	GS 38 - GS 52

Welding properties

UTP 613 Kb has a good weldability and a stable arc. The weld metal is resistant to ageing, crack resistant and is little affected by steel impurities.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 420	> 510	> 25	> 120

Weld metal analysis in %

C	Si	Mn	Fe
0,07	0,4	1,1	balance

Welding instruction

Keep a short arc during the welding process. Weld dry stick electrodes only. Re-drying: 2 - 3 h at 250 - 300° C. Preheat weldment if necessary

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350	5,0 x 450
Amperage	A	80 - 100	110 - 150	140 - 200	170 - 210

Approvals

TÜV (No. 00794), DB (No. 10.138.02), ABS, BV, DNV

UTP 614 Kb

Standard :
EN ISO 2560-A : E 42 3 B32 H10
AWS A5.1 : E 7018

Basic-coated stick electrode for constructions with high stressed joints, AC-weldable

Application field

UTP 614 Kb is a double coated stick electrode with a universally suited application field. It is used in industry, trade, as well as in production and repair welds for diverse bas materials.

Base materials:

Unalloyed construction steels	S235JRG2 – S355J2; E295, E335, St35, St 45, St 35.8, St45.8, St50-2
Boiler steels	P235GH, P265GH, P295GH
Fine-grained steels	bis S355N
Shipbuilding steels	A – E, AH - EH
Cast steels	C 35, GS-38, GS-45

Welding properties

Due to a special coating formula **UTP 614 Kb** shows a smooth and finely rippled weld seam, a stable arc, easy slag removal, and a very slight increase of the weld, as well as a notch-free seam. The weld metal is little affected by steel impurities. Due to the double coating the stick electrode is excellently suited for root- and out-of-position welding. Recovery 120%, H2 content < 8 ml/100g.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 400	> 510	> 22	80

Weld metal analysis in %

C	Si	Mn	Fe
0,06	0,7	0,9	balance

Welding instruction

Keep a short arc during the welding process. Hold stick electrode vertical to the weldment. Little heat input and string bead technique should be applied. The interpass temperature should not exceed 150°C. Re-drying: 2 - 3 h at 250 - 300°C.

Current type = + | ~

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350	5,0 x 450
Amperage	A	60 - 90	100 - 150	140 - 190	190 - 250

Approvals

TÜV (No. 10571), DB (No. 10.138.03), GL, BV, DNV, ABS, LR

UTP 617

Rutil-containing high performance stick electrode, 160% Recovery

Standard :
EN ISO 2560-A : E 38 0 RR 54
AWS A5.1 : E 7024

Application field

UTP 617 is a rutil-containing high performance stick electrode suited for joining and surfacing in machine building, boiler- and apparatus construction as well as in container- and shipbuilding.

Base materials:

Construction steels	St 34 - St 52
Boiler steels	H I - H II
Cast steels	GS 38 - GS 52

Welding properties

UTP 617 has a high current-carrying capacity and good reignition. Easy slag removal, a smooth and notch-free weld seam and little spatter loss. The weld deposit is crack-proof.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
390	510	> 22	47

Weld metal analysis in %

C	Si	Mn	Fe
0,05	0,4	0,4	balance

Welding instruction

Keep a short to medium long arc during the welding process. Ideally suited for fillet welds in horizontal position welding.

Current type = - ~

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 350*
Amperage	A	50 – 75	70 – 110	90 – 140

* available on request

UTP 62

Basic coated special stick electrode for high-stressed joints

Standard :

EN ISO 2560-A : E 50 41 NiMoB 42 H 5
AWS A5.1 : E 9018-G

Application field

UTP 62 is suited for joining and surfacing welds in machine building, boiler- and apparatus construction for standard steel and cast steels as well as for fine-grained construction steels with strength properties of 440-690 N/mm^2.

Base materials

Baustähle	St 52, St 60
Kesselstähle	H I - H II, 17 Mn 4, 19 Mn 5, 14 Mo 3
Feinkornstähle	Ste 255 - 500
Stahlguss	GS 45 - GS 60, GS 22 Mo 4

Welding properties

UTP 62 is weldable in all positions except vertical down. Easy slag removal, smooth, notch-free weld surface. The deposit is crack-proof. Recovery approx. 130%.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
> 550	610 - 780	> 20	> 120

Weld metal analysis in %

C	Si	Mn	Mo	Fe
0,08	0,5	1,6	0,5	balance

Welding instruction

Keep a short arc during the welding process. Weld dry stick electrodes only. Re-drying: 2 - 3 h at 250-300°C.

Current type = + | ~

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 350	3,2 x 450	4,0 x 450	5,0 x 450
Amperage	A	80	110 - 140	140 - 190	170 - 230

* available on request

UTP 6020

Standard :
EN ISO 2560-A : E 50 0 B 1 2
AWS A5.9 : E 11018 M

Basic coated stick electrode for high-strength tempered fine-grained steels

Application field

UTP 6020 is suited for construction- and repair welds of high-strength heat-treated fine-grained steels with 70 - 90 kp/mm^2 tensile strength. Low alloyed, heat-treated steels of similar strength can be welded as well.

Welding properties

UTP 6020 is weldable in all positions except vertical down. Easy slag removal, smooth, notch-free weld surface. The deposit is crack-proof. Recovery approx. 115%.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
665	765	18	82

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,06	0,4	1,6	0,3	0,4	1,8	balance

Welding instruction

Keep a short arc during the welding process. The stick electrode should not be weaved broader than 3x of the core wire diameter. Dry storage for stick electrodes. Before the welding process, possibly re-drying 2 - 3 h at 250 - 300 °C

Current type | = + | ~ |

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 350*
Amperage	A	70 - 100	100 - 130	130 - 170

* available on request

UTP 6025

Standard :
EN ISO 2560-A : E 46 82 Ni B42 H5

Basic coated stick electrode

Application field

UTP 6025 is a basic-coated stick electrode and is suited for joining and surfacing welds in the chemical apparatus construction and for tube construction up to working temperatures of -100°C untreated and to -140°C hardened.

Base materials

TT St 35 N - TT St 45 N, TT St 35 V - TT St 45 V, 14 Ni 6, 10 Ni 14, 12 Ni, 16 Ni 14, St-W-TT, St E 26-51

Welding properties

UTP 6025 is weldable in all positions except vertical down. Easy slag removal, smooth, notch-free weld surface. The weld deposit is cold-tough and crack-proof.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule
460	540	24	110

Weld metal analysis in %

C	Si	Mn	Ni	Fe
0,05	0,3	1,0	2,6	balance

Welding instruction

Keep a short arc during the welding process. The stick electrode should not be weaved broader than 3x of the core wire diameter. Dry storage for stick electrodes. Before the welding process, possibly re-drying 2 - 3 h at 250 - 300 °C

Current type = +

Welding positions

PA PB PC PE PF

Availability / Current adjustments

Stick electrodes	Ø mm x L	3,2 x 350*	4,0 x 450*
Amperage	A	110 - 140	140 - 180

* available on request

UTP A 118

Welding wire, universal applicable

Standard :

Material-No.	:	1.5125
EN ISO 14341-A	:	G3Si1
AWS A5.18	:	ER 70 S-6

Application field

UTP A 118 is suited for joinings on high-stressed constructions in the steel-, boiler-, shipbuilding-, automobile-, container- and apparatus manufacture.

Base materials:

Construction steels	St 37 - St 52
Boiler steels	H I - H II, 17 Mn 4
Tube steels	St 35, St 45, St 35.8
Fine-grained steels	StE 255 - 500

Mechanical properties of the weld metal

Yield strength Re MPa	Tensile strength Rm MPa	Elongation A %	Impact strength Kv Joule
410	540	24	78

Weld metal analysis in %

C	Si	Mn	Fe
0,1	0,9	1,5	balance

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 21	C 1	EN ISO 544
0,8	DC (+)	x	x	x
1,0	DC (+)	x	x	x
1,2	DC (+)	x	x	x

Approvals

TÜV (No. 09478), DB (42.138.02)

UTP A 119

Welding wire, universal applicabler

Standard :

Material-No.	:	1.5130
EN ISO 14341-A	:	G4Si1
AWS A5.18	:	ER 70 S-6

Application field

UTP A 119 is suitable for joints welding of highly-stressed constructions in the steel-, boiler-, ship-, automobile-, container- and apparatus-construction. Suited also for welding in awkward positions in the dip-transfer range. Little loss in spraying.

Base materials:

Construction steels	St 37 - St 52
Boiler steels	H I - H II, 17 Mn 4
Tube steels	St 35, St 45, St 35.8
Fine-grained steels	StE 255 - 500

Mechanical properties of the weld metal

Yield strength Re MPa	Tensile strength Rm MPa	Elongation A %	Impact strength Kv Joule
460	560	24	80

Weld metal analysis in %

C	Si	Mn	Fe
0,8	0,9	1,7	balance

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 21	C 1	EN ISO 544
0,8	DC (+)	x	x	x
1,0	DC (+)	x	x	x
1,2	DC (+)	x	x	x

Approvals

TÜV (No. 09479), DB (No. 42.138.03)

Standard :
EN ISO 16834-A : G Mn3Ni1CrMo
AWS A5.28 : ER 100 S-G

UTP A 6020

Welding wire for high-strength tempered fine-grained steels

Application field

UTP A 6020 is suited for high-stressed, tempered, fine-grained steels applied in a very broad construction field. It is also very good suited for high quality requirements in the low temperature field. Also applicable in the piper,- container- and apparatus construction as well as for shipbuilding, and there mainly for the tanker construction.

Base materials

Fine-grained steels StE 620 - 690, Naxtra GS, 70 QStE 690 TM

Mechanical properties of the weld metal

Yield strength Re MPa	Tensile strength Rm MPa	Elongation A %	Impact strength Kv Joule
670 - 755	760 - 810	20	> 70

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Fe
0,1	0,5	1,6	0,33	0,3	1,4	balance

Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 21	C 1	EN ISO 544
0,8 *	DC (+)	x	x	x
1,0 *	DC (+)	x	x	x
1,2 *	DC (+)	x	x	x

* available on request

Standard :
EN ISO 16834-A : G Mn3Ni1CrMo
AWS A5.28 : ER 80 S-Ni 2

UTP A 6025

Ni-alloyed welding wire

Application field

UTP A 6025 is applied for welding cold-tough sheets, tube steels for the refrigeration industry as well as for fine-grained construction steel in working temperatures of -80°C. Further application fields are in container-, pipe- and machine construction.

The weld deposit of **UTP A 6025** has an excellent low-temperature toughness and age resistance.

Base materials

12 Ni 14 G 1, X 12 Ni 5 14 Ni 6, P-S275NL2, P-S500QL1, 13 MnNi 6-3

Mechanical properties of the weld metal

Yield strength Rp0,2 MPa	Tensile strength Rm MPa	Elongation A %	Impact strength Kv Joule + 20° C	- 40° C
500	600	22	120	80

Weld metal analysis in %

C	Si	Mn	Ni	Fe
0,1	0,6	1,1	2,5	balance

Welding instruction

Clean weld area thoroughly. In wall thicknesses > 15 mm preheating to 100°C is necessary. The interpass temperature should not exceed 150°C. For the reduction of stress peaks in larger sheets a stress relief annealing at 550 - 630°C can be applied.

