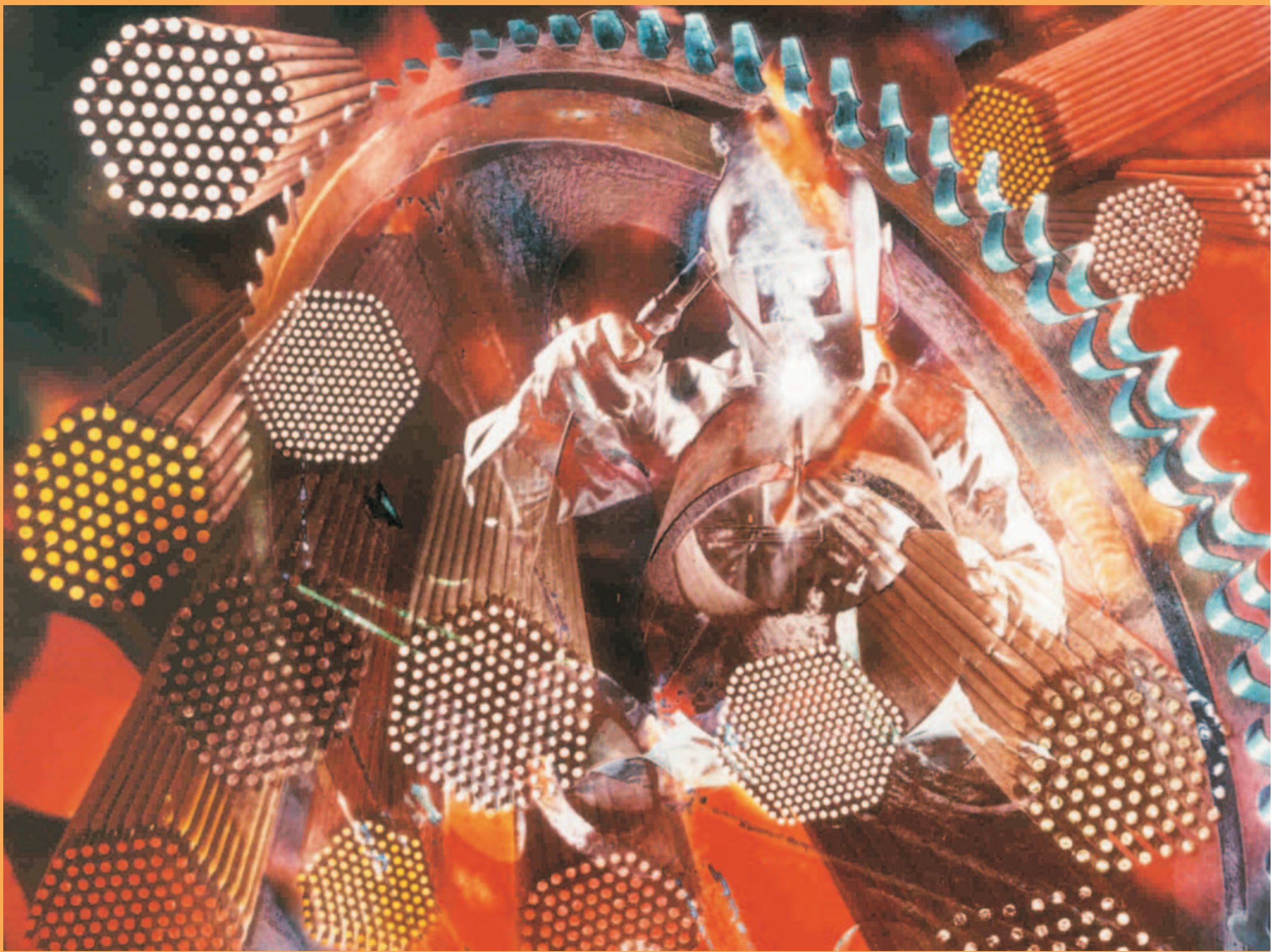


Welding consumables

General Information to Use This Manual

How to navigate in document

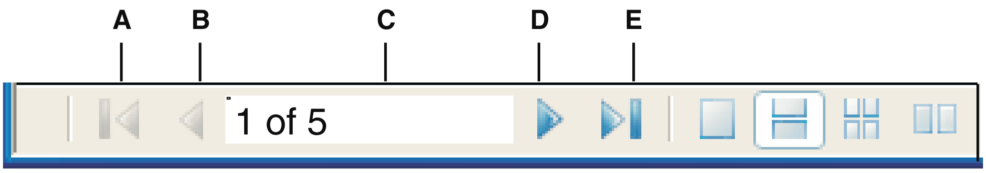
A. Navigating in document with Acrobat tools:

You can easily navigate through this document by paging or using the Acrobat navigation tools, e.g. the bookmarks, page thumbnails or links.

Paging through document

The navigation controls in the status bar at the bottom of the window provide a quick way to navigate through documents.

Navigation controls
A. Button „First page“ **B.** Button „Previous Page“ **C.** Current Page **D.** Button „Next page“ **E.** Button „Last Page“

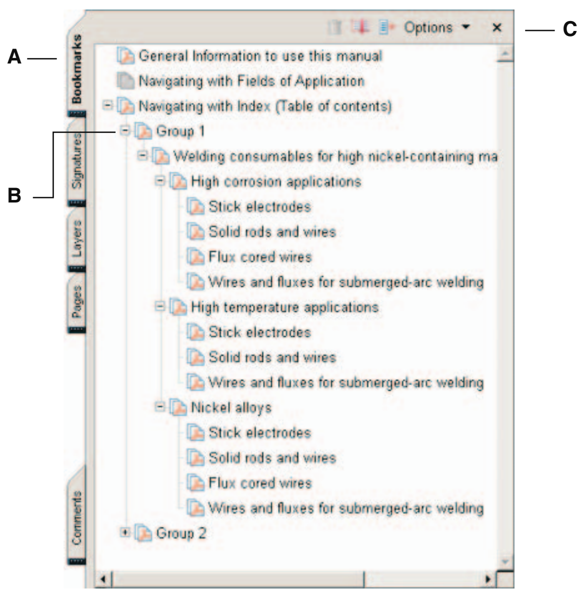


Each page in this document contains a footer with the symbols: ◀ ▶
To go to the previous page, click the ◀ Previous page button in the footer, to go to the next page, click the ▶ Next page button.

Navigating with bookmarks

Bookmarks provide a table of contents and usually represent the chapters and sections in a document. Bookmarks appear in the navigating pane.

Bookmarks tab
A. Bookmarks tab **B.** Expanded bookmark
C. Click to display bookmark Options menu



If the list of bookmarks disappears when you click a bookmark, click the Bookmarks tab to display the list again. If you want the Bookmark tab to always remain open after you click a bookmark, click the Options menu at the top of the Bookmarks panel, and make sure Hide after Use is not selected.

B. Navigating in document with links:

In addition to the Acrobat navigation tools we provide you different possibilities to navigate in this document by using links. Links take you to specific locations and they are always underlined.

1. Navigating with Fields of Application

UTP products are listed in a table according to their fields of application (from page IV to VII). This table is similar to the table on the UTP website (www.utp-welding.com). By clicking the underlined UTP product you will jump directly to the corresponding page in this document.

2. Navigating with index

By clicking the term "index" in the footer of each page in this document, you will jump to the index (table of contents) on page 4. Here you will find all UTP products classified in product groups. By clicking the underlined page number you will jump to the first page of the corresponding product group.

3. Navigating with product index numerical

From page 5 to 7 you will find all UTP products numerically classified. By clicking the underlined page number you will jump directly to the corresponding UTP product.

4. Navigating with base materials

Page 21 and pages 304 - 310 inform you about welding consumables for nickel alloys and base materials to UTP welding consumables. By clicking the underlined UTP product name you will jump directly to the corresponding page in this document.

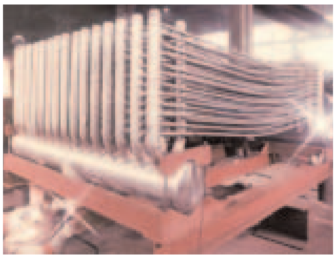
Products and their Application fields

Tank Construction

stainless and acid resistant steels

application of all welding methods

more information about our products



Power Plant and Plant Construction

nickel and nickel alloys

application of all welding methods

more information about our products

Liquid Gas Tanks / LNG

nickel and nickel alloys

application of all welding methods

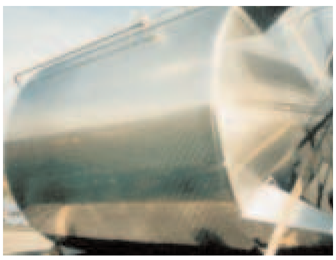
more information about our products

Chemical Plant Construction

Highly corrosion and heat resistant steels

application of all welding methods

more information about our products



Environmental Engineering

Highly corrosion CrNi-steels and nickel alloys

application of all welding methods

more information about our products

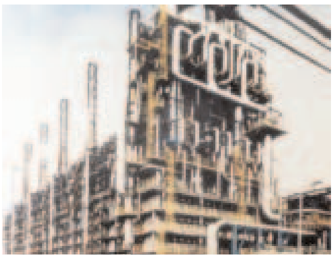
Products and their Application fields

Offshore

duplex and superduplex steels and superaustenite

application of all welding methods

more information about our products



Petrochemical Industry

high temperature CrNi-cast alloys and
nickel base materials

application of all welding methods

more information about our products

Shipbuilding

copper and copper alloys

application of all welding methods

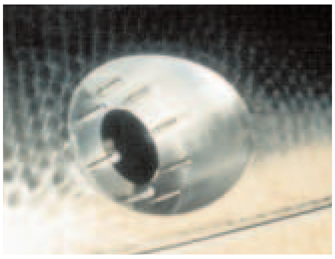
more information about our products

Steel Production

high-resistance wear protection alloys

application of all welding methods

more information about our products



Food Industry

stainless and acid-resistant steels

application of all welding methods

more information about our products

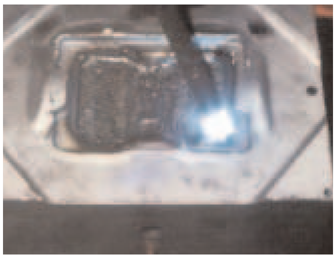
Products and their Application fields

Mining and Building Material Industry

wear resistant alloys

application of all welding methods

more information about our products



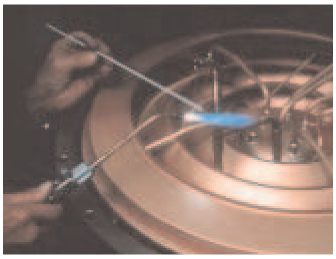
Maintenance and Repair

special alloys against wear as erosion, corrosion, cavitation, impact and abrasion as well as for high-quality joints.

more information about our products

Aluminium and Aluminium alloys

more information about our products



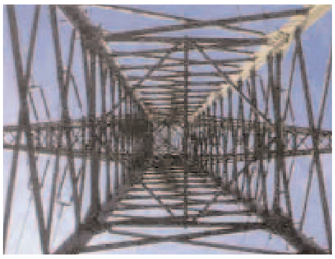
Soldered joints

in apparatus construction
copper pipe installation - heating, air condition, ventilation, precision engineering, precision tool construction, silver solders, high-strength brass brazing alloys, soft solders and fluxes
more information about our products

Automobile Industry

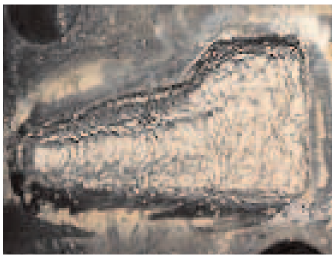
more information about our products

Products and their Application fields



Un- and low-alloyed steels

more information about our products



Cutting and Chamfering Electrodes

more information about our products

Flame Spray Powders

more information about our products

1. Corrosion resistant tank construction

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 68	UTP A 68	UTP A 68		
UTP 68 LC	UTP A 68 LC	UTP A 68 LC	UTP AF 68 LC	
UTP 68 Mo	UTP A 68 Mo	UTP A 68 Mo		
UTP 68 MoLC	UTP A 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC	UTP UP 68 MoLC UTP UP FX 68 MoLC
UTP 683 LC	UTP A 683	UTP A 683	UTP AF 683	UTP UP 683 UTP UP FX 683
UTP 6824 LC	UTP A 6824 LC	UTP A 6824 LC	UTP AF 6824 LC	
UTP 66	UTP A 66	UTP A 66		
UTP 660	UTP A 660	UTP A 660		
UTP 6615				
UTP 6635	UTP A 6635	UTP A 6635	UTP AF 6635	
UTP 6655 Mo				
UTP 68 TiMo	UTP A 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC	UTP UP 68 MoLC UTP UP FX 68 MoLC
UTP 684 MoLC	UTP A 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC	UTP UP 68 MoLC UTP UP FX 68 MoLC
UTP 6824 MoLC	UTP A 6824 MoLC	UTP A 6824 MoLC		

2. Power plant and plant construction

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 068 HH	UTP A 068 HH	UTP A 068 HH	UTP AF 068 HH	UTP UP 068 HH UTP UP FX 068 HH
UTP 7015			UTP AF 7015	
UTP 7015 Mo				
UTP 6222 Mo	UTP A 6222 Mo	UTP A 6222 Mo	UTP AF 6222 Mo	UTP UP 6222 Mo UTP UP FX 6222 Mo
UTP 6170 Co	UTP A 6170 Co	UTP A 6170 Co		UTP UP 6170 Co UTP UP FX 6170 Co
UTP 776 Kb	UTP A 776	UTP A 776		
UTP 759 Kb	UTP A 759	UTP A 759		
UTP 4225	UTP A 4225	UTP A 4225		
UTP 703 Kb	UTP A 703	UTP A 703		
UTP 704 Kb	UTP A 704	UTP A 704		
UTP 722 Kb	UTP A 722	UTP A 722		
UTP 80 Ni	UTP A 80 Ni	UTP A 80 Ni		
UTP 6202 Mo	UTP A 6202 Mo	UTP A 6202 Mo		
UTP 6208 Mo	UTP A 6208 Mo	UTP A 6208 Mo		

2. Power plant and plant construction • continued

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 6122 Co				
UTP 6225 Al	UTP A 6225 Al	UTP A 6225 Al		
	UTP A 5521 Nb			
UTP 7015 HL				
UTP 730				
UTP ANTINIT DUR 300			UTP AF ANTINIT DUR 300	
			UTP AF ANTINIT DUR 500	
UTP CELSIT 721		UTP A CELSIT 721	UTP AF CELSIT 721	

3. Liquid gas tanks / LNG

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 5020 Mo	UTP A 5020 Mo	UTP A 5020 Mo		UTP UP 5020 Mo UTP UP FX 5020 Mo
UTP 6222 Mo	UTP A 6222 Mo	UTP A 6222 Mo	UTP AF 6222 Mo	UTP UP 6222 Mo UTP UP FX 6222 Mo

4. Chemical apparatus construction

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 068 HH	UTP A 068 HH	UTP A 068 HH	UTP AF 068 HH	UTP UP 068 HH UTP UP FX 068 HH
UTP 7015			UTP AF 7015	
UTP 704 Kb	UTP A 704	UTP A 704		
UTP 722 Kb	UTP A 722	UTP A 722		
UTP 759 Kb	UTP A 759	UTP A 759		
UTP 776 Kb	UTP A 776	UTP A 776		
UTP 703 Kb	UTP A 703	UTP A 703		
UTP 6222 Mo	UTP A 6222 Mo	UTP A 6222 Mo	UTP AF 6222 Mo	UTP UP 6222 Mo UTP UP FX 6222 Mo
UTP 4225	UTP A 4225	UTP A 4225		
UTP 3127 LC	UTP A 3127 LC	UTP A 3127 LC		
UTP 5020 Mo	UTP A 5020 Mo	UTP A 5020 Mo		UTP UP 5020 Mo UTP UP FX 5020 Mo
UTP 6202 Mo	UTP A 6202 Mo	UTP A 6202 Mo		
UTP 6208 Mo	UTP A 6208 Mo	UTP A 6208 Mo		
UTP 3133 LC	UTP A 3133 LC	UTP A 3133 LC		

4. Chemical apparatus construction • continued

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 3128 Mo		UTP A 3128 Mo		
UTP 6122 Co				
UTP 6230 Mn	UTP A 6230 Mn	UTP A 6230 Mn		
UTP 6170 Co	UTP A 6170 Co	UTP A 6170 Co		UTP UP 6170 Co UTP UP FX 6170 Co
	UTP A 5521 Nb			
UTP 7015 Mo				
UTP 7015 HL				
UTP 7013 Mo				
UTP 7017 Mo				
	UTP A 8036			
	UTP A 8036 S	UTP A 8036 S		
UTP 68	UTP A 68	UTP A 68		
UTP 68 LC	UTP A 68 LC	UTP A 68 LC	UTP AF 68 LC	
UTP 68 Mo	UTP A 68 Mo	UTP A 68 Mo		
UTP 68 MoLC	UTP A 68 MoLC	UTP A 68 MoLC	UTP AF 68 MoLC	UTP UP 68 MoLC UTP UP FX 68 MoLC

4. Chemical apparatus construction • continued

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 66	UTP A 66	UTP A 66		
UTP 660	UTP A 660	UTP A 660		
UTP 6615				
UTP 6635	UTP A 6635	UTP A 6635	UTP AF 6635	
UTP 6655 Mo				
UTP 68 TiMo				
UTP 684 MoLC				
UTP 6824 LC	UTP A 6824 LC	UTP A 6824 LC	UTP AF 6824 LC	
UTP 6824 MoLC	UTP A 6824 MoLC	UTP A 6824 MoLC		
UTP 1817	UTP A 1817	UTP A 1817		
UTP 1915 HST	UTP A 1915 HST	UTP A 1915 HST		
UTP 1925	UTP A 1925	UTP A 1925		
UTP 2522 Mo	UTP A 2522 Mo	UTP A 2522 Mo		
UTP 3320 LC				
		UTP A 901 Ti		
		UTP A 902 Ti		

5. Environmental engineering

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 759 Kb	UTP A 759	UTP A 759		
UTP 776 Kb	UTP A 776	UTP A 776		
UTP 704 Kb	UTP A 704	UTP A 704		
UTP 6222 Mo	UTP A 6222 Mo	UTP A 6222 Mo	UTP AF 6222 Mo	UTP UP 6222 Mo UTP UP FX 6222 Mo
UTP 5020 Mo	UTP A 5020 Mo	UTP A 5020 Mo		UTP UP 5020 Mo UTP UP FX 5020 Mo