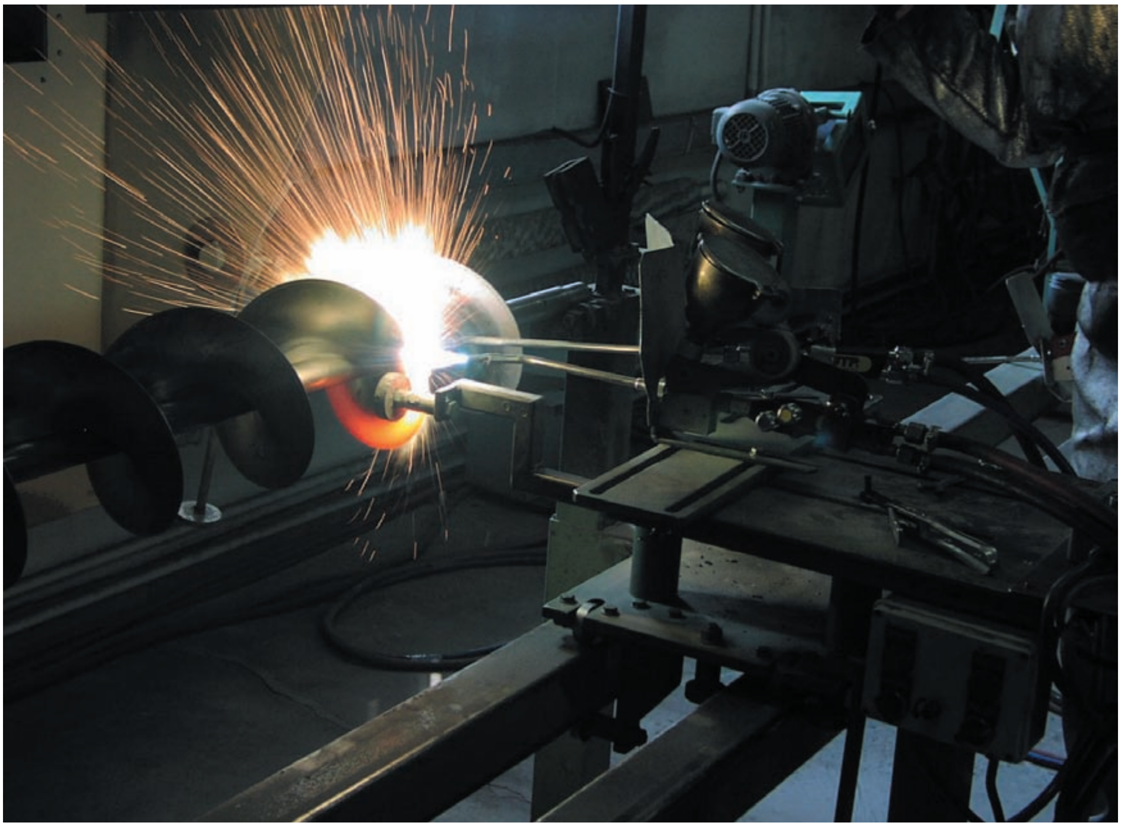
Welding procedure and availability

Ø (mm)	Current type	Shielding gas EN ISO 14175		Availability Spools
		M 21	C 1	EN ISO 544
0,8 *	DC (+)	x	x	x
1,0 *	DC (+)	x	x	x
1,2 *	DC (+)	x	x	x

* available on request

Approvals

TÜV (No. 01337)



Gruppe 10

Flame spraying powders

Index

- **UTP EXOBOND** flame spraying powders
- **UTP UNIBOND** flame spraying powders
- **UTP HABOND** flame spraying powders
- **UTP PTA** metal powders

More UTP flame spray powders are available namely

- **UTP METOXID** powders
- **UTP TOPGUN** powders
- **UTP PLAST / PLAST SUPER** plastic flame spray powders

Gruppe 10

Flame spraying powders

page

Flame spraying powders

Gruppe 10

Flame spraying powders

UTP EXOBOND flame spraying powders

UTP UNIBOND flame spraying powders

UTP HA-BOND flame spraying powders

UTP PTA metal powders

UTP EXOBOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness / Availability	Characteristics and application fields
UTP EB–1001 5.1 – 106/36	– 106 + 36 µm	Al 5,0 Ni balance	150 – 190 HB 1,0 Kg box	Bond coat, base powder for initial layer under further coats of wear resistant CrNi- and Cu-alloys
UTP EB–1002 N ~5.4 – 106/45	– 106 + 45 µm	Mo 5,0 Al 6,0 Ni balance	170 – 240 HV 1,0 Kg box	Bond coat, base powder on iron-, copper- and aluminium materials, also "one-step-powder", possible to apply thick layers, good sliding behaviour.
UTP EB–1003 3.1 – 125/45	– 125 + 45 µm	Si 1,2 Cr 19,3 Fe 0,8 Ni balance	180 – 280 HV 1,0 Kg box	Corrosion resistant base layer for subsequent coats, resistant to high temperatures. Corrosion resistant "one-step"-surfaces.

* available on request

UTP EXOBOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness Availability	Characteristics and application fields
UTP EB–1025 –	– 125 µm	Zn > 99,5	23 HB 1,0 Kg box	Active corrosion protection on steel under atmospheric stres-ses
UTP EB–1030 1.8 – 160/45	– 160 + 45 µm	Cu > 99,5	85 HRB 1,0 Kg box	Coatings providing good electrical conductivity;electrical con-trol buses, creation of soldering surfaces, electrical industry
UTP EB–1050* 11.8 – 45/5.6	– 45 + 5.6 µm	Co 12 WC 88	800 HV 5,0 Kg box	High resistance to abrasion and erosion; ventilator blades, sieve surfaces, feed screws
UTP EB–2001 ~3.2 – 125/45	– 125 + 45 µm	C 0,04 Si 0,4 Cr 15,5 Fe 8,0 Mn 0,3 Ni balance	160 – 230 HV 1,0 Kg box	CrNi alloys of moderate hardness subject to sliding friction wear, shaft journals, gland seats, cams of brake shafts, seal rings, impellers, valve stems, bearings etc.
UTP EB–2002 –	– 106 + 36 µm	C 0,2 Cr 9,3 Si 2,7 Fe 1,9 B 1,2 Al 0,4 Ni balance	350 – 380 HB 1,0 Kg box	Oxidation stability at moderate temperatures, high wear resi-stance; camshafts, bearings of rollings, cylinder liners, valve stems, hydraulic pistons, sliding ways etc

* available on request

UTP EXOBOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness Availability	Characteristics and application fields
UTP EB–2003 ~ 8.1 – 120/36	– 120 + 36 µm	Al 10,0 Cu balance	130 HB 1,0 Kg box	Good sliding and emergency running properties; rollers, bearing journals, slideways.
UTP EB–2005 –	– 106 + 36 µm	Matrix Ni, Cr, Si, B, Fe, Al with the addition of tungsten carbide	400 HV (matrix) 1,0 Kg box	Abrasion resistance for micro-particle surfacings, good oxidation stability; ventilator blades.
UTP EB–2007 ~ 6.4 – 106/36	– 106 + 36 µm	C 0,02 Si 0,7 Cr 17,0 Ni 12,5 Mo 2,2 Fe balance	180 HB 1,0 Kg box	Corrosion resistant coatings; pump sleeves, shafts and parts requiring the characteristics of stainless steel in the chemical and petrochemical industry. Special applications where coats like 18/8, AWS 316 L, 1.4436 are necessary.
UTP EB–3010 –	– 180 µm	C 0,01 Fe balance	90 HRB 1,0 Kg box	Low-alloy layer of ferrous material, repairs on cast components, filling and cushioning layers; compression bearings, ball bearing housings.

UTP EXOBOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness Availability	Characteristics and application fields
UTP EB–4010 ~ 6.2 – 125/45	– 125 + 45 µm	C 0,2 Si 0,7 Cr 16,0 Ni 2,0 Mn 0,7 Fe balance	260 – 350 HV 1,0 Kg box	Chromium steel alloy with high oxidation stability, good machinability; coating on bearing journals, shafts, pison rods.
UTP EB–5044 ~3.6 – 106/45	– 106 + 45 µm	Si 0,3 Cr 9,5 Al 6,5 Mo 5,5 Fe 5,5 Ni balance	83 HRB 1,0 Kg box	"One-step powder", also bond coat, repair and prophylactic protective coating, resistant to high temperatures; flue boilers, finned tube walls

UTP UNIBOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness Availability	Characteristics and application fields
UTP UB 5–2525 A* 2.2 – 125/36	– 125 + 36 µm	C 0,05 Fe 0,4 B 1,8 Si 2,8 Ni balance	230 HV 1,0 Kg box	Well suited to machine cutting; mould construction, glass industry.
UTP UB 5–2540 2.7 – 125/45	– 125 + 45 µm	C 0,25 Fe 2,5 Cr 7,5 B 1,6 Si 3,5 Ni balance	38 – 42 HRC 1,0 Kg box	Good resistance to corrosion and wear even at high operating temperatures; valve discs, conveyour chains, mixer parts, friction bearings, moulds in the glass industry, feed screws.

* available on request.

UTP UNIBOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %		Hardness Availability	Characteristics and application fields
UTP UB 5–2550* 2.8 – 125/45	– 125 + 45 µm	C 0,45 Cr 11,0 B 2,2 Si 3,7 Ni balance	Fe 3,0	50 HRC 1,0 Kg box	Good resistance to corrosion and wear even at high operating temperatures; gauges, cogs, bearing surfaces, cylinders, guide mechanisms, mixer blades, continuously cast rollers, valve discs, glass industry.
UTP UB 5–2555* 2.14 – 125/45	– 125 + 45 µm	C 0,5 Cr 16,5 Cu 3,0 Ni balance	B 3,7 Fe 2,9 Mo 3,0 Si 4,2	55 – 60 HRC 1,0 Kg box	Toughened coatings; valve stems, mixer and stirrer shafts, bearing seats, wearing rings, pump shafts, impellers.
UTP UB 5–2760 2.9 – 125/45	– 125 + 45 µm	C 0,75 Fe 3,5 Cr 15,0 B 3,2 Si 4,4 Ni balance		60 HRC 1,0 Kg box	Excellent resistance to wear and corrosion, high level of hardness with moderate dynamic compression stress; feed screws, running and sealing surfaces in valves, fittings and bearing seats.
UTP UB 5–2862* –	– 125 + 45 µm	NiCrBSi with the addition of 35 % tungsten carbide		60 HRC (Matrix) 1,0 Kg box	High abrasion resistance; stirrers, mixer blades, mould edges, extruder screws.

* available on request.

UTP UNIBOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness Availability	Characteristics and application fields
UTP UB 5–2756 X4* –	– 125 + 45 µm	NiCrBSi with the addition of 45 % tungsten carbide	55 HRC (Matrix) 3,5 Kg box	Special mixing powder with high abrasive wear resistance, also particularly suited for thin coating thick-ness applicati-ons, such as mould edges, scrapers, knives.
UTP UB 5–2864* – **UTP UB 5–2864 4*** –	– 125 + 45 µm – 106 + 20 µm	NiCrBSi with the addition of 50 % tungsten carbide	60 HRC (Matrix) 5,0 Kg box	Highest abrasion resistance; mandrels, cylinder screw shafts, excavator parts.
UTP UB 5–2871* –	–	NiCrBSi with the addition of 60 % tungsten carbide	60 – 65 HRC (Matrix) 3,5 Kg box	Powder flame spraying with simultaneous/belated fusing for the semiautomatic and fully automatic process of hard-facing on high wear resistant surfaces. Conveyor chains, Screw conveyors.

* available on request

UTP HABOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %		Hardness Availability	Characteristics and application fields
UTP HA – 032* ~8.2 – 80/40	– 80 + 40 µm	Cu 89 Sn 11		140 – 190 HB 0,5 Kg box	Low friction coefficient and low melting point; sliding surfaces; bearing seats; surfacing on non-ferrous metals.
UTP HA – 6315 G 2.1 – 106/20	– 106 + 20 µm	C 0,04 Fe 0,5 Si 2,0 B 1,2 Cu 20,0	Ni balance	170 – 240 HV 0,5 Kg box	Surfacing of grey cast iron, resistance to changes in temperature and excellent sea-water resistance.
UTP HA – 3 2.2 – 106/20	– 106 + 20 µm	C 0,03 Fe 0,5 B 1,3 Si 2,3	Ni balance	205 – 260 HV 0,5 Kg box	Repair surfacing, high impact resistance, press moulds, bearings, pump vanes.

* available on request

UTP HABOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness / Availability	Characteristics and application fields
UTP HA – 6320 2.2 – 53/20	– 53 + 20 µm	C 0,03 Fe 0,5 B 1,4 Si 2,4 Ni balance	190 – 260 HV 0,5 Kg box	Good wettability and smooth surfaces; surfacing on cast parts, moulds in the glass industry.
UTP HA – 2 2.2 – 106/20	– 106 + 20 µm	C 0,05 Fe 0,5 Si 3,0 B 1,6 Ni balance	260 – 310 HV 0,5 Kg box	Anti-oxidation protection and bond coat in the case of hard finishing passes, easy to machine cut; valve cones, gearwheels, bearings, moulds in the glass industry.

* available on request

UTP HABOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness Availability	Characteristics and application fields
UTP HA – 5 2.7 – 106/20	– 106 + 20 µm	C 0,25 Fe 2,5 Cr 7,5 Si 3,5 B 1,8 Ni balance	40 HRC 0,5 Kg box	Good resistance to corrosion and wear even at high operating temperatures; drawing dies, forging dies, tools in the plastics industry, ejector pins.

* available on request.

UTP HABOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness Availability	Characteristics and application fields
UTP HA – 06 2.19 – 106/20	– 106 + 20 µm	C 0,75 Si 2,4 W 7,5 Ni 13,4 Cr 19,5 Co balance Fe 3,0 B 1,7	39 – 45 HRC 0,5 Kg box	Resistant to changes in temperature, impact and corrosion; valve seats, knife edges, shears and scissor blades, friction bearings, hot punching tools.
UTP HA – 6* 2.8 – 106/20	– 106 + 20 µm	C 0,45 Cr 11,0 Ni balance B 2,3 Si 3,8 Fe 2,9	50 HRC 0,5 Kg box	Good resistance to corrosion and wear even at high operating temperatures; hard surfacing for valves, valve seats, impellers, guide rollers, pressure rollers.
UTP HA – 7 2.9 – 106/20	– 106 + 20 µm	C 0,75 Fe 3,5 Cr 15,0 Ni balance B 3,2 Si 4,5	60 HRC 0,5 Kg box	Good resistance to corrosion and wear even at high operating temperatures; pump rings, friction bearing surfaces, knife edges, press moulds, camshafts.
UTP HA – 8 –	– 106 + 20 µm	NiCrBSi with the addition of 35 % tungsten carbide	60 HRC (matrix) 0,5 Kg box	High level of protection against abrasive wear; slicing machine blades, conveyor chains, kneader parts.

* available on request.

UTP HABOND Flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness Availability	Characteristics and application fields
UTP HA – 8 SS –	– 106 + 20 µm	NiCrCoFeBSi with the addition of 55 % tungsten carbide	60 HRC (matrix) 0,5 Kg box	Highest abrasion resistance; mixer-settler parts and kneaders in the ceramics industry, die drawing tools, chopping blades, scrapers.
UTP HA – 8–65* –	– 150 + 20 µm	NiCoCrBSiFeW with the addition of tungsten carbide	60 HRC (matrix) 0,5 Kg box	Metal tungsten melting carbide mixing powder for thermal spraying and simultaneous melting for the automatic coating process such as hardfacing of wear intensive surfaces.

* available on request.

UTP PTA Metal powders for plasma-arc surfacing

UTP designation EN 1274	Grain size	Chemical composition in %		Hardness Availability	Characteristics and application fields
UTP PTA 2-701.10 ~ 7.1 – 150/50 **UTP PTA 2-701.11** ~ 7.1 – 200/63	– 150 + 50 µm – 200 + 63 µm	Cr 30,0 W 13,0 C 2,4 Co balance	Ni 2,0 Fe 1,0 Si 2,0	53 HRC 5,0 Kg box	Qualities to protect against adhesive and abrasive wear, high-temperature resistant; hardsurfacing of running and sealing surfaces in valves carrying gas, water and acid, hot-working tools subject to high stresses, valve seats, valve collets for combustion engines, grinding, mixing, carrying and drilling tools, dies and press moulds
UTP PTA 2-706.10 ~ 7.2 – 150/50 **UTP PTA 2-706.11** 7.2 – 200/63	– 150 + 50 µm – 200 + 63 µm	Cr 29,0 W 4,0 C 1,0 Co balance	Ni 2,0 Fe 1,0 Si 1,0	41 HRC 5,0 Kg box	
UTP PTA 2-708.10 – **UTP PTA 2-708.11** –	– 150 + 50 µm – 200 + 63 µm	Cr 26,0 Ni 23,0 W 12,0 Co balance	C 1,7 Fe 2,0 Si 1,0	45 HRC 5,0 Kg box	
UTP PTA 2-712.10 7.3 – 150/50 **UTP PTA 2-712.11** 7.3 – 200/63	– 150 + 50 µm – 200 + 63 µm	Cr 29,0 W 9,0 Co balance	C 1,5 Fe 2,0 Si 1,5	48 HRC 5,0 Kg box	

These qualities are not stocked as standard; available on request.

UTP PTA Metal powders for plasma-arc surfacing

UTP designation EN 1274	Grain size	Chemical composition in %		Hardness Availability	Characteristics and application fields
UTP PTA 2-721.10 7.5 – 150/50 **UTP PTA 2-721.11** 7.5 – 200/63	– 150 + 50 µm – 200 + 63 µm	Cr 28,0 Mo 6,0 Ni 3,0 Co balance	C 0,3 Fe 2,0 Si 1,5	32 HRC 5,0 Kg box	High corrosion resistance and resistance to adhesive (metal-to-metal) wear, buffer material for hard stellite qualities; medical engineering.
UTP PTA 3-710.10 – **UTP PTA 3-710.11** –	– 150 + 50 µm – 200 + 63 µm	Cr 32,0 C 4,3 Fe balance	Si 1,0 Mn 1,0	57 HRC 5,0 Kg box	Highly wear-resistant, preferred for protection against mineral wear with low impact; feed screws, excavator teeth.
UTP PTA 5-068HH.10 – **UTP PTA 5-068HH.11** –	– 150 + 50 µm – 200 + 63 µm	Cr 20,0 Mn 2,0 Nb 3,0 Ni balance	Fe 2,0 C 0,05 Si 0,5	170 HB 5,0 Kg box	Buffer layer preferred for stellite qualities, corrosion-resistant; pressure vessel construction, petro-chemical industry, power plants.
UTP PTA 5-776.10 ~ 3.9 – 150/50 **UTP PTA 5-776.11** ~ 3.9 – 200/63	– 150 + 50 µm – 200 + 63 µm	Cr 15,0 Mo 16,0 W 5,0 Ni balance	Fe 6,0 C < 0,1 Si < 1,0 Co < 3	200 HB 5,0 Kg box	Corrosion and high-temperature resistant coatings, forging hammers, saddles, continuous cast rollers/ buffer layer, mixer blades.

These qualities are not stocked as standard; available on request.

Appendix

page

Abbreviations and designations used in material test reports

Abbreviations and designations have been introduced on an international basis for test report data. The are used in test reports and in the literature; they help to understand results in foreign languages because of clear definitions.

Abbreviation	Designation English	Unit of measurement
R_p	Yield strenght	MPa
$R_{p0,2}$	0,2 yield strength	MPa
$R_{p1,0}$	1,0 yield strength	MPa
R_{eH}	Yield strength / upper limit	MPa
R_{eL}	Yield strength / lower limit	MPa
R_m	Tensile strength	MPa
A	Elongation at rupture	%
L	Gauged length	mm
A_5	Elongation at rupture (L = 5 d) L = Gauged length 5 d = 5 x specimen diameter	%
K_v	Impact strength	J
K_v (ISO-V)	Impact strength acc. to ISO (International Standard Organisation) specimen with V-notch (impact section 0,8 cm≈)	J
K_v (DVM)	Impact strength acc. to DVM (Deutscher Verband für Materialprüfung) specimen with round notch (impact section 0,7 cm≈)	J

MPa	=	Megapascal
J	=	Joule
mm	=	Millimeter
%	=	Per cent

Melting temperatures of various base metals and alloys

Metal/ alloy	Chem. Symbol	° Celsius	Metal/ alloy	Chem. Symbol	° Celsius
Aluminium	Al	660	Molybdenum	Mo	2620
Al forging alloys	–	540 – 650	German silver	–	900
Antimony	Sb	630	Nickel	Ni	1453
Beryllium	Be	1278	Niobium	Nb	2468
Lead	Pb	327	Palladium	Pd	1554
Boron	B	2180	Platinum	Pt	1772
Bronze	–	ca. 1000	Rhodium	–	1966
Cadmium	Cd	321	Red brass	–	1150
Chromium	Cr	1857	Selenium	Se	221
Iron pure	Fe	1536	Silver	Ag	961
Germanium	Ge	937	Silicon	Si	1410
Gold	Au	1064	Steel	–	ca. 1500
Cast iron	–	ca. 1200	Tantalium	Ta	2996
CrNi 18/8	–	ca. 1420	Titanium	Ti	1660
Iridium	Ir	2410	Vanadium	V	1890
Cobalt	Co	1495	Bismuth	Bi	271
Copper	Cu	1083	Tungsten	W	3410
Magnesium	Mg	650	Zinc	Zn	419
Manganese	Mn	1245	Tin	Sn	232
Brass	Ms	ca. 900	Zirconium	Zr	1852

Alloying and Accompanying Elements in Steel

The principal influences exerted by the alloying and accompanying elements on steel are given now:

ALUMINIUM ordinal number : 13 crystal structure : cubic, fc density [kg/m³] : 2.70 melting point [°C]: 660 lattice width [A] : 4.04 atomic radius [A] : 1.43 E-module [103 MPa] : 70.5		**Chemical symbol: Al** This is the most powerful, very frequently used deoxidising and also detriding agent. As a result, it also has an extremely favourable effect on resistance to ageing. Small additions assist fine-grained structure. As Al forms very hard nitrides with nitrogen, it is usually an alloying element in nitriding steels. It increases scaling resistance and is therefore frequently added to alloy ferritic heat resistant steels. With unalloyed carbon steels, scaling resistance can be promoted by calorising (introduction of aluminium into the surface). Al very sharply restricts the gamma phase. On account of the very pronounced increase in coercive field intensity, Al is an alloying element in iron-nickel-cobalt-aluminium permanent magnet alloys.
ARSENIC ordinal number: 33 crystal structure: rhomb. density [kg/m³] : 5.72 melting point [°C]: 817 lattice width [A] : 4.14 atomic radius [A] : 1.39		**Chemical symbol: As** Also resticts the gamma phase and is a steel parasite, as it possesses a strong tendency to segregation, in a similar way to phosphorus. Elimination of segregation due to differential annealing is however even more difficult than is the case with phosphorus. In addition, it increases temper brittleness, sharply reduces toughness and impairs weldability.
BORON ordinal number: 5 crystal structure: monoclinic density [kg/m³] : 2.34 melting point [°C]: 2180 lattice width[A] : 8.9/5.06 atomic radius [A] : 0.88		**Chemical symbol: B** As boron possesses a high cross section for neutron absorption, it is used to alloys steels for controllers and shields of atomic energy plants. Austenitic 18/8 CrNi steels can be raised to increased yield point and strength with boron by means of precipitation hardening, but corrosion resistance is reduced in the process. Precipitation induced by room temperature increases the strength properties of high-temperature austenitic steel types in the high temperature range. In structural steels, this element improves through hardening and thus causes an increase in core strength in case-hardening steels. A reduction in weldability must be expected in boron alloyed steels.

BERYLLIUM

ordinal number:	4
crystal structure:	hexagonal
density [kg/m³] :	1.278
melting point[°C]:	1290
lattice width [A] :	2.3/3.58
atomic radius [A] :	1.12
E-module [103 MPa] :	310

Chemical symbol: Be

Very pronounced restriction of the gamma phase. With Be it is possible to carry out preciptation hardening, but toughness is reduced in the process. Pronouncedly deoxidising, considerable affinity for sulphur. Not very often used as accompanying element in steels.

CARBON

ordinal number:	6
crystal structure:	hexagonal
density [kg/m³] :	3.51
atomic radius [A] :	0.77
E-module [103 MPa] :	920

Chemical symbol: C

Carbon is the most important and influential alloying element in steel. In addition to carbon however, any unalloyed steel will contain silicon, manganese, phosphorus and sulphur, which occur unintentionally during manufacture. The addition of further alloying elements to achieve special effects and intentional increase in the manganese and silicon contents result in alloy steels.
With increasing C content, the strength and hardenability of the steel increase, but its ductility, forgeability, weldability and machinability (using cutting machine tools) are reduced. Corrosion resistance to water, acids and hot gases are practically unaffected by the carbon.