6. Offshore

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 6808 Mo	UTP A 6808 Mo	UTP A 6808 Mo		UTP UP 6808 Mo UTP UP FX 6808 Mo
UTP 6810 MoKb	UTP A 6810	UTP A 6810		
UTP 6807 MoCuKb				
UTP 6809 MoCuKb				
UTP 5020 Mo	UTP A 5020 Mo	UTP A 5020 Mo		UTP UP 5020 Mo UTP UP FX 5020 Mo
UTP 759 Kb	UTP A 759	UTP A 759		
UTP 6809 Mo				

7. Petrochemical industry

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 2133 Mn	UTP A 2133 Mn	UTP A 2133 Mn		
UTP 2535 Nb	UTP A 2535 Nb	UTP A 2535 Nb		
UTP 3545 Nb	UTP A 3545 Nb	UTP A 3545 Nb		
UTP 6225 Al	UTP A 6225 Al	UTP A 6225 Al		
UTP 5048 Nb				
UTP 68 H	UTP A 68 H	UTP A 68 H		
UTP 2535 CoW				
UTP 3033 W				
UTP 2949 W				
UTP 6122 Co				
UTP 6170 Co	UTP A 6170 Co	UTP A 6170 Co		UTP UP 6170 Co UTP UP FX 6170 Co
UTP 068 HH	UTP A 068 HH	UTP A 068 HH	UTP AF 068 HH	UTP UP 068 HH UTP UP FX 068 HH

7. Petrochemical industry • continued

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 7015			UTP AF 7015	
UTP 7015 Mo				
UTP 6222 Mo	UTP A 6222 Mo	UTP A 6222 Mo	UTP AF 6222 Mo	UTP UP 6222 Mo UTP UP FX 6222 Mo
UTP 68 Kb				
UTP 6820	UTP A 6820	UTP A 6820		

8. Shipbuilding - copper and copper alloys

Electrode	MIG / MAG	TIG
UTP 39		
	UTP A 38	UTP A 38
UTP 320	UTP A 320	UTP A 320
UTP 34 N	UTP A 34 N	UTP A 34 N
UTP 387	UTP A 387	UTP A 387
UTP 389	UTP A 389	UTP A 389
UTP 3422	UTP A 3422	UTP A 3422
UTP 34	UTP A 34	UTP A 34
UTP 343		
	UTP A 3444	UTP A 3444
UTP 80 M	UTP A 80 M	UTP A 80 M
UTP 80 Ni	UTP A 80 Ni	UTP A 80 Ni
	UTP A 381	UTP A 381
	UTP A 384	UTP A 384
	UTP A 3423	UTP A 3423

9. Steel production

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 63	UTP A 63	UTP A 63		
			UTP AF A 7	UTP UP A 7 UTP UP FX A 7
UTP 630				
UTP 673	UTP A 673	UTP A 673		
UTP 690			UTP AF 690	
UTP 694	UTP A 694	UTP A 694		
	UTP A 696	UTP A 696		
	UTP A 661	UTP A 661		UTP UP 661 UTP UP FX 661
				UTP UP 662 UTP UP FX 662
UTP 702	UTP A 702	UTP A 702	UTP AF 702	
UTP 702 HL				
			UTP AF 732	
			UTP AF 733	
			UTP AF 734	
UTP 68 HH				

9. Steel production • continued

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 73 G 2	UTP A 73 G 2	UTP A 73 G 2		UTP UP 73 G 2 UTP UP FX 73 G 2
UTP 73 G 3	UTP A 73 G 3	UTP A 73 G 3		UTP UP 73 G 3 UTP UP FX 73 G 3
UTP 73 G 4	UTP A 73 G 4	UTP A 73 G 4		UTP UP 73 G 4 UTP UP FX 73 G 4
				UTP UP 73 G 6 UTP UP FX 73 G 6
UTP DUR 250	UTP A DUR 250		UTP AF DUR 250	UTP UP DUR 250 UTP UP FX DUR 250
			UTP AF DUR 250 MP	
UTP DUR 550 W				
			UTP AF DUR 550 MP	
	UTP A 5519 Co			
UTP 5520 Co	UTP A 5520 Co		UTP AF 5520 Co	
UTP 7000			UTP AF 7000 MP	
UTP 7008				

10. Food industry

Electrode	MIG / MAG	TIG
UTP 1925	UTP A 1925	UTP A 1925
UTP 1915 HST	UTP A 1915 HST	UTP A 1915 HST
UTP 2522 Mo	UTP A 2522 Mo	UTP A 2522 Mo
UTP 1817	UTP A 1817	UTP A 1817
UTP 3127 LC	UTP A 3127 LC	UTP A 3127 LC
UTP 3128 Mo		UTP A 3128 Mo

11. Mining and building material industry

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP CHRONOS				
			UTP AF BM	
UTP BMC			UTP AF BMC	
		UTP A SUPER DUR W 80 NI		
				UTP UP DUR 250 UTP UP FX DUR 250
UTP DUR 300				UTP UP DUR 300 UTP UP FX DUR 300
UTP DUR 350	UTP A DUR 350		UTP AF DUR 350	
			UTP AF DUR 350 MP	
UTP DUR 600	UTP A DUR 600		UTP AF DUR 600	UTP UP DUR 600 UTP UP FX DUR 600
			UTP AF DUR 600 MP	
			UTP AF DUR 650 S	
UTP DUR 650 Kb	UTP A DUR 650		UTP AF DUR 650	UTP UP DUR 650 UTP UP FX DUR 650
			UTP AF DUR 650 MP	
			UTP AF DUR 650 SMP	

11. Mining and building material industry • continued

Electrode	MIG / MAG	TIG	Flux cored wire
UTP CELSIT 706		UTP A CELSIT 706 V	UTP AF CELSIT 706
UTP CELSIT 712		UTP A CELSIT 712 SN	UTP AF CELSIT 712
UTP CELSIT 701		UTP A CELSIT 701 N	UTP AF CELSIT 701
UTP LEDURIT 60		UTP A LEDURIT 60	UTP AF LEDURIT 60
UTP LEDURIT 61			
UTP LEDURIT 65			
			UTP AF LEDURIT 68
			UTP AF LEDURIT 70
			UTP AF LEDURIT 76
			UTP AF LEDURIT 520
UTP 75			
UTP 711 B			
	UTP A 7550	UTP A 7550	
UTP 7560		UTP A 7560	
UTP 7114			
UTP 718 S			

11. Mining and building material industry • continued

Electrode	MIG / MAG	TIG	Flux cored wire	Wear protection discs
UTP CELSIT 706 HL				
UTP CELSIT V				
UTP CELSIT 712 HL				
UTP CELSIT 701 HL				
UTP CELSIT 755				
UTP CELSIT 760			UTP AF CELSIT 760	
				UTP ABRADISC 6000

12. Maintenance and Repair

12. Maintenance and repair

12.1 Cast iron welding

Electrode	MIG / MAG	TIG	Flux cored wire
UTP 8			
UTP 8 C			
UTP 8 Ko			
UTP 8 NC			
UTP 88 H			
UTP 888			
UTP 83 FN			
UTP 84 FN			
UTP 85 FN			
UTP 86 FN			
UTP GNX-HD			
UTP 81			
UTP 807			
UTP 5 D			
	UTP A 8051 Ti	UTP A 8051 Ti	UTP AF 8051 Mn
	UTP A 8058		
		UTP 5	

12.2.a Maintenance and repair • tool construction, hot working tools • Fe-basis

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 73 G 2	UTP A 73 G 2	UTP A 73 G 2		UTP UP 73 G 2 UTP UP FX 73 G 2
UTP 73 G 3	UTP A 73 G 3	UTP A 73 G 3		UTP UP 73 G 3 UTP UP FX 73 G 3
UTP 73 G 4	UTP A 73 G 4	UTP A 73 G 4		UTP UP 73 G 4 UTP UP FX 73 G 4
UTP 702	UTP A 702	UTP A 702	UTP AF 702	
UTP 702 HL				
UTP 750			UTP AF 750	
UTP DUR 550 W			UTP AF DUR 550 MP	
	UTP A 673	UTP A 673		
			UTP AF 732	
			UTP AF 733	
			UTP AF 734	
UTP 651	UTP A 651	UTP A 651		
UTP 653				

12.2.b Maintenance and repair • tool construction, hot working tools • Co-basis

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 7010				
UTP CELSIT 721		UTP A CELSIT 721	UTP AF CELSIT 721	
UTP CELSIT 706		UTP A CELSIT 706 V	UTP AF CELSIT 706	
UTP CELSIT 712		UTP A CELSIT 712 SN	UTP AF CELSIT 712	
UTP CELSIT 701		UTP A CELSIT 701 N	UTP AF CELSIT 701	
UTP CELSIT 721 HL				
UTP CELSIT 706 HL				
UTP CELSIT V				
UTP CELSIT 712 HL				
UTP CELSIT 701 HL				
UTP CELSIT 755				
UTP CELSIT 760			UTP AF CELSIT 760	

12.2.c Maintenance and repair • tool construction, hot working tools • nickel alloys (Ni-basis)

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 700				
UTP 7000			UTP AF 7000 MP	
UTP 776 Kb	UTP A 776	UTP A 776		
UTP 068 HH	UTP A 068 HH	UTP A 068 HH	UTP AF 068 HH	UTP UP 068 HH UTP UP FX 068 HH
UTP 6222 Mo	UTP A 6222 Mo	UTP A 6222 Mo	UTP AF 6222 Mo	UTP UP 6222 Mo UTP UP FX 6222 Mo
UTP 6218 Mo				
UTP 7008				
UTP 5520 Co	UTP A 5520 Co		UTP AF 5520 Co	
	UTP A 5519 Co			

12.3 Maintenance and repair • tool construction, cold working tools

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 67 S				
	UTP A DUR 600	UTP A DUR 600		
UTP 73 G 2	UTP A 73 G 2	UTP A 73 G 2		UTP UP 73 G 2 UTP UP FX 73 G 2
UTP 673	UTP A 673	UTP A 673		
UTP 665				
UTP 65 D				
UTP 651	UTP A 651	UTP A 651		
UTP 690				
	UTP A 696	UTP A 696		
			UTP AF 732	
		UTP A 74		

12.4 Maintenance and repair • claddings against grinding wear

Electrode	MIG / MAG	TIG	Flux cored wire
UTP 63	UTP A 63	UTP A 63	
UTP 630			
UTP 6302			
UTP 67 S	UTP A 67 S	UTP A 67 S	
UTP 670			
UTP DUR 600	UTP A DUR 600	UTP A DUR 600	UTP AF DUR 600
UTP 7200			
UTP LEDURIT 61			
UTP 711 B			
UTP 7100			
UTP 75			
UTP 7560			
UTP 7502			
UTP LEDURIT 60		UTP A LEDURIT 60	UTP AF LEDURIT 60
		UTP A SUPER DUR W 80 Ni	

12.5 Maintenance and repair • surfacings against gliding wear

Electrode	MIG / MAG	TIG	Flux cored wire
UTP 34 N	UTP A 34 N	UTP A 34 N	
UTP 343			
	UTP A 3436		UTP AF 3436
UTP 6805 Kb			

12.6 Maintenance and repair • wear resistant surfacings

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP DUR 300				UTP UP DUR 300 UTP UP FX DUR 300
UTP DUR 350	UTP A DUR 350		UTP AF DUR 350	
UTP DUR 400				
UTP 7114				

12.7 Maintenance and repair • sugarcane-working industry

Elektrode
UTP 718 S

12.8 Maintenance and repair • hot working steels

Electrode	MIG / MAG	TIG	Flux cored wire	UP wire UP powder
UTP 690	UTP A 690	UTP A 690	UTP AF 690	

13. Aluminium and aluminium alloys

Electrode	MIG / MAG	TIG
UTP 49		
	UTP A 493	UTP A 493
UTP 485	UTP A 485	UTP A 485
	UTP A 495	UTP A 495
UTP 48	UTP A 48	UTP A 48
	UTP A 403	UTP A 403
UTP 47	UTP A 47	UTP A 47
	UTP A 47 Ti	UTP A 47 Ti
	UTP A 495 Mn	UTP A 495 Mn
	UTP A 495 MnZr	UTP A 495 MnZr

14. Soldering joints

14.1 Brazing alloys

Brazing alloys without Ag	Available UTP Flux
UTP 1 UTP 1 M UTP 1 MR	HLS-B
UTP 11	HLS; HLP
UTP 2 UTP 2 M UTP 2 MR	HLS; HLP
UTP 6 UTP 6 M UTP 6 MR	HLS; HLP

14.2 Soft solders, cd-free

Silver solders, cadmium free	Available UTP Flux
UTP 7 UTP 7 M	AGF; AGX; 3 W
UTP 3034 UTP 3034 M	AGF; AGX; 3 W
UTP 3040 UTP 3040 M	AGF; AGX; 3 W
UTP 3044 UTP 3044 M	AGF; AGX; 3 W
UTP 306 UTP 306 M	AGF; AGX; 3 W
UTP 3030 UTP 3030 M	AGF; AGX; 3 W
UTP 3046 UTP 3046 M	AGF; AGX; 3 W
UTP Trifolie	AGF; AGX; 3 W

14.3 Silver solders, cd-containing

Silver solders, cadmium containing	Available UTP Flux
UTP 31 N UTP 31 NM	AGF; AGX
UTP 3 UTP 3 M	AGF; AGX

14.4 Cu-P-(Ag)-brazing alloys

Brazing alloys, Cu-P-(Ag)	Available UTP Flux
UTP 3706	AGX*; 3 W
UTP 35	AGX*
UTP 36	AGX*
UTP 37	AGX*; 3 W
UTP 3515	AGX*

* no flux required for joints of copper

14.5 Soft solders

Soft solders and pastes	Available UTP Flux
UTP 57 UTP 57 Pa	570
UTP 570 UTP 570 Pa	570; 570 F; 573
UTP 573 UTP 573 Pa	570; 573
UTP 576	570; 570 F; 573
UTP 560	570; 570 F; 573

14.6 Aluminium solders

Solders and brazing alloys for aluminium	Available UTP Flux
UTP 4	4 Mg

15.1 Car industry • tool construction

Electrode	MIG / MAG	TIG	Flux cored wire
UTP 65			
UTP 65 D			
UTP 651	UTP A 651	UTP A 651	
UTP 63	UTP A 63	UTP A 63	
	UTP A 384	UTP A 384	
UTP 3422	UTP A 3422	UTP A 3422	
UTP 673	UTP A 673	UTP A 673	
UTP 694	UTP A 694	UTP A 694	
UTP 690	UTP A 696	UTP A 696	UTP AF 690
UTP 702	UTP A 702	UTP A 702	UTP AF 702
UTP 73 G 2	UTP A 73 G 2	UTP A 73 G 2	
UTP 73 G 3	UTP A 73 G 3	UTP A 73 G 3	
UTP 73 G 4	UTP A 73 G 4	UTP A 73 G 4	

15.1 Car industry • tool construction • continued

Electrode	MIG / MAG	TIG	Flux cored wire
UTP CELSIT 721		UTP A CELSIT 721	UTP AF CELSIT 721
UTP CELSIT 721 HL			
UTP CELSIT 701		UTP A CELSIT 701 N	UTP AF CELSIT 701
UTP CELSIT 701 HL			
UTP CELSIT 706		UTP A CELSIT 706 V	UTP AF CELSIT 706
UTP CELSIT 706 HL			
UTP CELSIT 712		UTP A CELSIT 712 SN	UTP AF CELSIT 712
UTP CELSIT 712 HL			
UTP CELSIT 755			
UTP CELSIT 760			UTP AF CELSIT 760
UTP CELSIT V			

15.2 Car industry • fabrication

MIG / MAG	TIG
UTP A 384	UTP A 384
UTP A 3422	UTP A 3422
UTP A 34	UTP A 34
UTP A 385	UTP A 385
UTP A 3423	UTP A 3423
UTP A 403	UTP A 403
UTP A 404	UTP A 404

16. Un- and low alloyed steels

Electrode	MIG / MAG	TIG
UTP 611		
UTP 612		
UTP 613 Kb		
UTP 614 Kb		
UTP 617		
UTP 62		
UTP 6020	UTP A 6020	UTP A 6020
UTP 6025	UTP A 6025	UTP A 6025
	UTP A 118	
	UTP A 119	

17. Cutting and chamfering electrodes

Electrode
UTP 82
UTP 82 AS
UTP 82 Ko

18. Flame spray powders

UTP EXOBOND	UTP UNIBOND	UTP HABOND	UTP PTA-metal powders
UTP EB-1001	UTP UB 5-2525 A	UTP HA-032	UTP PTA 2-701.10
UTP EB-1002 N	UTP UB 5-2540	UTP HA-6315 G	UTP PTA 2-701.11
UTP EB-1003	UTP UB 2-2650	UTP HA-3	UTP PTA 2-706.10
UTP EB-1005	UTP UB 5-2550	UTP HA-3 G	UTP PTA 2-706.11
UTP EB-1020	UTP UB 5-2555	UTP HA-6320	UTP PTA 2-708.10
UTP EB-1025	UTP UB 5-2760	UTP HA-2	UTP PTA 2-708.11
UTP EB-1030	UTP UB 5-2862	UTP HA-2 G	UTP PTA 2-712.10
UTP EB-1050	UTP UB 5-2756 X4	UTP HA-2321	UTP PTA 2-712.11
UTP EB-2001	UTP UB 5-2864	UTP HA-5-79	UTP PTA 2-721.10
UTP EB-2002	UTP UB 5-2864 4	UTP HA-5	UTP PTA 2-721.11
UTP EB-2003	UTP UB 5-2871	UTP HA-06	UTP PTA 3-710.10
UTP EB-2005		UTP HA-6	UTP PTA 3-710.11
UTP EB-2007		UTP HA-7	UTP PTA 5-068HH.10
UTP EB-3010		UTP HA-8	UTP PTA 5-068HH.11
UTP EB-4010		UTP HA-8 SS	UTP PTA 5-776.10
UTP EB-5044		UTP HA-8-65	UTP PTA 5-776.11

Manual 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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Printed in Germany

If it can be welded – we know how.

UTP

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.

Since 1991 UTP has belonged to the Böhler Group, since 1996 to the Böhler Thyssen Welding Group and since 2002 to the Böhler-Uddeholm-Group. Nevertheless, UTP remains independent in itself.

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

A addition	:	UTP solid rods and wires
AF addition	:	UTP flux cored wires
UP addition	:	UTP submerged arc wires and fluxes
without addition	:	UTP stick electrodes, UTP solders and brazing alloys

If it can be welded – we know how.

Group 1

Welding consumables for high nickel-containing materials

Index

- High corrosion applications
- High temperature applications
- Nickel alloys

  – stick electrodes
  – solid rods and wires
  – flux cored wires
  – wires and fluxes for submerged-arc welding

Group 1

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

Flux cored wires for high corrosion applications

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

Electrodes for nickel alloys

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Solid rods and wires for nickel alloys

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UTP A 8036 S	special alloy	FeNi rods and wires for INVAR alloys	85

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.