CALCIUM

ordinal number:	20
crystal structure:	krz
density [kg/m³] :	1.55
melting point [°C]:	840
lattice width [A] :	5.56
atomic radius [A] :	1.97
E-module [103 MPa] :	19.6

Chemical symbol: Ca

Used together with Si in the form of silicon-calcium for deoxidation. Ca increases scaling resistance of heating conductor materials.

CER

ordinal number:	58
crystal structure:	hexagonal
density [kg/m³] :	
melting point [°C]:	
lattice width [A] :	
atomic radius [A] :	
E-module [103 MPa] :	

Chemical symbol: Ce

Has a purifying action, as it deoxidises pronouncedly and promotes desulphurisation. It is frequently used in conjunction with lanthanum, neodymium, praseodymium and other rare earth metals as a composite metal.
In high alloy steels, to some extent promotes hot forming properties and improves scale resistance in heat resisting steels. Fe-Ce alloys with approximately 70 % Ce are pyrophoric (flint stones). Addition to spheroidal graphite cast iron.

COBALT

ordinal number:	27
crystal structure :	hexagonal
density [kg/m³] :	8.89
melting point [°C]:	1495
lattice width [A] :	2.51/4.1
atomic radius [A] :	1.25
E-module [103 MPa] :	204

Chemical symbol: Co

Co does not form any carbides. It inhibits grain growth at elevated temperatures and pronouncedly improves retention of temper and high temperature strength. Therefore, used frequently as alloying element in high speed steels, hot forming tool steels, creep-resistant and high temperature materials. Promotes graphite formation.
In large quantities, increases remanence, coercive field intensity and thermal conductivity. Therefore, alloying base for super high quality permanent magnet steels and alloys. Under the influence of neutral irradiation, the pronouncedly radioactive isotopes, Co is formed, for which reason Co is undesirable in steels for atomic reactors.

CHROMIUM

ordinal number:	24
crystal structure:	krz
density [kg/m³] :	7.19
melting point[°C]:	1857
lattice width [A] :	2.89
atomic radius [A] :	1.27
E-module [103 MPa] :	127

Chemical symbol: Cr

Cr renders steels oil and air-hardenable. By reduction of the critical rate of cooling necessary for martensite formation, it increases hardenability, thus improving its susceptibility to hardening and tempering. Notch toughness is reduced however, but ductility suffers only very slightly.
Weldability decreases in pure chromium steels with increasing Cr content. The tensile strength of the steel increases by 80 - 100 MPa per 1 % Cr.
Cr is a carbide former. Its carbides increase the edge-holding quality and wear resistance. High temperature strength and high-pressure hydrogenation properties are promoted by chromium. Whilst increasing Cr contents improve scaling resistance, a minimum content of about 13 % chromium is necessary for corrosion resistance of steels; this must be dissolved in the matrix.
The element restricts the gamma phase and thus extends the ferrite range. It does however stabilize the austenite in austentic Cr-Mn and Cr-Ni steels. Thermal and electrical conductivity re reduced. Thermal expansion is reduced (alloys for glass sealing). With simultaneously increased carbon content, Cr contents up to 3 % increase remanence and coercive field intensity.

COPPER

ordinal number:	29
crystal structure:	kfz
density [kg/m³] :	8.96
melting point [°C]:	1083
lattice width [A] :	3.61
atomic radius [A] :	1.28
E-module [103 MPa] :	123

Chemical symbol: Cu

Copper is added to very few steel alloys, as it concentrates under the layer of scale and through penetrating into the grain boundary, causes high surface sensitivity in hot forming processes, for which reason it is regarded as a steel parasite.
The yield strength and the yield point/strength ratio are increased. Contents above 0.30 % can cause precipitation hardening. Hardenability is improved. Weldability is not affected by copper in alloy and low alloy steels, Cu produces significant improvement in weathering resistance. In acid resistant high alloy steels, a Cu content above 1 % produces improvement in resistance to hydrochloric acid and sulphuric acid.

HYDROGEN

ordinal number:	1
crystal structure:	hexagonal
density [kg/m³] :	0.0899*10-³
melting point [°C]:	-252.9
lattice width [A]:	3.75/6.1

Chemical symbol: H

Hydrogen is a steel parasite because it causes embrittlement through reduction of ductility and necking without increasing yield strength and tensile strength. It is cause of undesirable flaking and promotes the occurence of ghost lines. Atomic hydrogen occuring during pickling penetrates the steel, forming pitting. Moist hydrogen decarburises at elevated temperatures.

MAGNESIUM

ordinal number:	12
crystal structure:	hexagonal
density [kg/m³] :	1.74
melting point [°C]:	650
lattice width [A] :	3.21/5.2
atomic radius [A] :	1.60
E-module [103 MPa] :	44.3

Chemical symbol: Mg

Promotes spheroidal graphite formation in cast iron

MANGANESE

ordinal number:	25
crystal structure:	cubic, bc
density [kg/m³] :	7.43
melting point [°C]:	1245
lattice width [A] :	3.89
atomic radius [A] :	1.26
E-module [103 MPa] :	208

Chemical symbol: Mn

Manganese deoxidises. It compounds with sulphur to form Mn sulphide, thus reducing the undesirable effect of the iron sulphide. This is of particular importance in free-cutting steel; it reduces the risk of red shortness.

Ar3 and Ar1 are decreased by Mn addition. It very pronoucedly reduces the critical cooling rate, thus increasing hardenability. Yield strength is increased by addition of Mn and, in addition, Mn facourably affects forgeability and weldability and pronouncedly increases hardness penetration depth. Contents > 4 % also lead with slow cooling to formation of brittle martensitic structure, so that the alloying range is hardly used.

Steels with Mn contens > 12 % are austenitic if the carbon content is also high, because Mn considerably extends the gamma phase. Such steels are prone to very high degree of strain hardening where the surface is subjected to impact stress, whilst the core remains tough. For this reason, they are highly resistant to wear under the influence of impact.

Steels with Mn contents of > 18 % remain unmagnetisable even after relatively pronounced cold forming and are used as special steels as well as steels remaining tough at subzero temperatures which are subjected to low temperature stress.

The coefficient of thermal expansion increases as a result of Mn, whilst thermal and electrical conductivity are reduced.

MOLYBDENUM

ordinal number:	42
crystal structure:	cubic, bc
density [kg/m³] :	10.22
melting point [°C]:	2620
lattice width [A] :	3.15
atomic radius [A] :	1.39
E-module [103 MPa] :	301

Chemical symbol: Mo

Mo is usually alloyed together with other elements. Reducing the critical cooling rate improves hardenability. Mo significantly reduces temper brittleness, for example in the case of CrNi and Mn steels, promotes fine grain formation and also favourably affects weldability. Increase in yield point and strength. With increased Mo content, forgebility is reduced. Pronounced carbide former; cutting properties with high speed steel are improved thereby.

It belongs to the elements which increase corrosion resistance and is therefore used frequently with high alloy Cr steels and with austenitic CrNi steels. High Mo contents reduce susceptibility to pitting. Very strong reduction of the austenitic area. Increased high temperature strength, scaling resistance is reduced.

NITROGEN

ordinal number:	7
crystal structure:	hexagonal
density [kg/m³] :	$1.25 * 10^{-3}$
melting point [°C]:	- 195.8
atomic radius [A] :	0.77

Chemical symbol: N

This element can occur both as a steel parasite and as an alloying element. Parasitic because of the reduction in toughness through precipitation processes, causing susceptibility to ageing and blue brittleness (deformation in the blue heat range of 300 - 350° C) and an account of the possibility of initiation of intercrystalline stress cracks in unalloyed and low alloy steels.

As an alloying element, N extends the gamma phase and stabilizes the austenitic structure. In austenitic steels N increases strength and above all the yield strength plus mechanical properties in heat. As a result of nitride formation during nitriding, N permits high surface hardness to be achieved.

NIOBIUM

ordinal number:	41
crystal structure:	cubic, bc
density [kg/m³] :	8.57
melting point [°C]:	2468
lattice width [A] :	3.30
atomic radius [A] :	1.46
E-module [103 MPa] :	104

Chemical symbol: Nb

Niobium is a very pronounced carbide former, thus alloyed particularly as stabilizers of chemical resistant steels. Nb is a ferrite former and thus reduces the gamma phase. On account of the increase in high temperature strength and creep rupture strength due to Nb, it is frequently alloyed to high-temperature austenitic boiler steels and high speed steels.

NICKEL

ordinal number:	28
crystal structure:	cubic, bc
density [kg/m³] :	8.90
melting point [°C]:	1453
lattice width [A] :	3.52
atomic radius [A] :	1.24
E-module [103 MPa] :	202

Chemical symbol: Ni

With structural steels produces significant increase in notch toughness, even in the low temperature range, and is therefore alloyed for increasing toughness in case-hardening, heat-treatable and subzero toughness steels.

All transformation points (A1 - A4) are lowered by Ni; it is not a carbide former. As result of pronounced extension of the gamma phase, Ni in contents of > 7 % imparts austenitic structure to chemically resistant steels down to well below room temperature. Ni on its own makes the steel rust resistant, even in high percentages, but in austenitic Cr-Ni steels

NICKEL
(continued)

results in resistance to the effect of chemicals. Resistance of these steels in oxidizing substances is achieved by Cr.
At temperatures above 600° C, austenitic steels have greater high temperature strength, as their recrystallisation temperature is high. They are practically unmagnetisable. Thermal and electrical conductivity are significantly reduced. High Ni contents in precisely defined alloying ranges lead to physical steels with certain physical properties, low thermal expansion (Invar types).

OXYGEN

ordinal number:	8
crystal structure:	ortho-rhomb.
density [kg/m³] :	$1.429*10^{-3}$
melting point [°C]:	-182.9
atomic radius [A] :	0.66

Chemical symbol: O
Steel parasite; important for its specific effect are nature and composition of its compounds in steel as well as form and distribution. The mechanical properties, particularly notch toughness, especially in transverse direction, are reduced, whilst the tendency to ageing brittleness, red shortness, fibrous fracture and fishscale fracture is increased.

PHOSPHORUS

ordinal number:	15
crystal structure:	ortho-rhomb.
density [kg/m³] :	1.83
atomic radius [A] :	1.28

Chemical symbol: P
Is usually regarded as a steel parasite, as P produces pronounced primary segregation an solidification of the melt and the possibility of secondary segregation in solid state due to the pronounced restriction of the gamma phase.
As a result of the relatively low rate of diffusion, both in the alpha- and in the gamma crystal, segregation which has occurred can only be corrected with difficulty. As it is hardly possible to achieve homogeneous distribution of the P1 an attempt is made to keep the phosphorus content very low and accordingly, with high grade steels, to strive for an upper limit of 0.03 - 0.05 %. The extent of segregation cannot be determind with certainty.
Even in the smallest quantities, P increases proneness to temper embrittlement. Phosphorus embrittlement increases with the rise in C content, with rising hardening temperature, with grain size and with decrease of the ratio of reduction by forging. Embrittlement occurs as cold shortness and sensitivity to impact stress (tendency to brittle fracture). In low alloy structural steels with C contents of about 0.1 %, P increases strength and corrosion resistance to atmospheric effects. Cu assists the improvement in corrosion resistance (rust resistant steels).
In austenitic Cr-Ni steels, additions of P can cause increases in yield strength and achieve precipitation effects.

LEAD

ordinal number:	82
crystal structure:	kfz
density [kg/m³] :	11.36
melting point [°C]:	327
lattice width [A] :	4.95
atomic radius [A] :	1.75
E-module [103 MPa] :	16.2

Chemical symbol: Pb

Is added to cutting tool steels in contents of about 0.2 - 0.5 % as, by virtue of its extremely fine suspension-like distribution, formation of shorter chips and clean faces of cut are achieved, thus improving machinability. The lead contents stated hardly affect the mechanical properties of the steel at all.

SULPHUR

ordinal number:	16
crystal structure:	ortho-rhomb.
density [kg/m³] :	2.07
melting point [°C]:	119
atomic radius [A] :	1.27

Chemical symbol: S

Produces the most pronounced segregation of all steel accompanying elements. Iron sulphide, leads to red shortness or hot shortness, as the low melting point sulphide eutectics surround the grains in reticular fashion, so that only slight cohesion of the latter occurs and during hot forming the grain boundaries tend to break down. This is further increased by the action of oxygen.