- 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 electrode core wire. This does not apply to vertical up welding.

- The 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 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	Electrode	MIG wire TIG rod
COPPER– NICKEL	2.0872 2.0882	CuNi10Fe CuNi30Fe	Cunifer 10 Cunifer 30	389 387	A 389 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	80 Ni	A 80 Ni
NICKEL– COPPER	2.4360 2.4375	NiCu30Fe NiCu30Al	Monel® 400, Nicorros Monel® K-500, Nicorros AL	80 M	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	068 HH / 7015 Mo 6222 Mo	A 068 HH 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	2133 Mn	A 2133 Mn
FERRO– CHROMIUM– NICKEL– MOLYBDENIUM	1.4529	X 1 NiCrMoCuN 25 20 6	Cronifer 1925 hMo Avesta 254 S Mo	759 Kb	A 759
	1.4563	X 1 NiCrMoCu 31 27 4	Sanicro 28, Nicrofer 3127 LC	3127 LC	A 3127 LC
	2.4816 2.4817	NiCr15Fe LC-NiCr15Fe	Inconel® 600, Nicrofer 7216 (H) Inconel® 600 L, Nicrofer 7216LC	7015 Mo	A 068 HH
	2.4851 2.4633	NiCr23Fe NiCr25FeAlY	Inconel® 601, Nicrofer 6023 Nicrofer 6025HT	6225 Al	A 6225 Al
	2.4951 2.4952	NiCr20Ti NiCr20TiAl	Nimonic® 75, Nicrofer, Nicrofer 7520 Nimonic® 80 A, Nicrofer 7520 Ti	068 HH	A 068 HH

Welding consumables for nickel alloys

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

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

UTP 3127 LC

Low-carbon, fully austenitic 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.

DIN	Mat.No.	DIN	Mat.No.
G- X7 NiCrMoCuNb 25 20	1.4500	X2 NiCrMoCu 25 20 5	1.4539
X5 NiCrMoCuNb 20 18	1.4505	X1 NiCrMoCu 31 27	1.4563
X5 NiCrMoCuTi 20 18	1.4506		

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 electrode **UTP 3127 LC** distinguishes itself by resistance against stress corrosion cracking, crevice corrosion and pitting in media containing chloride ions.

Welding properties

The 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
> 400	> 600	> 30	> 50

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Cu	Fe
< 0,03	< 0,9	1,5	27	31	3,5	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 electrode diameter. Dry the electrodes for 2 hours at 120 - 200° C before use.

Current type : **DC (+) / AC**

Welding positions : PA PB PC PE PF

Current adjustment :

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

* available on request

Approval : TÜV

Standards : Material-No. : 1.4562
DIN EN 1600 : EZ 28 32 7 Cu L B

UTP 3128 Mo

Basic coated electrode for high corrosion resistant NiFeCrMo alloys

Application field

Welding of NiFeCrMo-alloys for construction of phosphoric acid sulphuric acid plants.

Base metals :	X 1 NiCrMoCu 32 28 7	1.4562
	X 1 NiCrMoCu 31 27 4	1.4563

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.

Welding properties

The electrode **UTP 3128 Mo** can be welded in all positions except vertical-down. It has a stable arc. Easy and thorough 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	> 60

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Cu	N	P	S	Fe
< 0,03	< 0,5	2,5	27	31	6,5	1,1	0,15	< 0,02	< 0,01	bal.

Welding instructions

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld electrode with a slight tilt and a short arc. String beads are welded. The interpass temperature of < 150° C, the heat input < 12 kJ/cm and a max. weaving width 2,5 x diameter of the electrode core wire should not be exceeded.
Dry the electrodes for 2 hours at 120 - 200° C before use.

Current type : DC (+)

Welding positions : PA PB PC PE PF

Current adjustment :

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

Approval

TÜV

Standards : Material No. : ~1.4591
DIN EN 1600 : EZ 32 31 1 L R

UTP 3133 LC

Highly corrosion resistant electrode for the construction of apparatus in chemical industry

Application field

The rutile basic coated electrode **UTP 3133 LC** is suitable for joining and surfacing of high corrosion resistant rolled and cast iron materials of the same and of similar nature, such as 1.4591, X 1 CrNiMoCuN 33 32 1 (Nicrofer 3033, alloy 33).
The weld metal has an excellent resistance to pitting, crevice corrosion and stress corrosion cracking in media containing chloride ions, such as a good general corrosion resistance in hot mineral acid, mixed acid, alkalis , sea- and brackish water.

Welding properties

UTP 3133 LC has excellent welding properties, a stable arc, very easy slag removal. The seam has a finely rippled 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
> 500	> 750	> 35	> 90

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	N	Cu	Fe
< 0,04	< 0,9	3,5	32	31	1,5	0,4	0,5	balance

Welding instruction

Weld **UTP 3133 LC** with a slight tilt and with a short arc. Welding string beads guarantees low heat input. Interpass temperature of max. 120° C. Dry the electrodes for 2 hours at 120 – 200° C before use.

Current type : DC (+) or AC **Welding positions :** PA PB PC PE PF

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	50 – 70	70 – 90	90 – 110

Approval

TÜV

Standards : Material No : 2.4652
DIN 1736 : EL-NiCr 26 Mo
DIN EN ISO 14172 : E Ni 8165 (NiCr25Fe30Mo)

UTP 4225

Basic coated electrode for joining and surfacing

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 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 strength K_v Joule
> 350	> 550	> 30	> 80

Weld metal analysis in %

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

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	50 – 70	70 – 100	90 – 120

Approval

TÜV

UTP 5020 Mo

Basic coated electrode with high strength and corrosion resistance for welding of highly nitrogen-containing steel (6 Mo) and Duplex steel

Standards :

Material No.	:	2.4848
DIN 1736	:	EL-NiCr20Fe14 Mo11WN (mod.)
DIN EN ISO 14172	:	E Ni 6650 (NiCr20Fe14Mo11WN)

Application field

UTP 5020 Mo is suitable for joining and surfacing on special steels and duplex alloys used in the chemical apparatus construction and offshore sector, such as e. g. Cronifer 1925 hMo X 1 NiCrMoCuN25206 UNS N 08926.
Joining with low-alloyed steels and cladding on C-steel is possible.

Welding properties

Good resistance against pitting, crevice corrosion, erosion and intercrystalline corrosion. The weld metal has high mechanical properties and is resistant against chloride induced stress corrosion cracking.

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
> 480	> 725	> 30	> 80	> 60

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
< 0,030	< 0,60	< 0,70	21,0	balance	11,5	13,5
W	N	S	P	Nb		
1,0 - 2,0	0,05 - 0,15	< 0,010	< 0,020	0,20		

Welding instruction

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld electrode with a slight tilt and with 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 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

Current adjustment :

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

Approval
TÜV

Standards : Material No : 2.4621
DIN 1736 : EL-NiCr20Mo9Nb
DIN EN ISO 14172 : E Ni 6625 (NiCr22Mo9Nb)
AWS A5.11 : E NiCrMo-3

UTP 6222 Mo

Basic coated NiCrMo-electrode for corrosion and heat resistant materials

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). 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	Impact strength Kv Joule –196° C
> 450	> 760	> 30	> 75	45

Approximate weld metal analysis in %

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

Welding instruction

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld 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 electrode core wire should not be exceeded. Re-dry the 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

Current adjustment :

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, DNV, ABS, GL, BV, C

UTP 704 Kb

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

Standards :			
	Material No.	:	2.4612
	DIN 1736	:	EL-NiMo15Cr15Ti
	DIN EN ISO 14172	:	E Ni 6455 (NiCr16Mo15Ti)
	AWS A5.11	:	E NiCrMo-7

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

Welding instructions

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld 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 electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm electrode carrier.

Current type : **DC (+)**

Welding instruction : PA PB PC PE PF

Current adjustment :

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, C

UTP 776 Kb

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

Standards :	Material No.	: 2.4887
	DIN 1736	: EL-NiMo15Cr15W
	DIN 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 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	Ni	Cr	Mo	W	Fe
< 0,02	< 0,2	0,6	balance	16,5	16,5	4	5

Welding instructions

For avoidance of intermetallic precipitation the 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 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 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

Current adjustment :

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, C

UTP 722 Kb

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

Standards :

Material No.	:	2.4638
DIN 1736	:	EL-NiCr21Mo14W
DIN 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	W	Fe	Ni
< 0,02	< 0,2	0,8	21	13,5	3	3	balance

Welding instructions

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld 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 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

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300	3,2 x 250	4,0 x 350
Amperage	A	50 – 70	70 – 110	90 – 130

UTP 759 Kb

Basic coated NiCrMo electrode for highest corrosion requirements

Standards :	Material No	:	2.4609
	DIN 1736	:	EL-NiCr22Mo16
	DIN 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	Fe	Ni
< 0,02	< 0,2	0,5	22,5	15,5	1	balance

Welding instruction

Opening angle of the prepared seam approx. 70°, root gap approx. 2 mm. Weld 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 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

Current adjustment :

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, C

Standards : Material-No. : 2.4616
DIN 1736 : EL-NiMo29
DIN EN ISO 14 172 : Ni 1066 (NiMo 28)
AWS A5.11 : ENiMo-7

UTP 703 Kb

Basic coated NiMo electrode

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

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 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

Current adjustment :

Electrodes	Ø mm x L	2,5 x 250	3,2 x 300	4,0 x 350
Amperage	A	50 – 70	70 – 100	90 – 120

Standards : DIN 1736 : EL-NiMo28Cr (mod.)
EN ISO 14172 : E Ni 1069
(NiMo 28 Fe 4 Cr)

UTP 6202 Mo

Basic coated NiMo electrode for highest corrosion standards

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	Cr	Ni	Mo	Fe	P	S
0,01	0,2	0,5	1,0	balance	27,5	3,0	0,015	0,015

Nb	Al	Co
< 0,5	< 0,5	< 0,5

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 electrodes 2 – 3 hours at 250 – 300° C before use and weld them out of a warm electrode carrier.

Current type : DC (+)

Welding positions :

Current adjustment :

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 : DIN 1736 : EL-NiMo24Cr (mod.)
EN ISO 14172 : E Ni 1062
(NiMo 24 Cr 8 Fe 6)

UTP 6208 Mo

Basic coated NiMo-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	Cr	Ni	Mo	Fe	P	S
0,01	0,2	0,5	7,0	balance	24,0	5,5	0,015	0,015

Nb	Al	Co
< 0,5	< 0,5	< 0,5

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 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

Current adjustment :

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 : Material No. : 1.4563
DIN EN 12072 : W/G 27 31 4 Cu L
AWS A5.9 : ER 383

UTP A 3127 LC

Fully austenitic rods and wires for corrosion resistant steels

Application field

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

1.4550	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	31	3,5	1	balance

Current type : DC (–) [TIG]
DC (+) [MIG]

Shielding gas according to EN 439 : I 1 (AR 99,95)

Availability

TIG rod	Ø mm x 1000 mm	1,6	2,0	2,4
MIG wire	Ø mm	1,0	1,2	

Approval

TÜV

Standards : Material No. : 1.4562
DIN EN 12072 : W/GZ 28 32 7 Cu L

UTP A 3128 Mo

Rods for high corrosion resistant NiFeCrMo-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	Cr	Ni	Mo	Cu
0,01	0,1	1,6	27	32	6,5	1,2
N	P	S	Fe			
0,2	< 0,015	< 0,01	balance			

Current type : DC (–) [TIG]

Shielding gas according to EN 439 : I 1 pure Argon [TIG]

Availability

TIG rod	Ø mm x 1000 mm	2,0	2,4

Standards : Material-No. : 1.4591
DIN EN 12072 : W/GZ 32 31 1 L

UTP A 3133 LC

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

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	Mo	Cr	Ni	Mo	Cu	N	Fe
< 0,015	< 0,5	< 2,0	33	31	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. UTP A 3133 LC is only weldable in TIG technique.

Current type : DC (–) [TIG]

Shielding gas according to EN 439 : I 1 (Argon), R 1 [TIG]

Availability

TIG rod	Ø mm x 1000 mm	2,0	2,4
MIG wire	Ø mm	1,2	

Approval

TÜV

UTP A 4225

High nickel containing and corrosion resistant rods and wires

Standards :

Material No.	:	2.4655
DIN 1736	:	SG-NiCr27Mo
DIN EN ISO 18274	:	S Ni 8125 (NiFe26Cr25Mo)

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	Ni	Mo	Cu	Fe
< 0,02	< 0,3	2,5	25,5	41	5	2	balance

Current type : DC (–) [TIG]

DC (+) [MIG]

Shielding gas according to EN 439 : I 1 AR 99,95

Availability

TIG rod	Ø mm x 1000 mm	1,6	2,0	2,4
MIG wire	Ø mm	1,2		

Approval

TÜV

UTP A 5020 Mo

Rods and wires for high corrosion resistant alloys

Standards :

Material No.	:	2.4849
DIN EN ISO 18274	:	S Ni 6650 (NiCr20Fe14Mo11WN)
AWS A5.14	:	ER NiCrMo-18

Application field

UTP A 5020 Mo is suitable for joining and surfacing on special steels and duplex alloys, which are used in the chemical terotechnology and offshore technology, e. g.

Cronifer 1925 HMo   X 1 NiCrMoCuN 25 20 6   UNS N08926

Joining the mentioned materials with low-alloyed steels and surfacing on C-steels.

Properties of the weld metal

Good resistance to pitting, crevice corrosion, erosion and intercrystalline corrosion. The weld metal has high mechancial values and a good resistance to stress corrosion cracking in media containing chloride ions.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 480	> 725	> 30

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
< 0,02	< 0,5	< 0,5	19 - 21	balance	11	14
W	N	S	P	Nb		
1 - 2	0,05 - 0,15	< 0,01	< 0,02	0,2		

Shielding gas according to EN 439 :

I 1 Argon, R 1   [TIG]
I 1 Argon   [MIG]
M 11 + 28 He   [MAG]

Availability

TIG rod	Ø mm x 1000 mm	1,6*	2,0	2,4
MIG wire	Ø mm	1,0	1,2	

* available on request

Approval : TÜV

UTP A 6222 Mo

Rods and wires for high corrosion resistant NiCrMo-alloys

Standards :	Material No.	:	2.4831
	DIN 1736	:	SG-NiCr21Mo9Nb
	DIN EN ISO 18274	:	S Ni 6625 (NiCr22Mo9Nb)
	AWS A5.14	:	ER NiCrMo-3

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
> 420	> 720	> 30	20° C > 100 –196° C > 85

Weld metal analysis in %

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

Current type : DC (–) [TIG] DC (+) [MIG]

Shielding gas according to EN 439 :

I 1 Argon, R1 [TIG]
I 1 Argon [MIG]
M 11 + 28 He [MAG]

Availability

TIG rod	Ø mm x 1000 mm	1,6	2,0	2,4	3,2*
MIG wire	Ø mm	0,8*	1,0	1,2	1,6*

* available on request

Approvals : TÜV, GL, DNV, C

UTP A 704

Rods and wires for high corrosion resistant NiCrMo alloys

Standards :	Material No.	:	2.4611
	DIN 1736	:	SG-NiMo16Cr16Ti
	DIN 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	Fe	Ni
< 0,01	< 0,1	16	16	< 1,5	balance

Shielding gas according to EN 439:

I 1 (Argon), R 1	[TIG]
I 1 (Argon)	[MIG]
M 11 + 28 He	[MAG]

Availability

TIG rod	Ø mm x 1000 mm	1,6*	2,0	2,4
MIG wire	Ø mm	1,2*		

* available on request

Approvals

TÜV, C

UTP A 776

Rods and wires for high corrosion resistant NiCrMo alloys

Standards :

Material No.	:	2.4886
DIN 1736	:	SG-NiMo16Cr16W
DIN 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.

Welding instructions

Weld with possibly low heat input and low interpass temperature in order to avoid intermetallic precipitations.

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	W	Fe	V	Ni
< 0,01	0,1	16	16	3,5	6	0,2	balance

Shielding gas according to EN 439 :

I 1 (Argon), R 1	[TIG]
I 1 (Argon)	[MIG]
M 11 + 28 He	[MAG]

Availability

TIG rod	Ø mm x 1000 mm	1,6	2,0	2,4
MIG wire	Ø mm	1,0	1,2	

Approvals

TÜV, C

UTP A 722

Rods and wires for high corrosion resistant NiCrMo alloys

Standards :

Material No.	:	2.4635
DIN 1736	:	SG-NiCr22Mo14W
DIN 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.

Weld metal analysis in %

C	Si	Mn	Fe	Cr	Mo	Co
< 0,01	< 0,10	< 0,5	3,0	21,0	13,0	0,3
P	S	Co	Cu	W	Ni	
< 0,015	< 0,010	< 0,2	< 0,2	3,0	balance	

Shielding gas according to EN 439 :

I 1 Argon, R 1	[TIG]
I 1 Argon	[MIG]
M 11 + 28 He	[MAG]

Availability

TIG rod	Ø mm x 1000 mm	2,0	2,4
MIG wire	Ø mm	1,2*	

* on BS 300

Standards : Material No. : 2.4607
DIN 1736 : SG-NiCr23Mo16
DIN EN ISO 18274 : S Ni 6059 (NiCr23Mo16)
AWS A5.14 : ER NiCrMo-13

UTP A 759

Rods and wires for high corrosion resistant NiCrMo alloys

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	Fe	Ni
< 0,01	0,1	22,5	15,5	< 1	balance

Shielding gas according to EN 439 :

I 1 Argon, R 1	[TIG]
I 1 Argon	[MIG]
M 11 + 28 He	[MAG]

Availability

TIG rod	Ø mm x 1000 mm	1,6	2,0	2,4	3,2*
MIG wire	Ø mm	0,8*	1,0	1,2	1,6*

* available on request

Approvals

TÜV, C

Standards :

Material No.	:	2.4615
DIN 1736	:	SG-NiMo27
DIN EN ISO 18274	:	S Ni 1066 (NiMo28)
AWS A5.14	:	ER NiMo-7

UTP A 703

Rods and wires for corrosion resistant NiMo alloys

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	Fe	Ni
< 0,01	< 0,1	28	< 2,0	balance

Shielding gas according to EN 439 :

I 1 Argon, R 1	[TIG]
I 1 Argon	[MIG]
M 11 + 28 He	[MAG]

Availability

TIG rod	Ø mm x 1000 mm	2,0	2,4*
MIG wire	Ø mm	1,2*	

* available on request

Approval

TÜV

Standards : Material No. : 2.4701
DIN 1736 : SG-NiMo28Cr
DIN EN ISO 18274 : S Ni 1069 (NiMo28Fe4Cr)

UTP A 6202 Mo

Rods and wires for high corrosion resistant NiMo-alloys

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

Shielding gas according to EN 439 :
I 1 Argon, R 1 [TIG]
I 1 Argon [MIG]
M 11 + 28 He [MAG]

Availability

TIG rod	Ø mm x 1000 mm	2,0	2,4
MIG wire	Ø mm	1,2	

Approval

TÜV

UTP A 6208 Mo

Rods and wires for high corrosion resistant NiMo alloys

Standards :

Material No.	:	2.4702
DIN 1736	:	SG-NiMo24Cr8Fe
DIN EN ISO 18274	:	S Ni 1062 (NiMo24Cr8Fe6)

Application field

For joining materials of similar nature, as e. g. NiMo24Cr, Material No. 2.4604 (Nimofer 6224) Alloy B 10 (UNS 10624) or other NiMo-alloys with similar composition such as for surfacing on low-alloyed steels.
UTP A 6208 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	Cr	Mo	Mn	Fe	Ni	P	S
0,015	0,05	7,5	24	1,0	6	62	< 0,02	0,01

Shielding gas according to EN 439 :

I 1 Argon, R 1	[TIG]
I 1 Argon	[MIG]
M 11 + 28 He	[MAG]

Availability

TIG rod	Ø mm x 1000 mm	2,0	2,4
MIG wire	Ø mm	1,2	

Approval

TÜV (applied)

UTP AF 6222 Mo

Nickel-base flux-cored wire with slag

Standards :	Material No.	:	2.4621
	DIN 1736	:	NiCr20Mo9Nb
	DIN EN ISO 14172	:	E Ni 6625 (NiCr22Mo9Nb)
	AWS A 5.34	:	E NiCrMo 3 T0-4

Application field

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

NiCr22Mo9Nb	2.4856	UNS N06625	alloy 625
X NiCrMoCu25 20 5	1.4539	UNS N08904	alloy 904
X NiCrNb18 12	1.4583		
StE 355	1.0562		
X 8Ni9	1.5662		alloy 553 Type 1

Properties of the weld metal

UTP AF 6222 Mo distinguishes itself 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 has excellent welding properties with a regular and fine drop transfer. The weld seam is finely rippled and the transition from weld to base material is regular and free from notches. The wide parameter range 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
500	770	35	60

Weld metal analysis in %

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

Welding instructions

Clean welding area cautiously. Welding torch should be held slightly inclined.