As sulphur possesses a considerable affinity for manganese, it is combined in the form of Mn sulphide, as this is the least dangerous of all existing inclusions, being present distributed in point form in the steel. Toughness in transverse direction is reduced significantly by S.

Sulphur is added intentionally to steels for automatic machining up to 0.4 % as the friction on the tool cutting edge reduced by the tool. In addition, short chips occur when free-cutting steels are machined. Sulphur increases susceptibility to welding cracks.

ANTIMONY

ordinal number:	51
crystal structure:	rhomb.
density [kg/m³] :	6.62
melting point [°C]:	630
lattice width [A] :	4.5
atomic radius [A] :	1.59
E-module [103 MPa] :	54.9

Chemical symbol: Sb

A steel parasite, as it generally significantly reduces toughness properties; restricts the gamma phase.

SELENIUM

ordinal number:	34
crystal structure:	rhomb.
density [kg/m³] :	4.19
melting point [°C]:	221
atomic radius [A] :	1.40

Chemical symbol: Se

Used in free-cutting steels in a similar way to sulphur, it being intended to improve machinability even more effectively.

In corrosion resistant steels, it reduces resistance to a lesser degree than sulphur.

SILICON

ordinal number:	14
crystal structure:	diamond
density [kg/m³] :	2.33
melting point [°C]:	1410
atomic radius [A] :	1.32
E-module [103 MPa]:	113

Chemical symbol: Si

Si is contained in all steel in the same way as manganese, as iron ores incorporate a quantity of it according to their compostion. In steel production itself silicon is absorbed into the melt from the refractory furnace linings. But only those steels are called silicon steels which have a Silicon content of > 0.40 %.
Si is not a metal, but a metalloid as are also, for example, phoshorus and sulphur Si deoxidises. It promotes graphite precipitation and restrics the gamma phase significantly, increases strength and wear resistance (Si-Mn heat treatable steels); significant increase in the elastic limit, thus useful alloying element in spring steels.
It significantly increases scale resistance, so that such resisting steels are alloyed with it. The possible content is limited however an account of its imparing hot and cold formability. With 12 % Si, acid resistance is achieved to a large extent, but such grades can only be produced as very hard, brittle steel castings which can be machined only by grinding.
On account of significant reduction of electrical conductivity, coercive field intensity and low wattage loss, Si is used in steels for electrical quality sheet.

TIN

ordinal number:	50
crystal structure:	tetragonal
density [kg/m³] :	7.30
melting point [°C]:	232
lattice width [A]:	5.82/3.2
atomic radius [A] :	1.62
E-module [103 MPa]:	54.3

Chemical symbol: Sn

Steel parasite as it concentrates like Cu under the scale film, penetrates along the grain boundaries and causes cracking and solder brittleness. Sn tends towards pronounced segregation and restricts the gamma phase.

TANTALUM

ordinal number:	73
crystal structure:	cubic, bc
density [kg/m³] :	16.6
melting point [°C]:	2996
lattice width [A]:	3.30
atomic radius [A] :	1.46
E-module [103 MPa]:	175

Chemical symbol: Ta

This element occur together with Nb, and they are very difficult to separate from one another, so that they are usually used together. Very pronounced carbide formers, thus alloyed particularly as stabilizers of chemical resistant steels. It is a ferrite former and thus reduces the gamma phase. Ta has a neutron high absorption cross-section; only low-Ta Nb steel is considered for use for reactor steels.

TELLURIC

ordinal number:	52
crystal structure:	rhomb.
density [kg/m³] :	6.24
melting point [°C]:	450
lattice width [A]:	4.45/5.9
atomic radius [A] :	1.60
E-module [103 MPa]:	41.2

Chemical symbol: Te

Telluric influences steel properties comparable to selenium, used in free-cutting steels similar to sulphur. Is being intended to improve machinability even more effectively.
In corrosion resistant steels, it reduces resistance to a lesser degree than sulphur.
Contents up to 0.2 % improve the machinability.

TITANIUM

ordinal number:	22
crystal structure:	hexagonal
density [kg/m³] :	4.50
melting point [°C]:	1660
lattice width [A]:	2.95/4.7
atomic radius [A] :	1.47
E-module [103 MPa]:	106

Chemical symbol:Ti

On account of its very strong affinity for Oxygen, nitrogen, sulphur and carbon, has a pronounced carbide forming action. Used widely in stainless steels as carbide former for stabilization against intercystalline corrosion. Also possesses grain refining properties.
Ti restricts the gamma phase very pronouncedly. In high concentation, it leads to precipitation processes and is added to permanent magnet alloys an account of achieving high coercive field intensity. Ti increases creep rupture strength through formation of special nitrides. Finally, Ti tends pronouncedly to segregaion and banding.

TUNGSTEN

ordinal number:	74
crystal structure:	cubic, bc
density [kg/m³] :	19.3
melting point [°C]:	3410
lattice width [A]:	3.16
atomic radius [A] :	1.39
E-module [103 MPa]:	368

Chemical symbol:T (German W)

Tungsten is a very pronounced carbide former (its carbides are very hard) and restricts the gamma phase. It improves toughness and prevents grain growth. T increases high temperature strength and retention of temper as well as wear resistance at high temperatures (red heat) and thus cutting ability.
It is therefore alloyed primarily to high speed and hot forming tool steels, as well as creep-resistant steel types and to ultra-hard steels. Significant increase in coercive field intensity, thus alloying element of permanent magnet steel alloys. T impairs scaling resistance. Its high specific gravity is particular noticeable in high T-alloy high speed and hot forming tool steels.

VANADIUM

ordinal number:	23
crystal structure:	cubic, bc
density [kg/m³] :	5.96
melting point [°C]:	1890
lattice width [A]:	3.03
atomic radius [A] :	1.34
E-module [103 MPa]:	127

Chemical symbol:V

Refines the primary grain and the casting structure. Pronounced carbide former, thus providing increase in wear resistance, edge holding quality and high temperature strength. It is used therefore primarily as additional alloying element in high speed, hot forming and creep resistant steels. Significant improvement in retention of temper, reduction of overheating sensitivity. As V refines the grain and inhibits air hardening as a result of carbide formation, it promotes the weldability of heat treatable steels. Increase in resistance to compressed hydrogen an account of carbide formation. V restricts the gamma phase and shifts the Curie point at elevated temperatures.

ZIRCONIUM

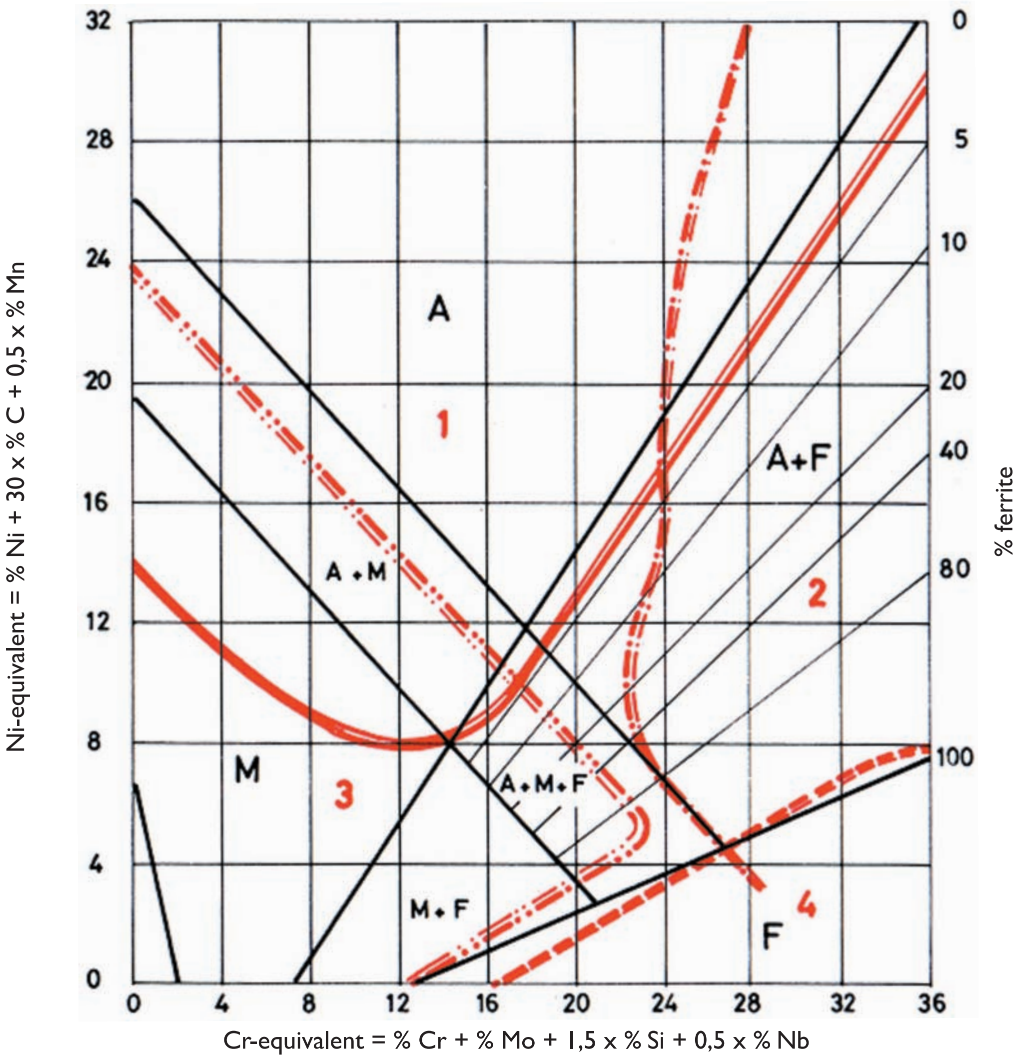
ordinal number:	40
crystal structure:	hexagonal
density [kg/m³] :	6.49
melting point [°C]:	1852
lattice width [A]:	3.23/5.1
atomic radius [A] :	1.60
E-module [103 MPa]:	92.2

Chemical symbol: Zr

Carbide former; metallurgical use as alloying element for deoxidation, denitridig and desulphurisation, as it leaves minimal deoxidation products behind.
Additions of Zr to fully deoxidised sulphur-bearing free-cutting steels have a favourable effect on sulphide formation and thus prevention of red shortness. It increases the life of heating conductor materials and produces restriction of the gamma phase.

Schaeffler Diagram

The Schaeffler diagram shows the influence of the alloying elements on the structure of the weld metal. Also shown are the critical temperature ranges for welding.



A = austenite F = ferrite M = martensite

1 Hot-crack proneness range above 1250° C

2 Embrittlement range due to sigma phase after temperature stressing between 500° C and 900° C

3 Hardening-crack proneness range below 400° C

4 Grain growth range above 1150° C

Comparative hardness table

Brinell	Rockwell		Vickers
HB	HRB	HRC	HV
80	36,4		80
85	42,4		85
90	47,4		90
95	52,0		95
100	56,4		100
105	60,0		105
110	63,4		110
115	66,4		115
120	69,4		120
125	72,0		125
130	74,4		130
135	76,4		135
140	78,4		140
145	80,4		145
150	82,2		150
155	83,8		155
160	85,4		160
165	86,8		165
170	88,2		170
175	89,6		175
180	90,8		180
185	91,8		185
190	93,0		190
195	94,0		195
200	95,0		200
205	95,8		205
210	96,6		210
215	97,6		215
220	98,2		220
225	99,0		225
230		19,2	230
235		20,2	235
240		21,2	240
245		22,1	245
250		23,0	250
255		23,8	255
260		24,6	260
265		25,4	265
270		26,2	270
275		26,9	275
280		27,6	280
285		28,3	285
290		29,0	290
295		29,6	295
300		30,0	300
310		31,5	310
320		32,7	320
330		33,8	330
340		34,9	340
350		36,0	350

Brinell	Rockwell		Vickers
HB	HRB	HRC	HV
359		37,0	360
368		38,0	370
376		38,9	380
385		39,8	390
392		40,7	400
400		41,5	410
408		42,4	420
415		43,2	430
423		44,0	440
430		44,8	450
		45,5	460
		46,3	470
		47,0	480
		47,7	490
		48,8	500
		49,0	510
		49,8	520
		50,3	530
		50,9	540
		51,5	550
		52,1	560
		52,7	570
		53,3	580
		53,8	590
		54,4	600
		54,9	610
		55,4	620
		55,9	630
		56,4	640
		56,9	650
		57,4	660
		57,9	670
		58,4	680
		58,9	690
		59,3	700
		60,2	720
		61,1	740
		61,9	760
		62,7	780
		63,5	800
		64,3	820
		65,0	840
		65,7	860
		66,3	880
		66,9	900
		67,5	920
		68,0	940

Conversion of Basic Units

Length :

source		target	
1 Angström	[A]	$1*10^{-10}$	[m]
1 foot	[ft]	0.3048	[m]
1 inch	[“]	0.0254	[m]
1 mile	[ml]	1609	[m]
1 yard	[yd]	0.9144	[m]
1 mil (thou)	[mil]	0.0254	[mm]

Area :

source		target	
1 square inch	[in^2]	645.16	[mm^2]
1 square foot	[ft^2]	0.092903	[m^2]
1 square yard	[yd^2]	0.836130	[m^2]
1 square mile		2.590	[km^2]

Volume :

source		target	
1	[cm^3]	10^{-6}	[m^3]
1 cubic foot	[ft^3]	0.02832	[m^3]
1 cubic inch	[in^3]	$1.639*10^{-5}$	[m^3]
1 cubic yard	[yd^3]	0.764555	[m^3]
1 gallon (US)	[gal]	$3.785*10^{-3}$	[m^3]
1 gallon (UK)	[gal]	$4.546*10^{-3}$	[m^3]
1 litre	[l]	$1*10^{-3}$	[m^3]

Weight :

source		target	
1 pound	[lb]	0.4536	[kg]
1 ton, long (UK)		1016	[kg]
1 ton, short (US)		907.2	[kg]
1 ounce	[oz]	0.02835	[kg]

Density :

source	target	
1 [lb/ft^3]	16.02	[kg/m^3]
1 [lb/in^3]	$2.768*10^{-5}$	[kg/m^3]
1 [lb/USgal]	119.8	[kg/m^3]
1 [g/cm^3]	1000	[kg/m^3]

Force :

source		target	
1 dyne	[$g*cm/s^2$]	10^{-5}	[N]
1 poundal	[$lb*ft/s^2$]	0.13826	[N]
1 pound force	[lbf]	4.448	[N]
1	[kgf]	9.80665	[N]
1 tons force (long) (UK)		9.964*103	[N]

Energy / Work :

source		target	
1 calorie	[cal]	4.1868	[J]
1	[erg]	10^{-2}	[J]
1	[Btu]	1055	[J]
1	[ft/lbf], [ft-lb]	1.356	[J]
1	[PS*h]	$2.6845*10^6$	[J]
1	[kWh]	$3.6*10^6$	[J]

Power :

source	target	
1 [ft/lbf s]	1.3558	[W]
1 [PS]	735.5	[W]
1 [BTU/h]	0.2931	[W]
1 [W/in]	1550	[W/m^2]

Stress / Pressure :

source	target	
1 [MN/m²], [MPa]	1	[N/mm²]
1 [lbf/in]	6.895* 10^3	[N/m²]
1 [tonf/in]	15.444* 10^6	[N/m²]
1 [ksi]	6.895	[N/mm²]
1 [bar]	1* 10^5	[N/m²]
1 [Torr] (1mmHg)	133.322	[N/mm²]

Velocity :

source	target	
1 [in/min]	0.4233	[mm/s]
1 [ft/h]	8.467.10-5	[m/s]
1 [ft/min]	5.08.10^{-3}	[m/s]
1 [ft/s]	0.3048	[m/s]
1 [in/s]	0.0254	[m/s]
1 [km/h]	0.2778	[m/s]
1 [mph]	1.609	[km/h]

Thermal Conductivity :

source	target	
1 [BTU/h ft °F]	1.7307	[W/(m.K)]
1 [BTU/in(h ft °F)]	0.1442	[W/(m.K)]
1 [kcal/(mh °C)]	1.163	[W/(m.K)]

Temperature :

source		target	
1 degree Fahrenheit	[°F]	5/9 (°F-32)	[°C]
1	[°R]	5/9 (°R-459.69	[°C]
1 degree Kelvin	[K]	K - 273.15	[°C]
1 degree Celsius	[°C]	[°C] + 273.15	[K]

Deposition Rate :

source	target	
1 [lb/h]	0.4536	[kg/h]
1 [lb/min]	27.216	[kg/h]

Flow Rate :

source	target	
1 [ft³/h]	0.4719	[l/min]
1 [ft³/min]	28.31	[l/min]
1 [gal/h]	0.06309	[l/min]
1 [gal/min]	3.785	[l/min]

Heat Input :

source	target	
1 [J/in]	39.37	[J/m]

Energy Content :

source	target	
1 [Btu/lb]	2.326	[kJ/kg]
1 [cal/g]	4.1868	[kJ/kg]

Impact Work :

source	target	
1 [kgm/cm²]	0.8	[J]
1 [ft.lb/in²]	0.168122	[J]

Hydrogen Content :

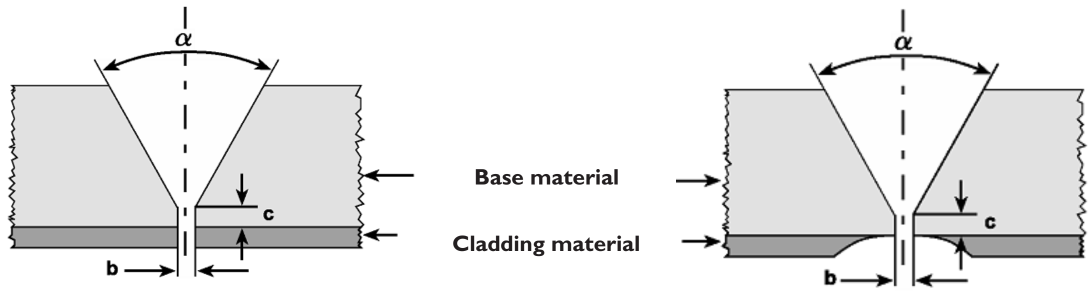
source	target	
1 [ppm H]	1/0.9	[ml/100g] H
1 [cal/g]	4.1868	[kJ/kg]

Groove preparation

For the base material side the grooves are prepared, according to choice, in a V or U form. The included angle a on the single V-joint is approximately 60°, the angle of slope on the U-joint approximately 10°. The following sketches only show the preparation for the single V-joint.

1) Seams accessible on both sides

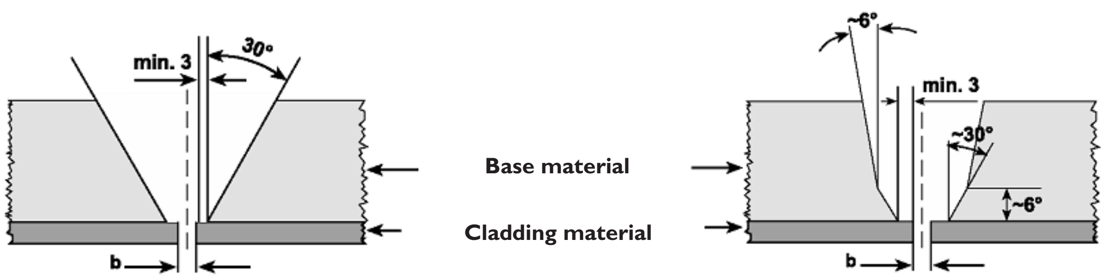
Finish A **Finish B**



Size b can be up to 2 mm. Size c is aligned in accordance with the chosen weld process. For finish B the cladding material should be machined only so far on the side edge of root face that cladding material will definitely not be melted by the consumable for the base material.

2) Seams only accessible on the base material side

Finish A – single V-joint **Finish B – V-joint upon V-root**



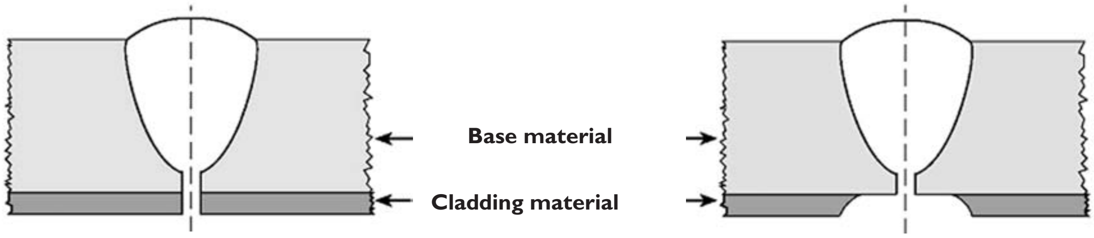
The safety distance of min 3 mm is indispensable for both finishes in order to avoid that the dilution of the weld deposit with the base material affects the clad joint. Size b is aligned in accordance with the chosen weld process.
Welding of the seam: the whole seam is welded with the consumable for the cladding material.

Work sequences during welding of seams accessible on both sides

The following sketches show the work sequences for the single V-joint finishes f. 1A and f. 1B.

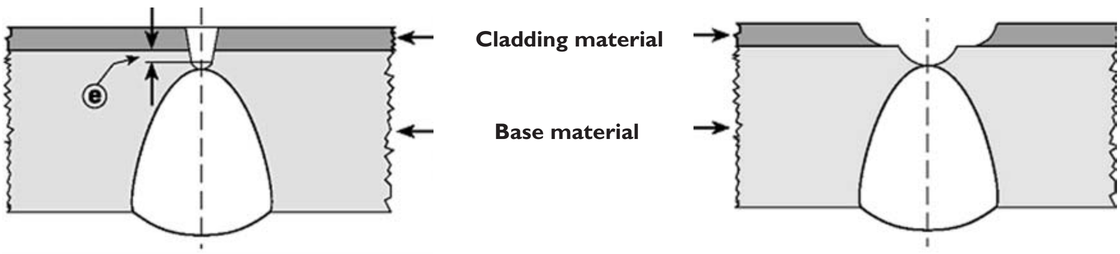
1) Welding of parent material

Finish A **Finish B**



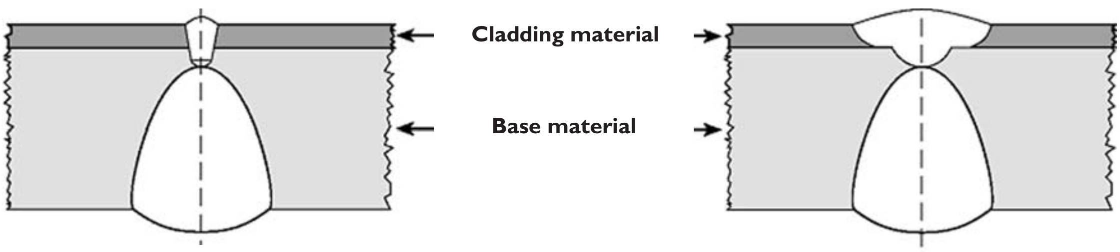
The parent material is welded with suitable matching or similar consumable.
The cladding must not be melted by the root layer.