Shielding gas : M 21 (Argon + 15 - 20 % CO_2)
C 1 (100 % CO_2)

Gas flow : 15 - 20 l / min

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

PA PB PC PF

Availability and recommended parameters Ø 1,2 mm

Welding current	Welding voltage	Wire feed
160 - 260 A	30 - 36 V	8 - 16 m / min

Spools Ø 1,2 mm und 1,6 mm

Approval : TÜV

UTP UP 5020 Mo
UTP UP FX 5020 Mo

Wire Flux combination

Standards

Wire :	Werkstoff-Nr.	:	2.4849
	DIN 1736	:	SG-NiCr20Fe14 Mo11WN (mod.)
	DIN EN ISO 18274	:	S Ni 6650 (NiCr20Fe14Mo11WN)
	AWS A5.14	:	ER NiCrMo-18
Flux :	DIN EN 760	:	SA-AB-2

Application field

UTP UP 5020 Mo and the flux **UTP UP FX 5020 Mo** are applied for joining of special high-grade steels (6 Mo etc.) such as duplex- and superduplex alloys.

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
480	720	35	75

Chemical weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe	W	Nb	P	S	N
0,03	0,4	0,7	21,0	bal.	11,0	12,5	1,5	0,1	0,015	0,015	0,1

Welding data

Wire diameter mm	Amperage A	Voltage V	Welding speed cm/min	Interpass temperature °C
1,6	200 - 250	28 - 30	30 - 50	< 150

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

Welding instructions

The welding area has to be free from impurities (oil, paint, markings etc.). Welding must be performed with a low heat input, for obtaining good mechanical - and corrosion values.
Flux has to be re-dried prior to welding: 2 hours at 300° C + 50° C.

Availability : 1,6 mm spool BS 300
further diameters on request

Approval : TÜV (applied)

UTP UP 6222 Mo
UTP UP FX 6222 Mo

Wire Flux combination

Standards

Wire :	Material No.	: 2.4831
	DIN 1736	: SG-NiCr21Mo9Nb
	DIN EN ISO 18274	: S Ni 6625 (NiCr22Mo9Nb)
	AWS A5.14	: ER NiCrMo-3
Flux :	DIN EN 760	: SA-AB-2

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	120 at + 20° C 65 at -196° C

Chemical weld metal analysis in %

C	Si	Mn	Cr	Nb	Ni	Fe	Mo	S	P
0,02	0,3	2,0	21,0	3,3	bal.	< 2,0	9,0	0,003	0,012

Welding data

Wire diameter mm	Amperage A	Voltage V	Welding speed cm/min	Interpass temperature °C
1,6	220 - 250	28 - 30	40 - 50	< 150
2,4	320 - 350	28 - 30	40 - 50	< 150

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

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.

Availability : Ø 1,6; spool BS 300
Ø 2,0 and 2,4 mm, spool K435/70
further diameters on request

Approval : TÜV

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

UTP 68 H

Fully austenitic CrNi electrode for temperature resistant steels

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

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

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	20	balance

Welding instruction

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

Current type : DC (+) / AC **Welding positions :** PA PB PC PE PF

Current adjustment :

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
Electrodes	Ø mm x L	5,0 x 400*				
Amperage	A	150 – 180				

* available on request

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

UTP 2133 Mn

Fully austenitic CrNi electrode for temperature resistant steels

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

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	33	1,3	balance

Welding instructions

Hold 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 electrodes for 2 – 3 h at 250 -300° C.

Current type : DC (+) **Welding positions :** PA PB PC PE PF

Current adjustment :

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, C, TÜV Vienna

UTP 2535 Nb

Basic coated electrode with high carbon content for cast steels

Standards : Material No. : 1.4853
EN 1600 : EZ 25 35 Nb B 6 2

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 25
1.4857 G–X 40 NiCrSi 35 25

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	35	1,2	0,1	balance

Welding instructions

Hold 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 electrodes for 2 - 3 hours at 250 - 300° C

Current type : DC (+)

Welding positions : PA PB PC PE PF

Current adjustment :

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

Approvals

TÜV Vienna, C

Standard : DIN EN 1600 : EZ 25 35 CoW B 6 3

UTP 2535 CoW

Basic coated electrode for high temperature cast materials

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	Co	W	Fe
0,50	0,8	1,1	25	35	14	4,5	balance

Welding instruction

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

Current type : DC (+)

Welding positions : PA PB PC

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 400*
Amperage	A	50 – 70	70 – 110	100 – 140

* available on request

Standard : DIN EN 1600 : EZ 3033 W B 6 2

UTP 3033 W

Basic coated electrode for high temperature cast steels with high carbon content

Application field

UTP 3033 W is used for joining and building up on identical and similar heat resistant cast steel parts for industrial ovens, specially for joining tube to tube and tube to cast parts for the production of ethylene (cracking tubes).
Specially for cast material such as G-X 55 NiCrWZr 33 30 4 (H 110), G-X 50 CrNi 30 30 (1.4868) and for service temperatures up to 1100° C.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %
> 550	> 700	> 5

Weld metal analysis in % :

C	Si	Mn	Cr	Ni	W	Fe
0,5	1	1,5	30	33	4,5	balance

Welding instruction

Clean weld area. Hold electrode as vertically as possible, keep a short arc. Minimize heat input, use string bead welding technique. No pre-heating. Interpass temperature max. 150° C. Re-dry the electrodes 2 – 3 h / 250 – 300° C.

Current type : DC (+) **Welding positions :** PA PB PC PE PF

Current adjustment :

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

* available on request

Standards : Material No. : 2.4879
DIN 1736 : EL-NiCr28W (mod.)

UTP 2949 W

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

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	49	4,5	balance

Welding instruction

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

Current type : DC (+) **Welding positions :** PA PB PC PF

Current adjustment :

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

* available on request

Standard : DIN EN 1600 : EZ 35 45 Nb B 6 2

UTP 3545 Nb

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

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	0,8	35	45	0,9	balance

Welding instructions

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

Current type : DC (+) **Welding positions :** PA PB PC PF

Current adjustment :

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

Standards : Material No. : ~ 2.4680
DIN 1736 : EL-NiCr 50 Nb (mod.)

UTP 5048 Nb

Basic coated electrode for high temperature cast steels

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).

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	Nb	Ni
< 0,1	0,6	0,6	50	1,5	balance

Welding instruction

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

Current type : DC (+) **Welding positions :** PA PB

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 350*
Amperage	A	60 – 80	80 – 100	90 – 130

* available on request

UTP 6170 Co

Basic coated NiCrCoMo electrode for high temperature alloys

Standards :

Materials No.	:	2.4628
DIN 1736	:	EL-NiCr21Co12Mo
DIN EN ISO 14172	:	E Ni 6617 (NiCr21Co12Mo)
AWS A5.11	:	~ENiCrCoMo-1

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 (NiCr21Co12Mo), 2.4851 (NiCr23Fe), 1.4876 (X10 NiCrAlTi 32 20), 1.4859 (GX10 NiCrNb 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	Co	Fe	Al	Ti	Ni
0,06	0,7	0,1	21	9	11	1	0,7	0,3	balance

Welding instructions

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

Current type : DC (+)

Welding positions :

PA PB PC PF

Current adjustment :

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

* available on request

Approval : TÜV

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

UTP 6122 Co

Basic coated high nickel containing electrode for high temperature applications

Application field
UTP 6122 Co is suitable for joining and surfacing high-temperature alloys. Special applications of the **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	Co	Fe	Nb	Ni
0,07	0,6	1	22	9	11	2	0,5	balance

Welding instructions
Hold 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 electrodes for 2 – 3 h / 250 – 300° C.

Current type : DC (+)

Welding positions :

PA PB PC PE PF

Current adjustment :

Electrodes	Ø mm x L	2,5 x 250	3,2 x 300	4,0 x 350
Amperage	A	50 – 70	70 – 100	90 – 120

UTP 6225 Al

Basic coated NiCrFe electrode with element addition for high temperature alloys

Standards :

Material No.	:	2.4649
DIN 1736	:	EL-NiCr25Fe10Al3YC
DIN EN ISO 14172	:	6025
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.
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	Fe	Al	Ti	Zr	Y	Ni
0,2	0,6	0,1	25	10	1,8	0,1	0,03	0,02	bal.

Welding instruction

Hold 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 electrodes for 2 – 3 h / 250 – 300° C.

Current type : DC (+)

Welding positions :

PA **PB** **PC** **PF**

Current adjustment :

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

* available on request

Standards :

DIN 1736	:	EL-NiCr28Fe9Nb (mod.)
DIN EN ISO 14172	:	E Ni 6152 (NiCr30Fe9Nb)
AWS A5.11	:	E NiCrFe-7

UTP 6230 Mn

Basic coated NiCrFe 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). 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	Fe	Nb	Ni
0,03	0,5	3,8	28	8,5	1,8	balance

Welding instruction

Hold 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 electrodes for 2 - 3 h / 250 - 300° C.

Current type : DC (+)

Welding positions :

PA PB PC PE PF

Current adjustment :

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

Standards : Material No. : 1.4842
EN 12072 : W/G 25 20
AWS A5.9: ~ ER 310 (Si)

UTP A 68 H

Rods and wires for heat and scale resistant CrNi-steels

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

1.4841 1.4845 1.4846 1.4849
1.4713 1.4742 1.4762

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	21	balance

Delta-Ferrit
0 FN

Welding instructions

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

Current type : DC (–) [TIG]

Shielding gas according to EN 439 : I 1 (Argon) [TIG]
M 12 (Argon / CO_2 2,5 %) [MAG]

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4	3,2*
Spools	Ø mm	1,0	1,2		

* available on request

Standards : Material No. : ~1.4850
EN 12072 : ~W/GZ 21 33 MnNb

UTP A 2133 Mn

Fully austenitic TIG-rod for high temperature materials

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 20	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.

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	33	1,2	balance

Shielding gas according to EN 439 : I 1 Argon

Current type : DC (–) [TIG]

Availability

Rods	Ø mm x 1000 mm	2,0	2,4	3,2
Spools	Ø mm	1,2		

Approval : TÜV

Standards : Material No. : 1.4853
EN 12072 : W/GZ 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

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.

Current type : DC (–)

Shielding gas according to EN 439 : I 1 (Argon) [TIG]

Availability

Rods	Ø mm x 1000 mm	2,0	2,4	3,2
Spools	Ø mm	1,2		

Approvals

TÜV Vienna, C

Standard : DIN EN 12072 : 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. 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 %
450	650	8

Weld metal analysis in %

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

Current type : DC (–) [TIG]

Shielding gas according to EN 439 : I 1 Argon [TIG]

Availability

Rods	Ø mm x 1000 mm	2,4	3,2
Spools	Ø mm	1,2	1,6*

* available on request

UTP A 6170 Co

NiCrCoMo rods and wires for high temperature materials

Standards :

Material No.	:	2.4627
DIN 1736	:	SG-NiCr22Co12Mo
DIN 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

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

Welding instructions

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

Current type : DC (–) [TIG]

DC (+) [MIG]

Shielding gas according to EN 439 :

I 1 Argon	[TIG]
I 1 Argon	[MIG]
M 11 + 28 He	[MAG]

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4
Spools	Ø mm	1,0	1,2	

Approval

TÜV

UTP A 6225 Al

High nickel containing rods and wires for high temperature alloys

Standards :	Material No.	:	2.4649
	DIN 1736	:	SG-NiCr25FeAl (mod.)
	DIN EN ISO 18274	:	S Ni 6704 (NiCr25FeAl3YC)
	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	Al	Ti	Y	Zr	Fe
0,2	0,5	0,1	25	bal.	2	0,15	0,08	0,05	10

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.

Shielding gas according to EN 439 :

mixed gas Argon-nitrogen (Argon + 2 - 3 % N_2) [TIG]
mixed gas Argon-nitrogen + carbon dioxide (Cronigon HT) [MAG]

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4
Spools	Ø mm	1,2		

Approval

TÜV

Standards : Material No. : 2.4642
DIN 1736 : SG-NiCr29Fe
DIN 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). 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	Fe	Co	Ni
0,03	0,3	0,3	29	0,1	9	< 0,1	balance

Current type : DC (–) [TIG]
DC (+) [MIG]

Shielding gas : TIG I 1 (Argon)
MIG I 1 (Argon)

Availability

Rods	Ø mm x 1000 mm	2,4*
Spools	Ø mm	1,2*

* available on request

Standards : Material No. : 2.4667
DIN 1736 : SG-NiCr19NbMoTi
DIN EN ISO 18274 : S Ni 7718 (mod.)

UTP A 5521 Nb

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

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

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 parameter wire Ø 1,2 mm

Welding current	A	150,0	180,0
Welding voltage	V	30,0	35,0
Wire speed	m/min	8,0	8,5
Pulse voltage	V	48,0	48,0
Basic current	A	60,0	85,0
Impulse time	ms	2,5	2,5
Basic time	ms	8,5	9,0
Frequency	Hz	90,0	125,0
Shielding gas ArH_2 6,5 %	l/min	18,0	22,0

Availability

Spools	Ø mm	1,2

* available on request

UTP UP 6170 Co
UTP UP FX 6170 Co

Wire Flux combination

Standards

Wire :	Material No.	: 2.4627
	DIN 1736	: UP-NiCr22Co12
	AWS A5.14	: ER NiCrCoMo-1
	prEN ISO 18274	: S Ni6617 (NiCr22Co12Mo9)
Flux :	DIN 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	Ni	Mo	Fe	Co	Al	P	Ti	S
0,06	0,5	1,5	21,0	bal.	8,5	2,5	11	0,9	0,015	0,3	0,015

Welding data

Wire diameter mm	Amperage A	Voltage V	Welding speed cm/min	Interpass temperature °C
1,6	200 - 250	28 - 30	30 - 50	< 150

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).
Flux has to be re-dried prior to welding: 2 hours at 300° C + 50° C.

Availability : Ø 1,6; spool BS 300
further diameters on request

Approval : TÜV (proposal)

UTP 068 HH

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

Standards : Material No. : 2.4648
DIN 1736 : EL-NiCr19Nb
DIN 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.

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
390	620	35	> 80	> 65	15 h
			> 80	> 50	650° C / air

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Nb	Fe	Ni
0,03	0,4	5	19	1,5	2,2	3	balance

Welding instructions

Hold 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

Current adjustment :

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, ABS, GL, BV, DNV, C

Standards : Material No. : 2.4807
DIN 1736 : EL-NiCr15FeMn
EN ISO 14 172 : Ni 6182 (NiCr15Fe6Mn)
AWS A5.11 : E NiCrFe-3

UTP 7015

Basic coated electrode for NiCr alloys and claddings

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	196° C	Hardness HB
> 380	> 620	> 35	> 80	> 65	approx. 170

Weld metal analysis in %

C	Si	Mn	Cr	Fe	Nb	Ni
< 0,04	0,4	6	16	6	2,2	balance

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 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 electrode core wire should not be exceeded. Re-dry electrode prior welding for 2 – 3 h at 250 – 300° C, welding out of a hot electrode carrier.

Current type : DC (+)

Welding positions : PA PB PC PE PF

Current adjustment :

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, GL, DNV, C

UTP 7015 Mo

Basic coated NiCrFe electrode for high temperature applications

Standards :

Material No.	:	2.4620
DIN 1736	:	EL-NiCr16FeMn
EN ISO 14 172	:	6093 (NiCr15Fe8NbMo)
AWS A5.11	:	E NiCrFe-2

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. The weld 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
> 380	> 620	> 35	> 80

Weld metal analysis in %

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

Welding instructions

Hold 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 electrodes for 2 – 3 h / 250 – 300° C.

Current type : DC (+)

Welding positions : PA PB PC PE PF

Current adjustment :

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, GL, DNV, C

Standards : Material No. : 2.4807
DIN 1736 : EL-NiCr15FeMn
EN ISO 14 172 : E 6062 (NiCr15Fe8Nb)
AWS A5.11 : ENiCrFe-3

UTP 7015 HL

Core wire alloyed high performance electrode for joining and surfacing

Application field

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

NiCr15Fe	2.4640, 2.4816
NiCr60Fe	2.4867
NiCr10	2.4870

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	Fe	Nb	Ni
< 0,04	0,5	6	16	6	2,2	balance

Welding instructions

Clean welding area to metallic bright and properly degreased. The opening angle of the seam should lie between 70 – 80°. Re-dry electrodes for 2 – 3 h at 250 – 300° C. The 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 (+)

Welding positions : 

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300	3,2 x 300	4,0 x 350	5,0 x 400
Amperage	A	50 – 75	70 – 105	90 – 130	130 – 170

Approvals

TÜV, GL, BV, DNV

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

UTP 7013 Mo

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

Application field

The high-nickel 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	Nb	W	Fe	Ni
0,05	< 0,6	3,5	13,0	7,0	1,0	1,2	7,0	bal.