2) Preparation on the clad side and welding of cap pass



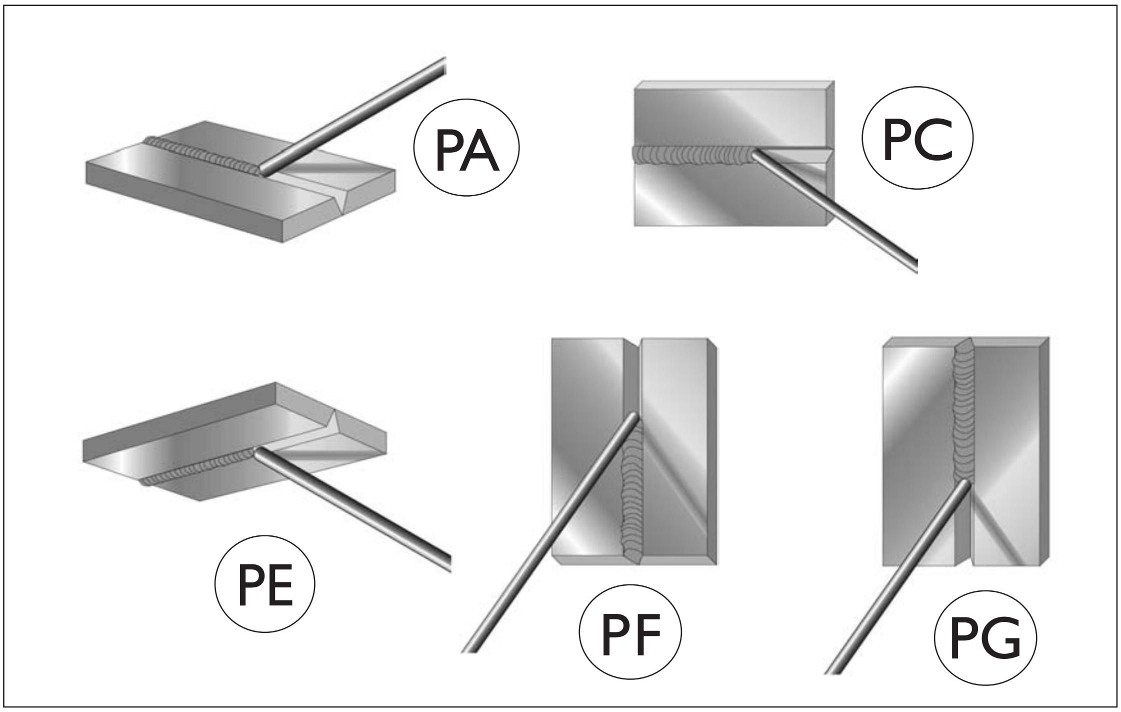
The root is machined out until perfect weld deposit of the parent material is achieved. Basically the cap pass for both finishes can be welded with a high alloyed consumable sufficient for the cladding (as long as the strength of the joint is not adversely affected) as well as with the consumable for the parent material. If the cap pass for finish A is welded with the chosen consumable for the parent material, then safety distance is to be respected to avoid dilution with the cladding material.

3) Welding of cladding

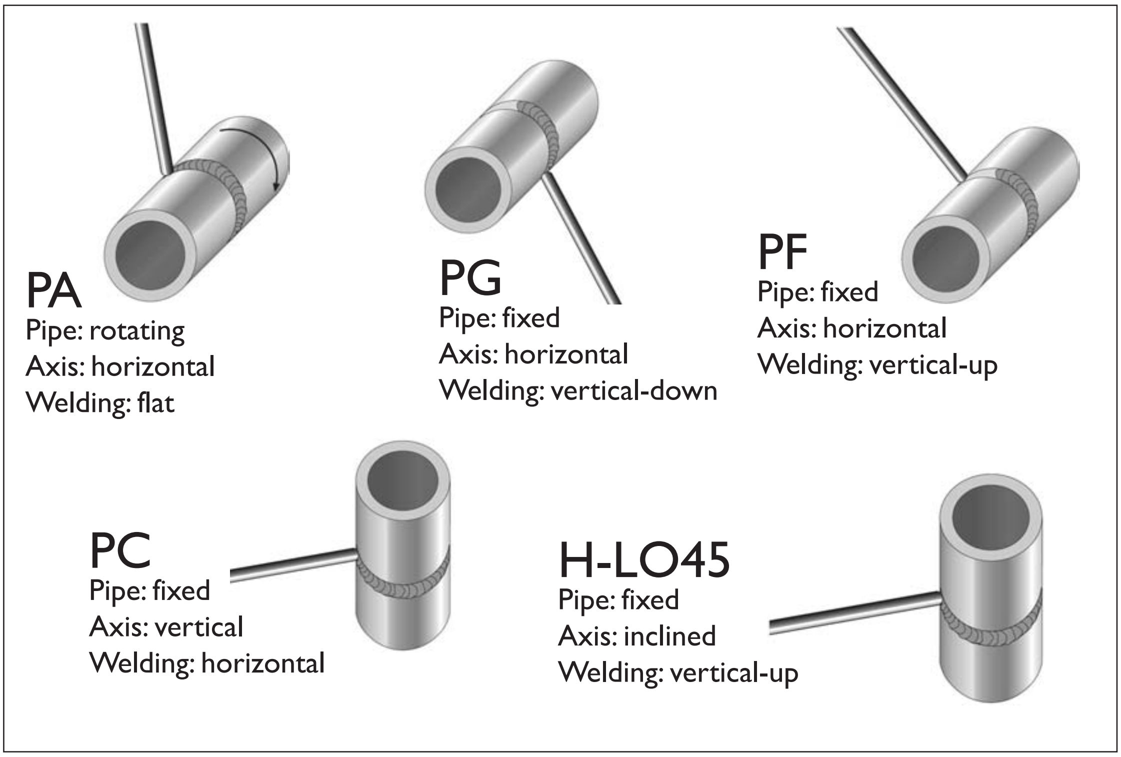


Finish welding of the joint on the clad side with a consumable matching to or higher alloyed than the cladding, which is sufficient to meet the demands made on the cladding with regard to durability.

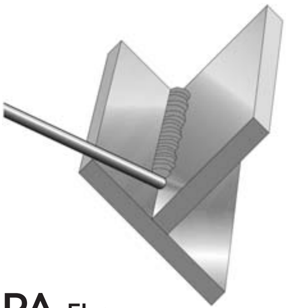
Welding positions according to DIN EN 287



Butt joints

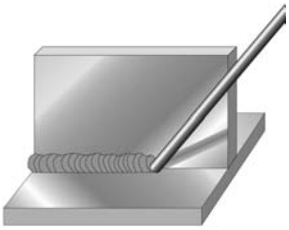


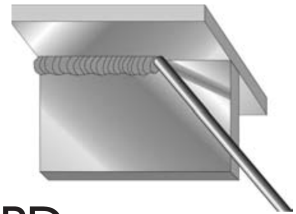
Welding positions according to DIN EN 287



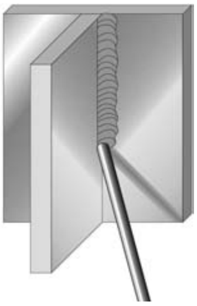
PA Flat

PB Horizontal

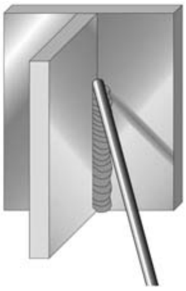




PD Overhead



PG Vertical-down

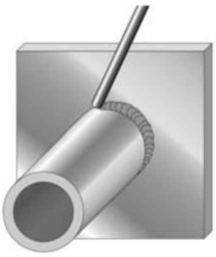


PF Vertical-up

Fillet joints

PB
Pipe: rotating
Axis: horizontal
Welding: horizontal

PG
Pipe: fixed
Axis: horizontal
Welding: vertical-down



PF
Pipe: fixed
Axis: horizontal
Welding: vertical-up

PB
Pipe: fixed
Axis: vertical
Welding:
horizontal-vertical

PD
Pipe: fest
Axis: vertical
Welding:
horizontal-overhead

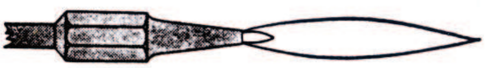
Flame adjustment

For the majority of brazing-jobs a neutral flame (figure 1) is recommended.

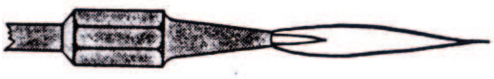
When brazing brass, it is helpful to adjust the flame slightly oxidizing (figure 2), it reduces the formation of harmful zinc-fumes.

When brazing aluminium, a reducing flame (excess acetylene, figure 3) is recommended. Brazing on stainless steel should be done with a slightly reducing flame (to prevent oxidation and carburization). Gasflux is recommended. Soft soldering should also be done with a reducing flame.

1 Neutral flame



2 Flame with excess oxygen (oxidizing)

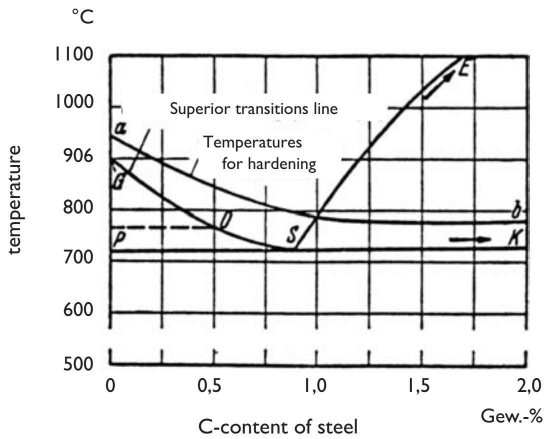


3 Flame with excess acetylene (reducing or carburizing)

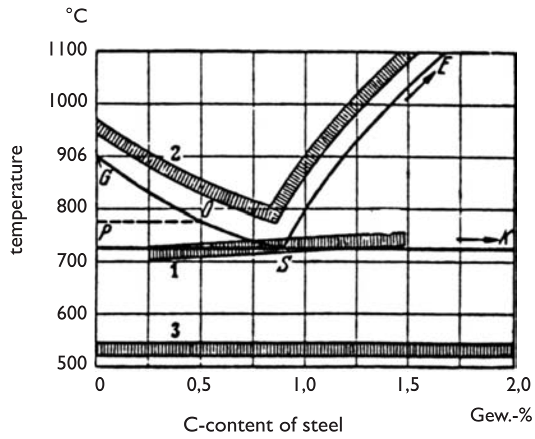
Average flame temperature with different gas-combinations:

oxygen-acetylene	approx. 3200° C
oxygen-propane	approx. 2500° C
oxygen-hydrogen	approx. 2370° C
oxygen-coal gas	approx. 2200° C
air-acetylene	approx. 2460° C
air-coal gas	approx. 1870° C
air-propane	approx. 1750° C

Hardening and annealing temperatures



Hardening temperatures
of Carbon steels
(medium pieces)



Annealing temperatures
of Carbon steels
1. Full annealing
2. Normalizing
3. Stress-free annealing

Conversion of measurements

mm	inch	swg
0,5	1/64	25
0,6		23
0,7	1/32	22
0,8		21
1,0	3/64	18
1,2		
1,5	1/16	16
1,6		
2,0	5/64	14
2,4	3/32	12
2,5		
3,0	1/8	10
3,2		
3,25		

mm	inch	swg
4,0	5/32	8
4,8	3/16	6
5,0		
6,0	1/4	4
6,8	17/64	2
8,0	5/16	0
10,0	25/64	4/0
12,0	15/32	6/0
15,0	19/32	–

Calculating the Linear Energy Input

The heat input in welding is generally defined as the linear energy input E_S. This is expressed in Joule/cm and is calculated with the following formula:

$$E_S = \frac{V \times A \times s}{cm} = \text{Joule/cm}$$

Arc voltage	in V	(volts)
Welding amperage	in A	(amperes)
Melting-off time	in s	(seconds)
Draw-out length	in cm	(centimetres)

Typcial calculation for welding with a manual stick electrode:

$$E_S = \frac{23 \times 130 \times 60}{35} = 5125 \text{ J/cm}$$

Typical calculation for welding with a solid wire (MIG) :

$$E_S = \frac{34 \times 310 \times 60}{50} = 12648 \text{ J/cm}$$

Material test certificates according to EN 10 204

Increasingly, certificates attesting the characteristics and property values of the welding filler metals are required by customers or inspection authorities within the framework of the acceptance testing weldments.

A few explanatory notes are given below with the request that they be kept in mind when making inquiries or ordering.

The EN standard 10 204 is taken as a basis to determine the schedule of such certificates in the case of inquiries and orders. EN 10 204 defines who is responsible for testing and authorized to sign, and whether the certificates must contain details concerning general typical values or specific test results relating to the particular delivery in question.

We would like to emphasize strongly that the EN standard 10 204 does not contain the following details and that these must be specified by the customer when ordering:

Scope of testing:	e. g.	type and number of tests, individual elements in case of chemical analyses
Consumables:	e. g.	type of shielding gas etc.
Test parameters:	e. g.	postweld heat treatment of the test piece, test temperature
Requirements :	e. g.	minimum values for yield strength, tensile strength, elongation, impact values, chemical composition tolerances
Inspection society:	e. g.	TÜV, Germanischer Lloyd, DB

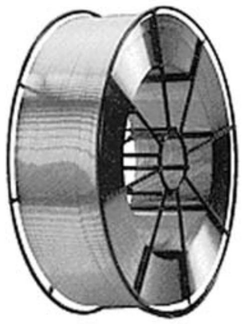
All certificates issued in conformity with EN 10 204 must be paid for and are charged separa-tely.

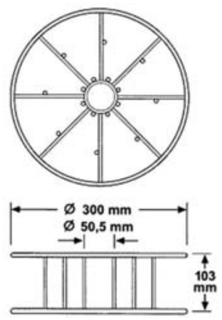
Examples for standard certifcates issued for filler metals:

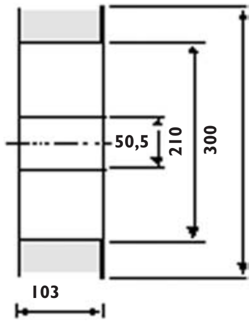
Type of certificate	Confirmation of certificate by	Content of the certificate
Test report "2.2"	Manufacturer	Non specific values, based on con-tinuous production records
Inspection certificate "3.1"	The manufacturer's authorized representative independent of the manufacturing department	Specific test results determined from the consignment or represen-tative lot of this consignment
Inspection certificate "3.2"	The purchaser's authorized re-presentative	Specific test results determined from the consignment or represen-tative lot of this consignment

Forms of Supply

Wire Basket Spool

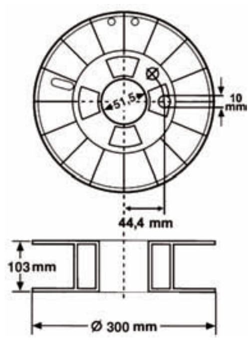


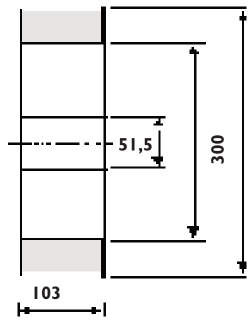




DIN EN ISO 544		Content kg of wire	Packaging
BS 300	Layer winding. The spool is made of plastified wire.	7 • 7,5 • 15 18 • 20	outer carton

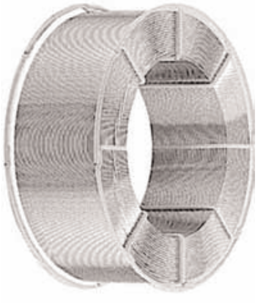
MIG Spool (Plastic)

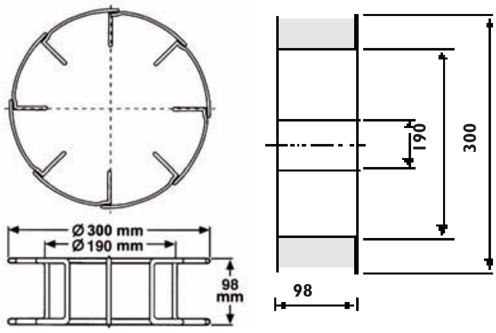




DIN EN ISO 544	Outer dia-meter	Center hole diameter	Overall width	Driving hole		Content Kg of wire	Packa-ging
				dia-meter	distance to center		
S 100	100	16,5	45	–	–	0,7	outer carton
S 200	200	50,5	55	10	44,5	5	
S 300	300	51,5	103	10	44,4	7 • 7,5 12 • 15	

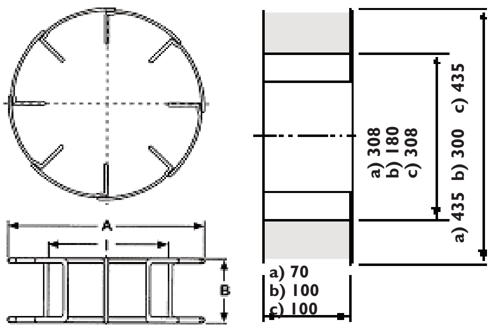
Wire Basket Spool





DIN EN ISO 544	Outer dia-meter	Inner dia-meter	Overall width	Content Kg of wire	Packaging
B 300	300	180	103	7 • 7,5 • 15 18 • 20	outer carton

Wire Basket Spool



DIN EN ISO 544	Outer dia-meter	Inner-dia meter	Overall width	Content Kg of wire
	435	308	70	25
B 300	300	180	100	7 • 7,5 • 15 • 18 • 20
B 450	435	308	100	25

Detailed information about joining of similar and dissimilar materials

	Cast iron	Nodular iron	Steels Cast steel non-alloyed	Steels Cast steels low- and me- dium alloyed	Steels Cast steels high alloyed
Aluminium and Al-alloys (up to 3 % Mg content) Al-cast					
Bronzes	34 N 8 Ko, 34 1, 11 3, 3040	34 N 1, 11 3, 3040	34 N 1 3, 3040 7	34 N 1, 2 3, 3040 7	34, 34 N 68 HH, 1, 2 3, 306 3040
German silver	8 Ko, 34 N 2, 1, 11, 6 3, 3040	84 FN, 34 N 1, 11, 2, 6 3, 3040	34 N, 80 M, 387, 2, 3, 6 3040, 7	34 N, 80 M 387, 1, 2, 6 3, 3040, 7	80 M, 387 34 N, 2, 6 306
Brass	34 N, 34 1 3, 3040, 7	34 N, 34 1 3, 3040, 7	34 N, 34 1 3, 3040, 7	34 N, 34 1 3, 3040, 7	34 N, 34 1 3, 3040, 7
Copper	8, 34 N 1, 11 3, 3040	34 N, 84 FN 8 1, 11 3, 3040	34 N, 68 HH 1, 2 3, 3040 7	68 HH, 34 N 80 M, 34, 1 2, 3, 3040, 570, 7	68 HH, 80 M 34 N, 34, 1 306, 3 3040
Nickel Nickel alloys	8, 84 FN 86 FN 2, 1, 11	84 FN 86 FN 2	80 Ni, 80 M 68 HH, 2 3, 3040, 7	80 Ni, 80 M 68 HH, 1, 2 3, 3040 570, 7	80 Ni, 80 M 68 HH, 2 3, 3040, 306, 570
Steel Cast steel high alloyed	8, 84 FN 86 FN 1, 11 3, 3040	84 FN, 85 FN 86 FN 1, 11, 2 3, 3040	63, 65, 68 H 2, 3, 3040 570	63, 65, 68 H 2, 3, 3040 306, 570	63, 630, 65, 68, 68 Mo, 683 LC 68 H, 68 HH, 2 3, 306, 3040 570
Steel Cast steel low- and me- dium alloyed	8, 84 FN 86 FN 1, 2 3, 3040	84 FN, 85 FN 86 FN 2 3, 3040	62, 63, 65 68 H, 2 3, 3040 570, 7	62, 6020 63, 630 68 H, 2, 3 3040, 570, 7	
Steel Cast steel non-alloyed	8, 84 FN 86 FN, 1, 11 2, 3, 3040 5, 5 D, 7	84 FN, 85 FN 86 FN, 1, 11 2, 3, 3040 5, 5 D, 7	611, 613 Kb 614 Kb, 68 H 2, 3, 3040 570, 7		
Nodular iron	8, 84 FN 86 FN, 1, 11 2, 3, 3040 5, 5 D, 7	84 FN, 85 FN 86 FN, 1, 11 2, 3, 3040, 7			
Cast iron	8, 84 FN, 88 H 85 FN, 86 FN 8 Ko, 5 D, 5, 1 11, 3, 3040				

Nickel Nickel alloys	Copper	Brass	German silver	Bronzes	Aluminium and Al-alloys (up to 3 % Mg content) Al-cast
	4 + 57 P	4 + 57 P			48, 49, 4
80 M, 80 Ni, I, 34 N, 3, 6 3040	34 N, 320, 39 34, 80 M, I, 6 35, 3, 3040 570	34 N, 320, 39 34, 80 M, I, 6 35, 3, 3040 570	34 N, 320 32, 34, I, 6 3, 3040 570, 7	34 N, 34, 32 320, I, 3, 6 7, 3040, 570	
80 Ni, 80 M 34 N, 68 HH 2, 306	39, 34 N, 387 I, 2, 3, 3040 7, 570	34 N, 34 387, I, 3 3040, 7, 570	34 N, 2, 3 3040, 387 570, 7		
34 N, 34 I, 3, 3040, 306, 570, 7	34 N, 34 387, I, 3 3040, 7, 570	34 N, 320 I, 3, 3040, 570, 7			
80 Ni, 80 M 68 HH, 34 N I, 2, 306, 3 3040, 570	39, 38, 35, 37, 3, 3040 570				
80 Ni, 80 M 68 HH 3, 3040 570					

Approvals of UTP welding consumables

(Data 01.01.2009)

UTP Type	TÜV	KTA	ABS	DB	GL	BV	DNV	LR
1 / 1M / 1MR					X			
8				X				
8 C				X				
A 34					X			
34 N				X				
39				X				
A 47 Ti	X			X				
A 48				X				
A 63	X			X				
65				X				
68	X		X		X			
A 68	X							
68 HH	X							
68 LC	X		X		X			
A 68 LC	X							
AF 68 LC	X							
68 Mo	X							
A 68 Mo	X							
68 MoLC	X		X	X	X		X	
A 68 MoLC	X				X			
AF 68 MoLC	X							
68 TiMo	X							
A 73 G 3	X							
A 73 G 4	X							
80 M	X		X		X			
A 80 M	X		X		X			
80 Ni	X							
A 80 Ni	X		X					
86 FN				X				
068 HH	X	X	X		X	X	X	
A 068 HH	X	X	X		X	X	X	
AF 068 HH	X							
UP 068 HH+ UP FX 068 HH	X							
A 118	X			X				
A 119	X			X				
387	X				X			
A 387	X				X			
389	X							

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Approvals of UTP welding consumables

(Data 01.01.2009)

UTP Type	TÜV	KTA	ABS	DB	GL	BV	DNV	LR
A 485				X				
A 493	X			X				
A 495	X			X				
A 495 Mn	X			X			X	
A 495 MnZr				X			X	
611	X			X			X	
612	X		X	X		X	X	
613 Kb	X		X	X		X	X	
614 Kb	X		X	X	X	X	X	X
653				X				
A 661	X							
683 LC				X				
684 MoLC	X				X		X	
A 703	X							
704 Kb	X							
A 704	X							
759 Kb	X							
A 759	X				X			
776 Kb	X							
A 776	X							
1817	X							
A 1817	X							
1915					X			
A 1915					X			
1925	X							
A 1925	X							
2133 Mn	X							
A 2133 Mn	X							
A 2522 Mo	X							
3127 LC	X							
A 3127 LC	X							
A 3128 Mo	X							
A 3133 LC	X							
A 3422					X			
A 3444	X				X			
4225	X							
A 4225	X							
A 6025	X							
6170 Co	X							
A 6170 Co	X							

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Approvals of UTP welding consumables

(Data 01.01.2009)

UTP Type	TÜV	KTA	ABS	DB	GL	BV	DNV	LR
A 6202 Mo	X							
6222 Mo	X		X		X	X	X	
A 6222 Mo	X		X		X		X	
AF 6222 MoPW	X							
UP 6222 Mo+ UP FX 6222 Mo	X							
A 6225 Al	X							
6635	X							
A 6635	X							
6808 Mo	X							
A 6808 Mo	X				X			
6809 Mo	X							
A 6820	X							
6824 LC	X				X		X	
A 6824 LC	X				X			
AF 6824 LC	X							
A 6824 MoLC	X							
7010		X						
7015	X	X			X		X	
7015 HL	X					X		
7015 Mo	X				X		X	
7200				X				
A Celsit 706 V		X						
Celsit V		X						
CHRONOS				X				
DUR 350				X				
DUR 600				X				

Approval companies:

TÜV Technischer Überwachungsverein Deutschland
KTA TÜV-Eignungsprüfung nach KTA-Regelwerk 1408.1
ABS American Bureau of Shipping
DB Deutsche Bahn AG
GL Germanischer Lloyd
BV Bureau Veritas
DNV Det Norske Veritas
LR Lloyd´s Register

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www.utp-welding.com

All data on our products contained in this welding guide are based upon careful investigation and intensive research. However, we do not assume any liability for their correctness.

We recommend the user to test - on his own responsibility - our products with regard to their special application.

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If it can be welded – we know how.