Welding instructions

The weld zone must be clean and properly degreased. Prior to welding, the electrodes must be dried for 2 – 3 hours at 250 – 300° C. The 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 PF

Current adjustment :

Electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350
Amperage	A	70 – 100	100 – 130	120 – 160

Approval

BV

UTP 7017 Mo

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

Standards :

Material No.	:	2.4625
DIN 1736	:	EL-NiCr15MoNb
DIN 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 veritical 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	Nb	Fe	Ni
0,05	< 0,5	3	15	3	2,5	7	balance

Welding instructions

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

Current type : DC (+) / AC

Welding positions : PA PB PC PF

Current adjustment :

Electrodes	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 electrode

Standards :	Material No.	:	2.4366
	DIN 1736	:	EL-NiCu30Mn
	DIN 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 ist 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	Fe	Ti	Al
< 0,05	0,7	3	balance	29	1	0,7	0,3

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 electrodes only! Re-dry electrodes 2 - 3 hours at 200° C.

Current type : DC (+)

Welding positions :

PA PB PC PE PF

Current adjustment :

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, ABS, GL, C

UTP 80 Ni

Basic coated pure nickel electrode.
Low carbon content.

Standards :

Material No.	:	2.4156
DIN 1736	:	EL-NiTi3
DIN EN ISO 14172	:	E Ni 2061 (NiTi3)
AWS A5.11	:	E Ni-1

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	Fe	Ti	Al
< 0,02	0,8	0,25	balance	0,1	2	0,2

Welding instruction

Weld with dry electrodes only! Prior to welding the 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 :**

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300*	3,2 x 300	4,0 x 350	5,0 x 400*
Amperage	A	60 – 85	90 – 130	110 – 150	140 – 175

* available on request

Approval

TÜV

UTP A 068 HH

NiCrFe rods and wires for corrosion and high temperature materials

Standards :		
	Material No.	: 2.4806
	DIN 1736	: SG-NiCr20Nb
	DIN 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

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

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 de-posit 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	> 640	> 35	20° C > 200 -196° C > 100

Weld metal analysis in %

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

Welding instruction

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

Current type : DC (–) [TIG]

DC (+) [MIG]

Shielding gas according to EN 439 :

TIG	I 1 (Argon)
MIG	I 1 (Argon)
MAG	M 11 + 28 He

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4	3,2*
Wires	Ø mm	0,8*	1,0	1,2	1,6*

* available on request

Approvals : TÜV, ABS, GL, DNV, C, TÜV Vienna

UTP A 80 M

Rods and wires for NiCu-alloys

Standards :

Material No.	:	2.4377
DIN 1736	:	SG-NiCu30MnTi
DIN 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.

Weld metal analysis in %

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

Shielding gas according to EN 439 : TIG I 1 (Argon)
MIG I 1 (Argon)
MAG M 11 + 28 He

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4	
Wires	Ø mm	0,8	1,0	1,2	1,6

Approvals : TÜV, ABS, BV, C

UTP A 80 Ni

Rods and wires for pure nickel alloys

Standards : Material No. : 2.4155
DIN 1736 : SG-NiTi4
DIN 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.

Weld metal analysis in %

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

Shielding gas according to EN 439 : TIG I 1 (Argon)
MIG I 1 (Argon)
MAG M 11 + 28 He

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4	
Wires	Ø mm	0,8	1,0	1,2	1,6

Approvals : TÜV, 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 %.

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	Ni	P	S	Fe
< 0,01	0,1	0,3	34 - 38	< 0,01	< 0,01	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.

Shielding gas according to EN 439 : I 1 (Argon 100 %)
M 11

Availability

Wires	Ø mm	1,2

Standard : 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 %.

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	Ni	P	S	Fe
0,015 - 0,025	0,1	0,3	34 - 38	< 0,01	< 0,01	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.

Shielding gas according to EN 439 : I 1 (Argon 100 %)
M 11

Availability

Rods	Ø mm x 1000 mm	2,0	2,4
Wires	Ø mm	1,2	

Standards : Material No. : 2.4648
DIN 1736 : T NiCr19Nb (mod.)
DIN EN ISO 14172 : E Ni 6082 (NiCr20Mn3Nb)
AWS A5.11 : E NiCrFe 3
AWS A5.34 : E NiCr 3 T0-4

UTP AF 068 HH

Nickel base flux cored wire with slag

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.

DIN designation	Mat.-No.	UNS No.	alloy
NiCr15Fe	2.4816	N06600	alloy 600
LC NiCr15Fe	2.4817	N01665	alloy 600 LC
X 10CrNiMoNb 18 12	1.4583*		
X10NiCrAlTi 32-21	1.4876		alloy 800
GX10NiCrNb 32-20	1.4859		
StE 355 1.0562*	*heterogeneous joints with Ni-base materials		

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	35	120

Weld metal analysis in %

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

Welding instruction

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

Shielding gas : M 21 (Argon + 15 - 20 % CO_2) **Gas flow :** 15 - 20 l / min

Current type : DC (+) **Welding positions :** PA PB PC

Availability and recommended parameters Ø 1,2 mm

Amperage	Voltage	Wire speed
160 - 260 A	30 - 36 V	8 - 16 m / min

Availabilty : Basket spool Ø 1,2 mm **Approval :** TÜV

UTP AF 7015

Nickel base flux cored wire with slag

Standards :

Material No.	:	2.4807
DIN 1736	:	NiCr15FeMn
DIN EN ISO 14172	:	E Ni 6182 (NiCr15Fe6Mn)
AWS A5.11	:	ENiCrFe3
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	170

Weld metal analysis in %

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

Welding instruction

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

Shielding gas : M 21 (Argon + 15 - 20 % CO_2)
C 1 (100 % CO_2)

Gas flow : 15 - 20 l / min

Current type : DC (+) / DC (–)

Welding positions : PA PB PC

Availability and recommended parameters Ø 1,2 mm

Amperage	Voltage	Wire speed
160 – 260 A	30 – 36 V	8 – 16 m / min

Availability : Basket spool Ø 1,2 und 1,6 mm

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
	DIN 1736	: UP-NiCr20Nb
	DIN EN ISO 18274	: S Ni 6082 (NiCr20Mn3Nb)
	AWS A5.14	: ER NiCr-3
Powder :	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:

DIN designation	**Mat.-No.**	**UNS**
NiCr15Fe	2.4816	N06600
LC-NiCr15Fe	2.4817	N10665
NiCr23Fe	2.4851	N06601
X10NiCrAlTi 32 20	1.4876	N08800

Weld metal analysis in %

C	Si	Mn	Cr	Fe	Nb	Ni
< 0,03	< 0,2	3	20	< 1,5	2,6	balance

Welding data (Ø 1,6 und 2,4 mm)

	Ø 1,6 mm	Ø 2,4 mm
Amperage (A)	200 - 250	320 - 360
Voltage (V)	29 - 31	29 - 31
Welding speed (cm/min)	35 - 40	40 - 45
Flux height (mm)	25	25
Stick out (mm)	25	25

Availability

Wire	1,6	2,0	2,4

Standards: Material-No. : 2.4621
EN ISO 14172 : E Ni 6625
AWS A 5.11 : ENiCrMo-3
AWS A 5.34 (draft) : ENiCrMo3 T1-4

UTP AF 6222 Mo PW

Nickel base flux cored wire for all-position welding with slag

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 CrNi- and low alloyed steels, furthermore in high temperature applications.

DIN-designation	Material-No.	UNS-No.	alloy
NiCr22Mo9Nb	2.4856	N 06625	625
X NiCrMoCu25 20 5	1.4539	N 08904	904
X NiCrNb18 12	1.4583		
StE 355	1.0562		
X 8Ni9	1.5662		A 553 Typ 1

Properties of the weld metal

UTP AF 6222 Mo PW distinguishes itself 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 characteristics and fast travel speeds. **UTP AF 6222 Mo PW** has excellent welding properties with a regular and fine drop transfer. The weld seam is finely rippled and the transition from weld to base material is regular and free from notches. The wide parameter range enables an application on different wall thicknesses.

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

$R_{p0,2}$ [MPa]	Rm [MPa]	Elongation A [%]	Impact energy [J] at +20°C	Impact energy [J] at -196°C
490	750	30	70	60

Typical chemical composition of the pure weld deposit (%)

C	Si	Mn	Cr	Mo	Nb	Fe	P	S	Ni
0.03	0.4	0.4	21.5	9.0	3.5	0.5	0.010	0.010	Rem.

Welding instructions

Clean welding area cautiously, slightly trailing torch position.

Shielding gas: Ar + 15 -25% CO_2 **Gas flow:** 15-20 l /min.

Current type: = + **Welding position:**

Availability and recommended parameters:

Diameter [mm]	Amperage [A]	Voltage [V]	Wire feed [m/min]
1.2	160 – 260	30 – 36	8 – 16

If it can be welded – we know how.

Selection chart for dissimilar metal welding

UNS	ASTM	Mat.No.	DIN	Tradename	Nickel 200/201 (LC-)Nickel 99,2/99,6	Monel® 400 Nicorros
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		A80 M A80 Ni
N04400	B127/163/165	2.4360	NiCu30Fe	Monel® 400 Nicorros	80 M 80 Ni	
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
N08800	B163/407/409	1.4876	X10NiCrAlTi32 20	Incoloy® 800(H) Nicrofer 3220(H)	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH
N08825	B163/423/424	2.4858	NiCr21Mo	Incoloy® 825 Nicrofer 4221 Nicrofer 4221 hMo	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH
N08028	B668/709	1.4563	X1NiCrMoCu3127	Sanicro 28 Nicrofer 3127LC	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH
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
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
C70600 C71500 C71640	B111/122/171 B402/466	2.0872 2.0882 2.0883	CuNi10Fe CuNi30Fe CuNi30FeMn	Cupronickel- alloys	80 M 80 Ni	80 M
				Stainless- steels	7015 Mo 068 HH 80 Ni	7015 Mo 068 HH
				Cryogenic steels Carbon steels	80 Ni	80 M 7015 Mo 068 HH

Inconel® 600/601 Nicrofer 7216(H)/6023	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
A068 HH A80 Ni	A068 HH A80 Ni	A068 HH A80 Ni	A068 HH A80 Ni	A068 HH A80 Ni	A068 HH A80 Ni	A068 HH A80 Ni	A80 M A80 Ni	A068 HH A80 Ni	A80 Ni
A068 HH	A068 HH	A068 HH	A068 HH	A068 HH	A068 HH	A068 HH A80 Ni	A80 M	A068 HH	A80 M A068 HH
	A6222 Mo A068 HH	A068 HH A6222 Mo	A068 HH A6222 Mo	A068 HH A6222 Mo	A6222 Mo A068 HH	A6222 Mo A068 HH	A80 Ni A068 HH	A068 HH A6222 Mo	A068 HH A6222 Mo
6222 Mo 7015 Mo 068 HH		A6222 Mo A068 HH	A6222 Mo	A6222 Mo	A6222 Mo	A6222 Mo	A80 Ni A068 HH	A6222 Mo A068 HH	A6222 Mo A068 HH
7015 Mo 068 HH 6222 Mo	6222 Mo 7015 Mo 068 HH		A068 HH A6222 Mo	A068 HH A6222 Mo	A6222 Mo A068 HH	A6222 Mo A068 HH	A80 Ni A068 HH	A068 HH A6222 Mo	A068 HH A6222 Mo
7015 Mo 068 HH 6222 Mo	6222 Mo	7015 Mo 068 HH 6222 Mo		A6222 Mo A4225	A6222 Mo A4225	A6222 Mo	A80 Ni A068 HH	A068 HH A6222 Mo	A068 HH A6222 Mo
7015 Mo 068 HH 6222 Mo	6222 Mo	7015 Mo 068 HH 6222 Mo	6222 Mo 4225		A4225	A6222 Mo	A80 Ni A068 HH	A068 HH A3127 LC	A068 HH A3127 LC
6222 Mo 7015 Mo 068 HH	6222 Mo	6222 Mo 7015 Mo 068 HH	6222 Mo 4225	6222 Mo 4225		A6222 Mo	A80 Ni A068 HH	A6222 Mo A4225	A6222 Mo A068 HH
6222 Mo 7015 Mo 068 HH	6222 Mo	6222 Mo 7015 Mo 068 HH	6222 Mo	6222 Mo	6222 Mo		A80 Ni A068 HH	A6222 Mo A068 HH	A6222 Mo A068 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	80 Ni 7015 Mo 068 HH		A80 Ni A068 HH	A80 M A80 Ni
7015 Mo 068 HH 6222 Mo	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		A068 H A1915 HST
7015 Mo 068 HH 6222 Mo	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 HST	

Group 2

Welding consumables for surfacing

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  - solid rods and wires
  - flux cored wires
  - wires and flux for submerged-arc welding

Group 2

Welding consumables for surfacing

Group 2

Welding consumables for surfacing

Stick electrodes for wear protection

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Solid rods and wires for wear protection (TIG, MIG / MAG)

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Gas welding rods for wear protection (autogeneous rods)

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Wear proctection discs

Flux cored wires for wear protection (Open-arc, MIG / MAG)

UP solid wires / UP flux combination for wear protection

Stick electrodes for tool steels

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

Gas shielded flux cored wires for tool steels

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

Solid rods on Cobalt base (Cobalt hard alloys / Celsit)

Gas shielded flux cored wires on Cobalt base (Cobalt hard alloys / Celsit)

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 <u>Hot working tools</u>

- 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 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 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 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 pre-heating and interpass temperature of 480° C.

For production of new cutting tools on low alloy base material, a pre-heating 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 pre-heat and interpass temperature should be approx. 450° C.
UTP 672, UTP 67 S

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, UTP AF 3436

If it can be welded – we know how.

Standards : DIN 8555 : E 1-UM-250

UTP DUR 250

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

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

Approximate weld metal analysis in %

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

Welding instructions

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

Current type : DC (+) / AC

Welding positions : PA PB PF PC PE

Current adjustment :

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

Standards : DIN 8555 : E 1-UM-300

UTP DUR 300

Basic coated welding 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/mm², 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

Approximate weld metal analysis in %

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

Welding instructions

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

Current type : DC (+)

Welding positions : PA PB PF PC PE

Current adjustment

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

Approval

ÖBB

Standards : DIN 8555 : E 1-UM-350

UTP DUR 350

Basic coated welding 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.

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
0,2	1,2	1,4	1,8

Welding instruction

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

Current type : DC (+) / AC **Welding positions :** PA PB PF PC PE

Current adjustment :

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

Approval

Deutsche Bahn AG, No. 20.138.06

Standards : DIN 8555: E 1-UM-400

UTP DUR 400

Basic coated, high-efficiency welding 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.

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

Approximate weld metal analysis in %

C	Si	Mn	Cr	Mo
0,15	1,5	4,0	1,5	0,5

Welding instruction

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

Current type : DC (+) / AC

Welding position : PA

Current adjustment :

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

Standard : DIN 8555 : E 6-UM-60

UTP DUR 600

Basic coated hardfacing electrode resisting impact and abrasion

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. The deposit is machinable by grinding only.

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

Weld metal analysis in %

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

Welding instruction

Hold 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 electrodes UTP DUR 250 or UTP DUR 300 for build-up. Re-dry electrodes that have got damp for 2h / 300° C.

Current type : DC (+) / AC **Welding positions :** PA PB PF PC PE

Current adjustment :

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

* available on request

Approvals

DB AG, No. 20.138.07, ÖBB

Standard : DIN 8555 : E 6-UM-60

UTP DUR 650 Kb

Basic coated hardfacing electrode resisting impact and abrasion

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.

Hardness of the pure weld deposit untreated, 3 layers	58 - 60 HRC
1 layer on high Mn-steel	ca. 24 HRC
2 layers on high Mn-steel	ca. 45 HRC

Weld metal analysis in %

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

Welding instruction

Hold 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 electrodes UTP DUR 250 or UTP DUR 300 for buildup. On high Mn-steel, UTP BMC should be used.
Re-dry electrodes that have got damp for 2 h / 300° C.

Current type : DC (+) / AC **Welding positions :** PA PB PF PC PE

Current adjustment :

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

Standard : DIN 8555 : E 6-UM-60

UTP 670

Basic coated hardfacing electrode resisting impact, compression and abrasion

Application field

UTP 670 is a high-efficiency 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 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.

Hardness of the pure weld deposit ca. 58 HRC

Weld metal analysis in %

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

Welding instruction

Hold electrode as vertically as possible and keep a short arc. Preheating is generally not necessary. 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 intermediate cooling or welding in a water bath. Electrodes that have got damp should be redried for 2 h / 300° C.

Current type : DC (+) / AC **Welding positions :** PA PB PF PC

Current adjustment :

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

Standard : DIN 8555 : E 7-UM-200-KP

UTP CHRONOS

Basic coated high Mn-steel 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.

Welding properties

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	balance

Welding instruction

Hold 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.

Current type : DC (+) / AC

Welding positions : PA PB PF PC

Re-drying : 2 h / 300° C

Current adjustment :

Electrodes	Ø mm x L	3,2 x 450*	4,0 x 450*	5,0 x 450*
Amperage	A	120 – 150	150 – 180	180 – 210

* available on request

Approval

DB AG, Nr. 30.138.05

Standards : DIN 8555 : E 7-UM-250-KP
AWS A5.13 : ~E FeMn-A

UTP 7200

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

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.

Welding properties

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 tungstene 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	4,5	balance

Welding instruction

Hold 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 PF PC

Current adjustment :

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

Approval

DB AG, No. 20.138.08

Standard : DIN 8555 : E 7-UM-250-KPR

UTP BMC

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

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.

Welding properties

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 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 :** PA PB PF PC

Current adjustment :

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

Standard : DIN 8555 : E 7-UM-250-KPR

UTP 730

Basic coated electrode against cavitation wear, stainless

Application field

UTP 730 is suitable for wear resistant surfacings on parts where high resistance against cavitation, corrosion, compression and impact is required, e. g. in the water turbines and pumps construction. Thank to its strong work-hardening behaviour, the pure weld metal can become twice as hard under impact load.
The main application field concerns the surfacing of 13/4 CrNi stainless steels for service life time improvement.

Welding properties

UTP 730 has good welding properties also in out-of-position welding, a stable arc, homogeneous seam appearance, easy slag removal.

Hardness of the pure weld deposit

untreated	approx. 240 HB
workhardened	approx. 50 HRC

Weld metal analysis in %

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

Welding instruction

Clean welding area to metallic bright. Interpass temperature should not exceed 250° C. Preheat heavy parts to 80 – 100° C. Hold electrode nearly vertical and with a short arc. Re-dry electrodes that have got damp for 2 h / 300° C.

Current type : DC (+) / AC

Welding positions : PA PB PF PC

Current adjustment :

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

* available on request

Standards :
EN 1600 : in appliance to
EZ 21 8 5 6 Si Mn B 4 3
DIN 8555 : E 9-300-CP

UTP ANTINIT DUR 300

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

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 HV
after heat treatment 1 h / 550° C	380 HV

Weld metal analysis in %

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

Welding instruction

Oxides must be removed in the welding area. 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 pre-heated 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 electrodes 2 - 3 h at 250 - 300° C.

Current type : DC (+)

Welding positions :

PA PB PC

Welding adjustment :

Electrodes	Ø mm x L	2,5 x 250*	3,2 x 350*	4,0 x 400*
Amperage	A	80 – 100	90 – 110	110 – 130

* available on request

Standard : DIN 8555 : E 10-UM-35-G

UTP 7114

Rutile coated hardfacing 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	6	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

Current adjustment :

Electrodes	Ø mm x L	2,5 x 350*	3,2 x 350*	4,0 x 450*
Amperage	A	70 – 100	90 – 130	120 – 150

* available on request

Standard : DIN 8555 : E 10-UM-60-GRZ

UTP LEDURIT 60

Rutile coated high efficiency 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	29	balance

Welding instruction

Hold 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 electrodes that have got damp for 2h/300° C.

Current type : DC (+) / AC

Welding position : PA

Current adjustment :

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

Approval

ÖBB

UTP LEDURIT 61

Rutile-basic coated hardfacing electrode for high abrasion and medium impact loads

Standards : DIN 8555 : E 10-UM-60-GRZ
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 finishing 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	35	balance

Welding instruction
Hold 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 electrodes that have got damp for 2h/300° C.

Current type : DC (+) / AC **Welding position :** PA

Current adjustment :

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	100 – 150	140 – 190

Standard : DIN 8555 : E 10-UM-65-GRZ

UTP LEDURIT 65

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

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	W	V	Fe
4,5	23,5	6,5	5,5	2,2	1,5	balance

Welding instruction

Hold 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 electrodes that have got damp for 2h/300° C.

Current type : DC (+) / AC

Welding position : PA

Current adjustment :

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

Standard : DIN 8555 : E 10-UM-60-G

UTP 718 S

High-efficiency electrode without slag for high wear resistant claddings against abrasion.

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	balance

Welding instruction

Hold 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 electrodes that have got damp for 2h/300° C.

Current type : DC (+) / AC **Welding position :** PA

Current adjustment :

Electrodes	Ø mm x L	3,2 x 350*	4,0 x 450*	5,0 x 450*
Amperage	A	120 – 150	140 – 170	170 – 200

* available on request

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

UTP 711 B

Rutile-basic coated surfacing electrode against abrasion

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 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 electrodes that have got damp for 2h/300° C.

Current type : DC (+) / AC **Welding position :** PA

Current adjustment :

Electrodes	Ø mm x L	3,2 x 350*	4,0 x 450*	5,0 x 450*
Amperage	A	90 - 130	100 - 150	140 - 190

* available on request

Standards : DIN 8555 : E 10-UM-65-GRZ
AWS A5.13 : ~E FeCr-A 1

UTP 7100

High-efficiency electrode without slag resisting abrasion and moderate impact loads

Application field

The high Cr-C-alloyed hardfacing 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	35	balance

Welding instruction

Hold 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

Current adjustment :

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

* available on request

Standard : DIN 8555: E 21-UM-65-G

UTP 75

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

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	10	balance

Welding instruction

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

Current type : DC (–) / AC **Welding positions :** PA PB

Current adjustment :

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

* available on request

Standard : DIN 8555 : E 21-UM-60-G

UTP 7560

Graphite basic coated tube 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.

Welding instruction

Clean welding area to metallic bright. Pre-heating depends on the dimension of work pieces, 250 – 300° C. The 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 position :** PA slight vertically

Current adjustment :

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

Standards : DIN 8555 : E 31-UM-200-CN
DIN 1733 : EL-CuMn14Al
AWS A5.6 : E CuMnNiAl

UTP 34 N

Basic coated complex aluminium-bronze 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 medias, best gliding properties and a very good machinability. Crack resistant and pore-free.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Hardness HB	El. conductivity $\frac{S \cdot m}{mm^2}$	Melting range ° C
400	650	25	approx. 220	approx. 3	940 - 980

Weld metal analysis in %

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

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 electrodes only!
Re-drying: 2 - 3 h at 150° C.

Current type : DC (+)

Welding positions : PA PB

Current adjustment :

Electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 450
Amperage	A	50 – 70	70 – 90	90 – 110

Approval

DB

Standards : DIN 8555 : E 31-UM-300-CN
AWS A5.13 : ~E CuAl-C

UTP 343

Basic coated hard bronze 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 %

Al	Fe	Cu
12	3	balance

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 electrode as vertically as possible. To avoid over-heating 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 electrode. Re-drying: 2 – 3 h / 150° C.

Current type : DC (+)

Welding positions : PA PB

Current adjustment :

Electrodes	Ø mm x L	2,5 x 250*	3,2 x 350*	4,0 x 350*
Amperage	A	50 – 70	70 – 90	90 – 110

* available on request

Standards : DIN 8555 : MSG 1-GZ-250
Material No. : 1.8401

UTP A DUR 250

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

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.

Hardness of the pure weld deposit : approx. 250 HB

Weld metal analysis in %

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

Welding instruction

Machine welding area to metallic bright. Massive parts have to be preheated to 150° C.

Recommended parameters for MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,2 1,6	130 - 260 190 - 350	26 - 31 29 - 33

Shielding gas : mixed gases M 1, M 2, M 3 and CO_2 18 - 20 l / min

Availability

Wire	Ø mm	1,2	1,6*

* available on request

Approval

DB AG, No. 20.138.09

UTP A DUR 350

Copper coated MAG wire for medium hard, wear resistant surfacing

Standards : DIN 8555 : MSG 2-GZ-400
Material No. : 1.8405

Application field

UTP A DUR 350 is for MAG buildups on structural parts subject to compression, impact and abrasion, such as caterpillar track components, machine and gear parts, stamps. The deposit may be soft annealed and hardened. Machining by grinding 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
0,7	0,3	2	1	0,2

Welding instruction

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

Recommended parameters for MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,2	130 - 260	26 - 31
1,6	190 - 350	29 - 33

Shielding gas : mixed gases M 1, M 2, M 3 and CO_2 18 - 20 l / min

Availability

Wires	Ø mm	1,2	1,6*

* available on request

UTP A DUR 600

Standards : DIN 8555. : W/MSG 6-GZ-60-S
Material No. : 1.4718

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

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. Machining by grinding is 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
0,5	3	0,5	9,5

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

Recommended parameters for MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,0	105 - 200	25 - 29
1,2	135 - 260	26 - 31
1,6	190 - 355	29 - 33

Shielding gas : mixed gases M 1, M 2, M 3 and CO_2 18 - 20 l / min

Availability

Rods	Ø mm x 1000 mm	1,6	2,0*	2,4	3,2
Wires	Ø mm	0,8*	1,0*	1,2	1,6

* available on request

Approval
DB AG, No. 20.138.10

Standard : DIN 8555 : MSG 3-GZ-60

UTP A DUR 650

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

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.

Hardness of the pure weld deposit: 55 - 60 HRC

Weld metal analysis in %

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

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.

Recommended parameters for MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,2 1,6	135 - 260 190 - 350	26 - 31 29 - 33

Shielding gas: mixed gases M 1, M 2, M 3 and CO_2 18 - 20 l / min

Availability

Wires	Ø mm	1,2	1,6*

* available on request

Standard : DIN 8555 : G/WSG 10-G0-55-GR

UTP A LEDURIT 60

Chromium carbide TIG-rod against mineral abrasion

Application field

UTP A LEDURIT 60 is universally suitable for highly wear resistant hardfacing of parts subject to severe mineral abrasion with little impact, such as conveyor screws, sliding guidance screws, extruder worms, milling rings, crusher jaws, mixer blades, and as final hardfacing on Mn-steel.

Hardness of the pure weld metal: 57 - 60 HRC
Hardness at 600° C approx. 340 HB

Weld metal analysis in %

C	Si	Mn	Cr	Fe
4,0	0,6	0,5	31	balance

Welding instruction

Clean welding area, preheating is generally not necessary. If crack-free deposits are required, preheating to 400 – 600° C, followed by a very slow cooling, is necessary.

Current type : DC (–)

Shielding gas: I 1 (Argon)
for oxy-acetylene welding use acetylene excess (reducing flame)

Availability and recommended parameters for TIG welding :

Rods	Ø mm x L	3,2 x 1000*	4,0 x 1000*	5,0 x 1000*
Amperage	A	70 – 110	100 – 130	130 – 170

* available on request

Standard :
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.

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	10	10

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.

Current type : DC (–)

Shielding gas : I 1 (Argon) approx. 6 l / min

Availability and recommended parameters for TIG welding

Rods	Ø mm x L	3,0 x 350*	4,0 x 350*	6,0 x 350*
Amperage	A	70 – 90	100 – 120	130 – 150

* available on request

Standard : DIN 8555 : G/WSG 22-G0-60-CS

UTP A 74

Cast NiCrBSi-welding rod for wear and corrosion resistant claddings.

Application field

The self-flowing gas welding rod **UTP A 74** is suitable for wear and corrosion resistant claddings on tools and parts such as cutting tools and - dies, pressure worms, parts of pumps. Finishing by grinding is possible.

Hardness of the pure weld metal

56 - 60 HRC

Weld metal analysis in %

C	Si	Cr	B	Fe	Ni
0,6	5,0	16,0	3,5	4,0	balance

Welding instruction

Clean welding area to metallic bright. Preheating temperature of 400° C on tools should be maintained. Melt base material slightly. Slow cooling down in oven or under a cover.

Shielding gas TIG : I 1 (Argon), approx. 6 l / min

Flame adjustment : neutral to slight reducing

Availability : Ø 4,0 / 5,0 x 1000 mm
available on request

Standards : DIN 8555 : W/MSG-31-GZ-200-CN
DIN 1733 : SG-CuMn13Al7
AWS A5.7 : ER CuMnNiAl
Material No. : 2.1367

UTP A 34 N

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

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

Current type : DC (+) [MIG]
DC (–) / AC [TIG]

Shielding gas MIG / TIG: I 1 (Argon 100 %)

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.

Availability

Rods	Ø mm x 1000 mm	1,6*	2,0*	2,4*	3,2*
Wires	Ø mm	1,0*	1,2	1,6	

* available on request

Approval

DB

Standards : DIN 8555 : MSG 31-GZ-250-C
AWS A5.13 : ~ER CuNiAl
Material No. : 2.0925

UTP A 3436

Complex aluminium bronze wire for wear resistant surfacings on dies

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 > 280 HB

Weld metal analysis in %

Al	Mn	Ni	Fe	Cu
10	1	6	3	balance

Current type : DC (+)

Shielding gas : I 1 (Argon 100 %)

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.

Availability

Wires	Ø mm	1,2*	1,6*

* available on request

Standard : DIN 8555 : G/WSG 21-UM-55-CG

UTP A 7550

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.

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	40

Shielding gas : I 1 (Argon 100 %)

Flame adjustment : neutral to slight reducing

Availability

Rods	6,0 x 450*
Wires	6,0*

* available on request

Standard : DIN 8555 : G 21-GF-60 G

UTP A 7560

Tungsten-carbide tube rod against extreme mineral abrasion

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.

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.

Hardness

Carbide : approx. 2500 HV
Matrix : approx. 60 HRC

Weld metal analysis in %

W_2C	FeC-Matrix
60	40

Flame adjustment : neutral to slight reducing

Availability

Rods	Ø mm	3,5 x 700*	4,0 x 700*	5,0 x 700*

* available on request

Standard : 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.

Weld metal analysis

CuZnNi-Matrix	approx. 40 %
Tungsten-carbides	approx. 60 %

Hardness

Carbide	approx. 2500 HV
Working temperature	approx. 900° C

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.

Availability

Length of rod	approx. 450 mm
Weight of rod	approx. 500 g
Grain size	1,6 - 3,2 mm and 3,2 - 4,8 mm available on request
Flame adjustment :	neutral (neither gas - nor oxygen-excess)

UTP-system for mineral wear protection

UTP ABRADISC 6000

Hardened wear protection discs for cladding on extensive parts with UTP DISCWELD-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 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** Ø 3,2 mm (70 -100 A, DC (+) / AC) 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 electrodes **UTP DISCWELD** Ø 3,2 x 350 mm) is sufficient to cover approx. 0,5 m^2.
Wear resistant strips ABRASTRIP 6000 S available on request.

Further information in the brochure UTP ABRADISC 6000.

Standard : DIN 8555 : MF 1-GF-250

UTP AF DUR 250

Open-arc flux cored wire for tough, easily machinable surfacings against rolling wear

Application field

The self-shielding open arc wire **UTP AF DUR 250** is used for buildups on parts which are mainly subject to rolling and gliding abrasive wear, such as crane wheels, rail couplings, idlers, slideways, flanges, as well as for buffer layers and buildups under highly wear resistant hardfacings.

Hardness of the pure weld deposit : approx. 280 HB

Weld metal analysis in %

C	Si	Mn	Cr
0,1	0,2	1,6	1,7

Welding instruction

Clean welding area. Preheat massive pieces to min. 150° C, use dragging welding technique with approx. 25 - 30 mm wire stickout.

Current type : DC (+)

Welding positions : PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
2,4*	250 - 450	23 - 31
2,8	300 - 500	23 - 31

* available on request

Standard : DIN 8555 : MF 1-GF-250

UTP AF DUR 250 MP

MAG flux cored wire for tough, easily machinable surfacings against rolling wear

Application field

The metal powder flux cored wire **UTP AF DUR 250 MP** 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 : 250 HB

Weld metal analysis in %

C	Si	Mn	Cr	Fe
0,12	0,7	1,2	0,7	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.

Current type : DC (+)

Welding positions : PA PB

Shielding gas : mixed gases M 21 and M 22 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6*	150 - 250	25 - 31

* available on request

Standard : DIN 8555 : MF 1-GF-350

UTP AF DUR 350

Open-arc flux-cored wire for tough, medium hard deposits

Application field

The self-shielding open arc wire **UTP AF DUR 350** 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. 370 HB
1 layer on steel with C = 0,5 % approx. 420 HB

Weld metal analysis in %

C	Si	Mn	Cr
0,12	0,2	1,5	2,7

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.

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

PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6*	150 - 350	22 - 33
2,4*	250 - 450	23 - 31
2,8*	300 - 500	24 - 33

* available on request

Standard : DIN 8555 : MF 1-GF-350

UTP AF DUR 350 MP

MAG flux cored wire for tough, medium hard surfacings

Application field

The metal powder flux cored wire **UTP AF DUR 350 MP** 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.

Hardness of the pure weld metal : 350 HB

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Fe
0,25	0,5	1,5	1,5	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.

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

PA PB

Shielding gas : mixed gases M 21 and M 22 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2* 1,6*	110 - 180 150 - 250	25 - 31 25 - 31

* available on request

Standard : DIN 8555 : MF 4-GF-55-ST

UTP AF DUR 600

Open-arc flux cored wire for highly wear resistant surfacings

Application field

The self-shielding open arc wire **UTP AF DUR 600** is universally used for buildups 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.

Hardness of the pure weld deposit : 55 - 58 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	W
0,6	0,6	1,5	6	1,5	1,5

Welding instruction

Clean welding area. Preheating is generally not necessary, use dragging welding technique with ap-prox. 25 - 30 mm wire stickout.

Current type : DC (+)

Welding positions : PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6*	150 - 350	22 - 33
2,4*	250 - 450	24 - 32
2,8*	300 - 500	25 - 33

* available on request

Standard : DIN 8555 : MF 6-GF-60

UTP AF DUR 600 MP

MAG flux cored wire for tough-hard and highly wear resistant surfacings

Application field

The metal powder flux cored wire **UTP AF DUR 600 MP** 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.

Hardness of the pure weld metal : 55 - 60 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo
0,6	0,6	0,8	7	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.

Current type : DC (+) **Welding positions :** PA PB

Shielding gas : mixed gases M 21, M 22 18 - 20 l / min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2* 1,6*	150 - 300 200 - 350	29 - 34 31 - 34

* available on request

Standard : DIN 8555 : MF 4-GF-60

UTP AF DUR 650

Open-arc flux cored wire for highly wear resistant surfacings

Application field

The self-shielded open arc wire **UTP AF DUR 650** is used for buildups on parts subject to a combination of impact and abrasion, especially at elevated service temperatures up to 550° C, such as beaters and hammers for crushers, tools for mines and road construction, stone separators, hammers and rail tamping tools. Machinable only by grinding.

Hardness of the pure weld metal: 58 - 62 HRC

Weld metal analysis in %

C	Si	Mn	Cr	W	Ti	Mo
1,1	0,2	1,1	4,5	5,1	2,6	1

Welding instruction

Clean welding area. Preheating is generally not necessary, use dragging welding technique with 25 - 30 mm wire stickout.

Current type : DC (+)

Welding positions : PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6*	150 - 350	23 - 32
2,0*	200 - 400	23 - 32
2,4*	250 - 450	24 - 32
2,8*	300 - 500	25 - 33

* available on request

Standard : DIN 8555 : MF 3-GF-60-ST

UTP AF DUR 650 MP

MAG flux cored wire for tough-hard surfacings against impact and abrasion

Application field

The metal powder flux cored wire **UTP AF DUR 650 MP** 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. Machining is possible by grinding or with tungstene carbide tools.

Hardness of the pure weld metal:

untreated	55 - 60 HRC
soft annealed 800° C	approx. 230 HB
hardened 1030° C/oil	approx. 58 HRC
tempered 650° C	approx. 40 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	W	V
0,3	0,6	0,8	5,2	1,4	1,3	0,4

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 current : DC (+) **Welding positions :**


PA


PB

Shielding gas : mixed gases M 21, M 22 18 - 20 l / min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	150 - 300	29 - 34
1,6*	200 - 350	31 - 35

* available on request

Standard : DIN 8555 : MF 10-GF-60-GP

UTP AF DUR 650 S

Open-arc TiC flux cored wire for wear resistant claddings against compression, impact and abrasion

Application field

The self-shielded (open-arc) flux cored wire **UTP AF DUR 650 S** 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 thikkness 10 - 15 mm in 3 - 4 layers.

Hardness of the pure weld metal: 57 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ti	Fe
1,6	0,5	1,0	6,0	1,3	5,0	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.

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

PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6	120 - 150	26 - 30
2,0*	180 - 200	26 - 30
2,4	250 - 300	26 - 30
2,8	300 - 350	26 - 30

* available on request

Standard : DIN 8555 : MF 10-GF-60-GP

UTP AF DUR 650 SMP

MAG TiC flux cored wire for wear resistant claddings against compression, impact and abrasion

Application field

The metal powder flux cored wire **UTP AF DUR 650 SMP** 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 thickness 10 - 15 mm in 3 - 4 layers.

Hardness of the pure weld deposit : 57 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ti	Fe
1,6	0,5	1,0	6,0	1,3	5,0	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 current : DC (+) **Welding positions :**

PA PB

Shielding gas : mixed gases M 21 and M 22 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	120 - 150	26 - 30
1,6*	180 - 200	26 - 30

* available on request

Standard : DIN 8555 : MF 7-GF-200-KP

UTP AF BM

Open-arc flux cored wire for wear resistant buildups on high Mn-steel.

Application field

The self-shielded open arc wire **UTP AF BM** 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
after workhardening : up to 450 HB

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Fe
1	0,7	14,5	3,5	1	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.

Current type : DC (+) **Welding positions :** PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6*	120 - 150	26 - 30
2,4*	250 - 450	24 - 31
2,8*	300 - 500	25 - 31

* available on request

Standard : DIN 8555 : MF 7-GF-250-KP

UTP AF BMC

Open-arc flux cored wire for wear resistant buildups exposed to compressive and impact stresses

Application field

The self-shielded open arc wire **UTP AF BMC** 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 industries, 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. 260 HB
after workhardening : up to 550 HV

Weld metal analysis in %

C	Mn	Cr	Fe
0,5	17	13	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.

Current type : DC (+) **Welding positions :** PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6*	120 - 150	26 - 30
2,4*	240 - 450	25 - 32
2,8*	300 - 500	26 - 33

* available on request

Standard : DIN 8555 : MF 8-GF-200-ZRKN

UTP AF A 7

Open-arc CrNiMn flux cored wire for buffer layers and crack resistant joints.

Application field

The self-shielded open arc wire **UTP AF A 7** is used mainly for tough, crack resistant buffer layers 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.

Mechanical values of the pure weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Hardness untreated HB	Hardness workhardend HV
> 390	> 620	> 35	approx. 200	approx. 400

Weld metal analysis in %

C	Mn	Cr	Ni
0,1	6,5	19	8,5

Welding instruction

Clean welding area. Preheat massive pieces and high tensile steel to min. 250° C. Use dragging welding technique and 25 - 30 mm wire stickout.

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

PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
2,4 2,8	250 - 500 300 - 550	25 - 32 26 - 32

Standard : DIN 8555 : MF 10-GF-50-G

UTP AF LEDURIT 520

Open-arc flux cored wire for wear resistant claddings against impact and abrasion

Application field

The self-shielded flux cored wire **UTP AF LEDURIT 520** is used for surfacings on construction parts subject to high mineral abrasion in combination with moderate impact loads, such as conveyor screws, gliding and guiding surfaces, mixer blades, excavator buckets, milling rolls and beater plates in coal mills, sand pumps, surfacing of refuse removing trucks. Excellent welding properties and a smooth seam surface generally make the finishing by grinding unnecessary. Also suitable as final layer with UTP AF DUR 600 or UTP AF BMC.

Hardness of the pure weld deposit: 50 - 55 HRC

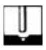
Weld metal analysis in %

C	Si	Mn	Cr	Fe
3	1,5	1,5	15	balance

Welding instruction

Clean welding area thoroughly resp. remove fatigued material. No preheating in general. Use dragging welding technique with approx. 25 - 30 mm wire stickout.

Welding current : DC (+) **Welding positions :**


PA

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
2,8*	300 - 500	24 - 31

* available on request

Standard : DIN 8555 : MF 10-GF-60-GR

UTP AF LEDURIT 60

Open-arc flux cored wire for highly wear resistant claddings against abrasion

Application field

The self-shielded open arc wire **UTP AF LEDURIT 60** is 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. 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 UTP AF DUR 600 or UTP AF BMC.

Hardness of the pure weld deposit : 56 - 58 HRC

Weld metal analysis in %

C	Si	Mn	Cr
4,4	0,2	0,3	27

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.

Current type : DC (+)

Welding positions : PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	120 - 300	22 - 29
1,6*	150 - 350	22 - 29
2,0*	200 - 400	24 - 30
2,4	250 - 450	24 - 30
2,8	300 - 500	24 - 31

* available on request

Standard : DIN 8555 : MF 10-GF-65-GR

UTP AF LEDURIT 68

Open-arc flux cored wire for highly wear resistant hardfacings against abrasion

Application field

The self-shielded open arc wire **UTP AF LEDURIT 68** 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. 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 : 63 - 65 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Nb
5,5	1,6	0,3	22	7

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.

Current type : DC (+)

Welding positions : PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6	150 - 350	22 - 29
2,0*	250 - 400	25 - 31
2,4	250 - 450	24 - 30
2,8	300 - 500	26 - 32

* available on request

Standard : DIN 8555 : MF 10-GF-70-GRTZ

UTP AF LEDURIT 70

Open-arc flux cored wire for heat resistant claddings against abrasion

Application field

The self-shielded open arc wire **UTP AF LEDURIT 70** 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. Finishing by grinding is generally not necessary due to the very good welding characteristics and smooth seam surface.

Hardness of the pure weld deposit : approx. 68 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Nb	W	V
5,3	1	0,5	20	6,5	6,5	2,5	1

Welding instruction

Clean welding area, preheating is generally not required. Dragging welding technique, possibly weav-ing, with 25 - 30 mm wire stickout.

Current type : DC (+) **Welding positions :** PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
2,4 2,8	250 - 450 300 - 500	29 - 34 27 - 38

Standard : DIN 8555 : MF 10-GF-70-GRTZ

UTP AF LEDURIT 76

Open-arc flux cored wire for heat resistant hardfacings against mineral abrasion

Application field

The self-shielded open arc wire **UTP AF LEDURIT 76** 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. Finishing by grinding is generally not necessary due to the good welding characteristics and the smooth seam surface.

Hardness of the pure weld deposit : approx. 68 HRC

Elevated temperature hardness at 500° C approx. 59 HRC
Elevated temperature hardness at 600° C approx. 55 HRC
Elevated temperature hardness at 700° C approx. 46 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Nb	V	B
5,3	1	0,3	11	6,5	6	1

Welding instruction

Clean welding area, preheating is generally not required. Dragging welding technique, possibly weav-ing, 25 - 30 mm wire stickout.

Current type : DC (+)

Welding positions : PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
2,4*	250 - 450	25 - 33
2,8*	300 - 500	26 - 34

* available on request

Standard : DIN 8555 : MF 9-GF-300-CP

UTP AF ANTINIT DUR 300

MAG flux cored wire for wear resistant surfacings in the armatures construction

Application field

The flux cored wire **UTP AF 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; guideways, glidings, mixer blades, valve seats.

Welding properties

The weld deposit of **UTP AF ANTINIT DUR 300** has a ferritic-austenitic structure in a ratio of approx 45 : 55 %. This alloy distinguishes itself by 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. Working temperature up to 280° C.

Hardness of the pure weld deposit: approx. 300 HV

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Co
0,12	5,7	6,6	21,4	8,0	< 0,2

Welding instruction

Preheat massive parts to min. 250° C. Use dragging welding technique with approx. 25 - 30 mm wire stickout. Remove oxides in the welding area. Peheating - and interpass temperature have to be adjusted to the base metal by welding one layer. The workpiece has to be preheated to min 300 - 400° C, when several layers are applied. Preheating temperature should be maintained during the whole welding operation. Pay attention to a good warming up of the workpiece.

Current type : DC (+) **Welding positions :** PA PB

Shielding gas : I 1 (Argon) or M 13 (Ar + O_2) 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
2,8*	300 - 500	26 - 31

* available on request

Standard : DIN 8555 : MF 9-GF-50-CP

UTP AF ANTINIT DUR 500

MAG flux cored wire for wear and corrosion resistant hardfacings in the armatures construction

Application field

The flux cored wire **UTP AF ANTINIT DUR 500** is suitable for wear and corrosion resistant surfacings on ferritic and austenitic base materials in the armatures construction, fittings, valve seats, glidings.

Welding properties

The weld deposit of **UTP AF ANTINIT DUR 500** has a ferritic-austenitic structure. This alloy distinguishes itself by 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, resistant against pitting and crevice corrosion. Working temperature up to 550° C.

Hardness of the pure weld deposit: approx. 53 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni	Co	Nb
0,12	4,5	4,8	18,0	5,5	8,0	< 0,2	1,1

Welding instruction

Preheat massive parts to min. 500 - 550° C. Use dragging welding technique with approx. 25 - 30 mm wire stickout. Remove oxides in the welding area. Peheating - and interpass temperature have to be adjusted to the base metal when welding one layer. Preheating temperature should be maintained during the whole welding operation. Pay attention to a good warming up of the workpiece. The whole wear and corrosion resistance will be obtained by welding several layers. Post heat treatment: 500 - 550° C / 2 h / furnace cooling.

Current type : DC (+)

Welding positions : PA PB

Shielding gas : Ar or Ar S 1

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
2,0*	200 - 400	25 - 31
2,4*	250 - 450	26 - 31
2,8*	300 - 500	26 - 31

* available on request

Standard : DIN 8555 : MF 31-GF-300-C

UTP AF 3436

MIG complex bronze flux cored wire for wear resistant hardfacings on dies

Application field

The flux cored wire **UTP AF 3436** is especially developed for surfacings on construction parts made of steel- and aluminium bronzes. Special properties are erosion - , cavitation - and corrosion resistant surfacings on cast-aluminium-bronzes, e. g. ship propellers as well as for the production and repair of drawing and pressing tools with steel as a base material.

Welding properties

The weld deposit has an excellent wear and corrosion resistance in seawater. Good gliding properties, easily machinable.

Hardness of the pure weld deposit at room temperature : approx. 320 HB

Weld metal analysis in %

Al	Fe	Ni	Cu
11,5	4	5	balance

Welding instruction

Grind welding area. Preheat massive and stress restrained work pieces to 250 - 450° 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.

Shielding gas : I 1 (Argon 100 %)

Current type : DC (+) **Welding positions :** PA PB

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6*	240	29

Standards : DIN 8555 : UP 1-GZ-250
Material No. : 1.8401

UTP UP DUR 250
UTP UP Flux DUR 250

Copper coated SAW wire for machinable surfacings and filler layers

Application field

The combination of wire and flux **UTP UP DUR 250 / UTP UP Flux 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

Weld metal analysis in %

C	Si	Mn	Cr	Ti	Al
0,3	0,4	1,0	1,0	0,2	0,1

Welding instruction

Clean welding area to metallic bright. Preheat massive parts to 150° C, cooling down slowly.

Recommended parameters for submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
3,0	400 - 500	28 - 30	35 - 45
4,0	500 - 600	28 - 30	35 - 45

Availability : SAW rings Ø 3,0 and 4,0 mm, available on request
SAW flux, available on request

Standards : DIN 8555 : UP 2-GZ-300
Material No. : 1.8404

UTP UP DUR 300
UTP UP Flux DUR 300

Copper coated SAW wire for machinable surfacings

Application field
The combination of wire and flux **UTP UP DUR 300 / UTP UP Flux 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

Weld metal analysis in %

C	Si	Mn	Cr	Ti	Al
0,5	0,4	1,0	1,2	0,2	0,1

Welding instruction
Clean welding area to metallic bright. Preheat massive parts to 150° C, cooling down slowly.

Recommended parameters for submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
3,0	400 - 500	28 - 30	35 - 45
4,0	500 - 600	28 - 30	35 - 45

Availability : SAW rings Ø 3,0 and 4,0 mm, available on request
SAW flux, available on request

Standards : DIN 8555 : UP 6-GZ-55
Material No. : 1.4718

UTP UP DUR 600
UTP UP Flux 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 Flux 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

Weld metal analysis in %

C	Si	Mn	Cr
0,45	3,0	0,5	9,5

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.

Recommended parameters of submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
3,0	320 - 450	28 - 30	35 - 45
4,0	400 - 500	28 - 30	35 - 45

Availability : SAW rings Ø 3,0 and 4,0 mm, available on request
SAW flux, available on request

Standards : DIN 8555 : UP 3-GZ-50-T
Material No. : Special alloys

UTP UP 73 G 2
UTP UP Flux 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 Flux 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. Machinable by grinding or hard metal alloys.

Hardness of the pure weld deposit

untreated : 48 - 52 HRC
tempered 550° C : approx. 55 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ti
0,35	0,3	1,2	7,0	2,0	0,3

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.

Recommended parameters for submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
2,4	300 - 350	28 - 30	35 - 45
3,0	320 - 450	28 - 30	35 - 45
4,0	400 - 500	28 - 30	35 - 45

Availability : SAW rings Ø 2,4, 3,0 and 4,0 mm, available on request
SAW flux, available on request

Standards : DIN 8555 : UP 3-GZ-40-T
Material No. : special alloy

UTP UP 73 G 3
UTP UP Flux 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 Flux 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. Machining with hard metal alloys.

Hardness of the pure weld metal

untreated : 38 - 42 HRC
tempered at 550° C : approx. 45 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ti
0,25	0,5	0,7	5,0	4,0	0,6

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.

Recommended parameters for submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
2,4	300 - 350	28 - 30	35 - 45
3,0	320 - 450	28 - 30	35 - 45
4,0	400 - 500	28 - 30	35 - 45

Availability : SAW rings Ø 2,4, 3,0 und 4,0 mm, available on request
SAW flux, available on request

Standards : DIN 8555 : UP 3-GZ-350-T
Material No. : special alloy

UTP UP 73 G 4
UTP UP Flux 73 G 4

Copper coated SAW wire for tough and wear-resistant surfacings

Application field

Due to the good hot wear resistance and toughness, the combination of wire and flux **UTP UP 73 G 4 / UTP UP Flux 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. The weld deposit is machinable.

Hardness of the pure weld deposit : 32 - 35 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo
0,1	0,4	0,6	6,5	3,3

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.

Recommended parameters for submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
2,4	300 - 350	28 - 30	35 - 45
3,0	320 - 450	28 - 30	35 - 45
4,0	400 - 500	28 - 30	35 - 45

Availability : SAW rings Ø 2,4, 3,0 and 4,0 mm, available on request
SAW flux, available on request

Standard : DIN 8555 : UP 3-GZ-350-T

UTP UP 73 G 6
UTP UP Flux 73 G 6

Copper coated SAW wire for tough and wear-resistant surfacings

Application field

The combination of wire and flux **UTP UP 73 G 6 / UTP UP Flux 73 G 6** is suitable for heat resistant surfacings on construction parts, which are subject to combined load of pressure, impact and abrasion at elevated temperatures up to 550° C, such as hot-rolls, rollers of table rollers, crane running wheels. Hot wear resistant claddings can be made on non- and low alloyed base materials. The weld deposit is machinable.

Hardness of the pure weld deposit : 32 - 35 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo
0,12	0,4	0,6	6,0	0,9

Welding instruction

Clean welding area to metallic bright, cracks in the tool have to be gouged out completely. Preheating and interpass temperature 150 - 400° C, depending on the size of the workpiece and the base material. Slow cooling and, if necessary, tempered at 550° C.

Recommended parameters for submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
2,4	300 - 350	28 - 30	35 - 45
3,0	320 - 450	28 - 30	35 - 45
4,0	400 - 500	28 - 30	35 - 45

Availability : SAW rings Ø 2,4, 3,0 and 4,0 mm, available on request
SAW flux, available on request

Standards : DIN 8555 : UP 5-GZ-400-RZ
Material No. : 1.4115

UTP UP 661
UTP UP Flux 661

Martensitic SAW wire for wear and corrosion resistant hardfacings

Application field

The combination of wire and flux **UTP UP 661 / UTP UP Flux 661** is suitable for high-grade build-dups 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. Heat resistant up to 900° C.

Hardness of the pure weld deposit approx. 40 HRC
1st layer on tempering steel C 45 approx. 55 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo
0,22	0,7	0,7	17,5	1,2

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.

Recommended parameters for submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
2,4	300 - 350	28 - 30	35 - 45
3,0	320 - 450	28 - 30	35 - 45
4,0	400 - 500	28 - 30	35 - 45

Availability : SAW rings Ø 2,4, 3,0 and 4,0 mm, available on request
SAW flux, available on request

Standards : DIN 8555 : UP 6-GZ-45-RZ
Material No. : 1.4122

UTP UP 662
UTP UP Flux 662

Martensitic SAW wire for wear and corrosion resistant hardfacings

Application field

The combination of wire and flux **UTP UP 662 / UTP UP Flux 662** is suitable for high-grade build-dups 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. Heat resistant up to 900° C.

Hardness of the pure weld deposit : approx. 45 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Ni
0,40	0,5	0,5	16,5	1,0	0,5

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.

Recommended parameters for submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
2,4	300 - 350	28 - 30	35 - 45
3,0	320 - 450	28 - 30	35 - 45
4,0	400 - 500	28 - 30	35 - 45

Availability : SAW rings Ø 2,4, 3,0 and 4,0 mm, available on request
SAW flux, available on request

Standards : DIN 8555 : UP 8-GZ-200-CK
Material No. : 1.4370

UTP UP A 7
UTP UP Flux A 7

Austenitic SAW wire for buffer layers and corrosion resistant surfacings

Application field

The combination of wire and flux **UTP UP A 7 / UTP UP Flux A 7** is suitable for tough and crack resistant buffer - and cushion layers under high wear resistant hard alloys as well as for rust - and scale resistant claddings on non - and low alloyed base materials. Crack welding on high strength steels and mixed combinations are possible.

Mechanical properties of the weld metal at room temperature

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Hardness untreated HB	Hardness workhardened HB
> 390	> 620	> 35	approx. 200	approx. 400

Weld metal analysis in %

C	Si	Mn	Cr	Ni
0,1	1,0	7,0	19,0	9,0

Welding instruction

Clean welding area to metallic bright, cracks in the tool have to be gouged out completely. Preheating and interpass temperature 150 - 300° C, depending on the size of the workpiece and the base material. Slow cooling

Recommended parameters for submerged arc welding

Wire Ø mm	Welding current A	Welding voltage V	Welding speed cm/min
2,4	300 - 350	28 - 30	35 - 45
3,0	320 - 450	28 - 30	35 - 45
4,0	400 - 500	28 - 30	35 - 45

Availability : SAW rings Ø 2,4, 3,0 and 4,0 mm, available on request
SAW flux, available on request

Standard : DIN 8555 : E 3-UM-55-ST

UTP 73 G 2

Basic coated electrode for wear resistant surfacings on hot and cold working steels

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 electrode has excellent welding properties, a stable and regular flow, good bead appearance and very easy slag removal.

Hardness of the pure weld metal : 55 - 58 HRC
Heat resistant up to 550° C

Weld metal analysis in %

C	Si	Mn	Cr	Mo
0,35	0,5	1,3	7	2,5

Welding instruction

Preheat the workpiece to 400° C. Hold electrode as vertically as possible and with a short arc. Allow the workpiece to cool down slowly. Finishing by grinding. Re-dry electrodes that have got damp for 2h/300° C.

Current type : DC (+) / AC **Welding positions :** PA PB PF PC

Current adjustment :

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

Standard : DIN 8555 : E 3-UM-45-T

UTP 73 G 3

Basic coated electrode for wear resistant surfacings on hot working steels exposed to impact, compression and abrasion

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 electrode has excellent welding properties, a stable and regular flow, good bead appearance and very easy slag removal.

Hardness of the pure weld metal : approx. 45 - 50 HRC
Heat resistant up to 550° C.

Weld metal analysis in %

C	Si	Mn	Cr	Mo
0,3	0,5	0,6	5	4

Welding instruction

Preheat the workpiece to 400° C. Hold 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 electrodes that have got damp for 2h/300° C.

Current type : DC (+) / AC

Welding positions : PA PB PF PC

Current adjustment :

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

Standard : DIN 8555 : E 3-UM-40-PT

UTP 73 G 4

Basic coated electrode for tough, crack resistant surfacings against compression, impact and abrasion on hot working tools

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 electrode has excellent welding properties, a stable and regular flow, good bead appearance and very easy slag removal.

Hardness of the pure weld metal : approx. 38 - 42 HRC
Heat resistant up to 550° C.

Weld metal analysis in %

C	Si	Mn	Cr	Mo
0,15	0,5	0,6	6,5	3,5

Welding instruction

Preheat the workpiece to 400° C. Hold 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 electrodes that have got damp for 2h/300° C.

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

PA PB PF PC

Current adjustment :

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

Standard : DIN 8555: E 3-UM-45-T

UTP 694

Basic coated electrode for wear resistant surfacings on hot working tools

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.

Hardness ot the pure weld metal : approx. 45 HRC

Weld metal analysis in %

C	Si	Mn	Cr	W	V
0,27	0,3	1,7	2,4	4,5	0,6

Welding instruction

Clean welding area carefully and preheat workpiece to 400° C. Hold 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 electrodes that have got damp for 2 h / 300° C.

Current type : DC (+) **Welding positions :** PA PB PF PC

Current adjustment :

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

Approval

ÖBB

Standard : DIN 8555: E 3-UM-55-ST

UTP DUR 550 W

Basic coated electrode for heat resistant surfacings on hot working tools with high tempering resistance

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 instruction

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	W	V	Co
0,35	0,8	0,8	2,2	8,5	0,35	2,2

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 PF PC

Current adjustment :

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

Standard : DIN 8555: E 3-UM-60-ST

UTP 673

Rutile coated electrode for wear resistant surfacings on cold and hot working tools

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 electrode is weldable with very low amperage settings (advantage for edge buildup).

Hardness of the pure weld metal: approx. 58 HRC
Heat resistant up to 550° C

Weld metal analysis in %

C	Si	Mn	Cr	Mo	W	V
0,3	0,8	0,4	5	1,5	1,3	0,3

Welding instruction

Preheat high-alloy tool steels to 400 - 450° C and maintain this temperature during the whole welding process. Hold electrode vertically with a short arc and lowest possible amperage setting. Machining only by grinding. Re-dry electrodes that have got damp for 2h/300° C.

Current type : DC (–) / DC (+) / AC

Welding positions : PA PB

Current adjustment :

Elektroden	Ø mm x L	2,0 x 250*	2,5 x 300	3,2 x 350	4,0 x 400
Stromstärke	A	30 – 50	50 – 70	90 – 120	130 – 160

* available on request

Standard : DIN 8555: E 3-UM-350-T

UTP 702

Basic coated, age-hardenable martensitic 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	Ni	Co	Mo	Fe
0,025	0,2	0,6	20	12	4	Rest

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 PF PC

Current adjustment :

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

Standard : DIN 8555: E 3-UM-350-T

UTP 702 HL

Basic coated, age-hardenable martensitic high efficiency electrode for highly wear resistant hardfacings on cold and hot working tools

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.

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	Ni	Co	Mo
0,03	0,3	0,6	19	11,5	4,5

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

Current adjustment :

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

Standard : DIN 8555: E 3-UM-50-CTZ

UTP 750

Rutile coated 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	Ni	Mo	Co	Fe
0,2	0,5	0,2	11,5	1	4,5	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

Current adjustment :

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

Standards : DIN 8555 : E 4-UM-60-ST
AWS A5.13 : E Fe 5-B (mod.)

UTP 690

Rutile coated high efficiency 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	W	V
0,9	0,8	0,5	4,5	8,0	2,0	1,2

Welding instruction

Clean the welding area and preheat high-speed steel tools to 400 - 600° C, maintain this tempera-ture during the whole welding process, followed by slow cooling. Machining by grinding is possible. Hold electrode vertically and with a short arc. Re-dry electrodes that have got damp for 2h/300° C.

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

PA PB

Current adjustment :

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

Approval

ÖBB

Standard : DIN 8555: E 5-UM-350-RS

UTP 665

High Cr-alloyed special electrode for repairing tool steels and 5- and 12 % Cr-cutting tools, quick repair

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	balance

Welding instruction

Preheat 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 PF PC

Current adjustment :

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

Standard : DIN 8555 : E 6-UM-60-S

UTP 67 S

Basic coated hardfacing electrode for cold working tools, core wire alloyed

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
0,5	3	0,5	9

Welding instruction

Hold 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 electrodes that have got damp for 2h/300° C.

Current type : DC (–) / DC (+) / AC

Welding positions : PA PB PF PC

Current adjustment :

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

* available on request

Standards: DIN EN ISO 14700: E Ni2

UTP 700

Rutile coated 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	Fe	Cr	Mo	W	Ni
0,15	1,0	1,0	5,5	17,0	18,0	4,5	balance

Welding instruction

Clean welding area to metallic bright. Preheating tools to 350 – 400° C, temperature should be maintained. Slow cooling. Hold 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 PF PC

Current adjustment :

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

Standard : DIN 8555: E 23-UM-200-CKTZ

UTP 7000

Rutile basic coated high efficiency electrode on NiCrMoW base for heat resistant hardfacings on hot working tools

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	W	Fe	Co	Ni
0,04	0,3	0,9	16,0	17,0	5,0	5,0	1,5	balance

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 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 Mo. Final layers have to be welded with **UTP 7000**. Re-dry electrodes that have got damp for 2h/300° C.

Current type : DC (+) / AC

Welding positions : PA PB

Current adjustment :

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

Standard : DIN 8555: E 23-UM-250-CKTZ

UTP 7008

Rutile basic coated high efficiency 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 workhardening. Machinable with cutting tools.

Hardness of the pure weld deposit : approx. 260 HB
workhardened approx. 500 HB

Weld metal analysis in %

C	Si	Mn	Fe	Cr	Mo	V	W	Ni
0,04	0,5	1,3	6,0	16,0	16,0	1,0	7,0	balance

Welding instruction

Clean welding area. Preheat tools to 350 - 400° C, temperature should be maintained during the welding process. Slow cooling in oven. Hold 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 electrodes that have got damp for 2 h / 300° C.

Current type : DC (+) / AC **Welding positions :** PA PB

Current adjustment :

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

* available on request

Standard : DIN 8555 : E 23-UM-250-CKPTZ

UTP 5520 Co

Basic coated electrode on NiCrCoMoTiAl base for hardfacings on hot working tools with extreme thermal load, age-hardenable

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	Co	Mo	Ti	Al	W	Ni
0,05	19,0	12,0	6,0	3,0	1,0	1,0	balance

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 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 electrodes that have got damp for 2 h / 300° C.

Current type : DC (+) **Welding positions :** PA PC

Current adjustment :

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

Standards : DIN 8555 : W/MSG 3-GZ-55-ST
Material No. : special alloy

UTP A 73 G 2

Copper coated wire for highly wear resistant build-ups on hot and cold working tools

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. Machinable by grinding or with tungstene carbide tools

Hardness of the pure weld deposit :

untreated	53 - 58 HRC
soft-annealed 820° C	approx. 235 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
0,35	0,3	1,2	7,0	2,0	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.

Recommended parameter for MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,2 1,6	130 - 260 190 - 350	26 - 31 29 - 33

Shielding gas : mixed gases M 1, M 2, M 3 18 - 20 l / min

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4	3,2
Wires	Ø mm	1,0*	1,2	1,6	

* available on request

Standards : DIN 8555 : W/MSG 3-GZ-45-T
Material No. : special alloy

UTP A 73 G 3

Copper coated wire for repair and production of high quality hot working tools

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. 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
0,25	0,5	0,7	5,0	4,0	0,6

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.

Recommended parameters for MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,0	105 - 200	25 - 29
1,2	135 - 260	26 - 31
1,6	190 - 350	29 - 33

Shielding gas : mixed gases M 1, M 2, M 3 18 - 20 l / min

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4	3,2
Wires	Ø mm	1,0	1,2	1,6	

Approval

TÜV

Standard : DIN 8555: W/MSG 3-GZ-40-T

UTP A 73 G 4

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.

Hardness of the pure weld deposit : 38 - 42 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo
0,1	0,4	0,6	6,5	3,3

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.

Recommended parameters for MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,2 1,6	135 - 260 190 - 350	26 - 31 29 - 33

Shielding gas : mixed gases M 1, M 2, M 3 18 - 20 l / min

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4	3,2
Wires	Ø mm	1,0*	1,2	1,6	

* available on request

Approval

TÜV

Standards : DIN 8555 : W/MSG 3-45-T
Material No. : 1.2567

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.

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	W	V
0,3	0,2	0,3	2,4	4,3	0,6

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.

Recommended parameters for MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,0	105 - 200	25 - 29
1,2	135 - 260	26 - 31
1,6	190 - 350	29 - 33

Shielding gases : mixed gases M1, M2, M3 18 - 20 l/min

Availability

Rods	Ø mm x 1000 mm	1,6*	2,0*	2,4*
Wires	Ø mm	1,0*	1,2*	1,6*

* available on request

Standards : DIN 8555 : W/MSG 3-60-T
Material No. : 1.2606

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. Machining is possible with tungstene carbide tools.

Hardness of the pure weld deposit 57 - 60 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	W	V
0,35	1,0	0,4	5,0	1,5	1,3	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. Slow cooling.

Recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2 1,6	135 - 260 190 - 350	26 - 31 28 - 31

Shielding gas : mixed gases M1, M2, M3 18 - 20 l/min

Availability

Rods	Ø mm x 1000 mm	1,6*	2,4*	3,2*
Wires	Ø mm	1,2*	1,6*	

* available on request

Standards : DIN 8555 : W/MSG 3-GZ-350-T
Material No. : 1.6356

UTP A 702

High alloyed, age-hardenable wire for high wear resistant surfacings on cold and hot working tools

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.

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.

Shielding gas : pure Argon for TIG and MIG pulsed arc 18 - 20 l/min

Availability

Rods	Ø mm x 1000 mm	1,6	2,0	2,4
Wires	Ø mm	1,0*	1,2	

* available on request

Standards : DIN 8555 : W/MSG 4-GZ-60-S
AWS A5.13 : R Fe 5-A
Material No : 1.3343

UTP A 696

Wire with properties of high-speed steel

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:

DIN 17007	Material No.
S 9-1-2	1.3316
S 3-3-2	1.3333
S 6-5-3	1.3344
S 2-9-1	1.3346

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.

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	W	V	Fe
1,0	0,2	0,2	4,0	8,5	1,8	2,0	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 electrode is weldable with very low amperage settings and subsequent slow cooling to 100° C in an oven or under asbestos.
After cooling the weld deposit is only machinable by grinding. Machining with tungstene carbide tools is only possible after soft-annealing.

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

Shielding gas: WSG: I 1 Argon 100 %

Availability

Rods	Ø mm x 915 mm	1,6	2,4
Wires	Ø mm	1,2*	1,6*

* available on request

Standards : DIN 8555 : W/MSG 5-GZ-400-RZ
Material No. : 1.4115

UTP A 661

Wire for wear and corrosion resistant surfacings

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.

Shielding gas : MSG: M 21 Argon/CO_2 5 - 25 %

Availability

Rods	Ø mm x 1000 mm	2,4		
Wires	Ø mm	1,0*	1,2	1,6*

* available on request

Approval

TÜV

Standard : DIN 8555 : MSG 23-GZ-250-CKTZ

UTP A 5519 Co

Wire on NiCrCoMoTiAl base for surfacings on hot working tools with extreme thermal load, age-hardenable

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	Co	Mo	Ti	Al	Fe	Ni
0,03	20,0	14,0	4,5	3,0	1,5	< 2,0	balance

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	**:**	MAG pulsed
Shielding gas	:	mixed gases, e. g. Cronigon He 30 S
Availability	:	basket spool Ø 1,2 mm* * available on request

Standard : DIN 8555 : W/MSG 23-GZ-250-CKTZ

UTP A 5520 Co

Wire on NiCrCoMoTiAl base for surfacings on hot working tools with extreme thermal load, age-hardenable

Application field

UTP A 5520 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 highly 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	Co	Mo	Ti	Al	W	Ni
0,05	19,0	12,5	6,3	3,1	2,1	1,0	balance

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 reduce dilution 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 5520 Co. Hammering every layer for the purpose of stress reduction. Grinding in the case of strong oxide formation. Stress-relief annealing at 550° C, if necessary.

Welding procedure	:	MAG pulsed
Shielding gas	:	mixed gases, e. g. Cronigon He 30 S
Availability	:	basket spool Ø 5,5 mm* * available on request

Standard : DIN 8555 : MF 3-GF-55-ST

UTP AF 732

MAG flux cored wire for high wear resistant surfacings on hot and cold working tools

Application field

The metal powder flux cored wire **UTP AF 732** 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. The weld deposit is machinable by tungsten carbide tools and heat resistant up to 550° C.

Hardness of the pure weld deposit

untreated (+ 20° C)	56 HRC
tempered at 550° C / 2 h	58 HRC
soft-annealed 800° C / 4 h	30 HRC

Weld metal analysis in %

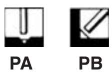
C	Si	Mn	Cr	Mo	Fe
0,35	1,0	1,2	9,0	2,8	balance

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-alloy materials is generally sufficient. Use slightly dragging or pushing welding technique with approx. 20 mm stick out.

Current type : DC (+)

Welding positions :



Shielding gas : mixed gases M 1 and M 2 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2* 1,6*	110 - 180 150 - 250	20 - 31 20 - 30

* available on request

Standard : DIN 8555: MF 3-GF-45-T

UTP AF 733

MAG flux cored wire for production and repair of high quality hot working tools

Application field

The metal powder flux cored wire **UTP AF 733** 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. Machining by hard metal tools, e. g. HSC and washing.

Hardness of the pure weld deposit

untreated	45 - 48 HRC
tempered at 580° C / 6 h	46 HRC

Weld metal analysis in %

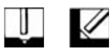
C	Si	Mn	Cr	W	Mo	V	Ti	Fe
0,25	0,5	0,6	5,5	2,5	2,7	0,5	0,10	balance

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 - 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.

Current type : DC (+)

Welding positions :



PA PB

Shielding gas : mixed gases M 1 and M 2 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2* 1,6*	110 - 180 150 - 250	20 - 31 20 - 30

* available on request

Standard : DIN 8555: MF 3-GF-40-T

UTP AF 734

MAG flux cored wire for tough, heat resistant surfacings on hot working tools

Application field

The metal powder flux cored wire **UTP AF 734** 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. 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
0,08	0,4	1,0	2,2	3,7	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.

Current type : DC (+)

Welding positions : PA PB

Shielding gas : mixed gases M 1 and M 2 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	110 - 180	20 - 31
1,6*	150 - 250	20 - 30

* available on request

Standard : DIN 8555: MF 8-GF-55-ST

UTP AF DUR 550 MP

MAG flux cored wire for heat resistant surfacings on hot working tools

Application field

The metal powder flux cored wire **UTP AF DUR 550 MP** 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. **UTP AF DUR 550 MP** is suitable for the production and for the repair of high quality hot working tools.

Hardness of the pure weld deposit

untreated (+ 20° C) 53 - 57 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Co	V	W
0,35	0,7	0,6	2,0	0,5	2,0	0,5	8,5

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.

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

Shielding gas : mixed gases M 1 and M 2 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6*	200 - 350	31 - 35

* available on request

Standard : DIN 8555: MF 3-GF-350-T

UTP AF 702

MAG flux cored wire for heat resistant surfacings, age-hardenable

Application field

The metal powder flux cored wire **UTP AF 702** 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.

Hardness of the pure weld deposit

untreated (+ 20° C) 32 - 35 HRC
after age hardening (4 h / 480° C) 48 - 52 HRC

Weld metal analysis in %

C	Si	Mn	Mo	Ni	Ti	Al	Fe
0,035	0,1	0,1	4,0	17,5	0,4	0,1	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.

Current type : DC (+) **Welding positions :** PA PB

Shielding gas : Argon I 1, mixed gas M12 (MIG/MAG pulsed) 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	110 - 180	20 - 30

* available on request

Standard : DIN 8555: MF 4-GF-60-ST

UTP AF 690

MAG flux cored wire with the properties of high-speed steel

Application field

The metal powder flux cored wire **UTP AF 690** 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.

Hardness of the pure weld deposit

untreated (+ 20° C)	60 HRC
tempered 2 x 550° C / 2 h	63 HRC
soft-annealed 850° C / 2 h	36 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Nb	W	V	Fe
1,2	0,25	0,6	5,0	7,5	2,5	2,2	1,1	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.

Current type : DC (+) **Welding positions :** PA PB

Shielding gas : mixed gases M 1, M 2 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	110 - 180	20 - 30
1,6*	150 - 250	20 - 30

* available on request

Standard : DIN 8555: MF 5-GF-45-CTZ

UTP AF 750

MAG flux cored wire for heat and corrosion resistant surfacings

Application field

The metal powder flux cored wire **UTP AF 750** 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.

Hardness of the pure weld metal

untreated	46 - 50 HRC
soft-annealed 850 - 900° C	approx. 35 HRC
hardened 1100 - 1150° C / air	46 - 50 HRC
tempered 700° C	approx. 40 HRC

Weld metal analysis in %

C	Si	Mn	Cr	Mo	Co	Fe
0,15	0,4	0,25	15,5	2,5	13,5	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.

Current type : DC (+)

Welding positions :


PA


PB

Shielding gas : mixed gases M 1, M 2 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	110 - 180	20 - 30

* available on request

Standard : DIN 8555 : MF 23-GF-200-CKTZ

UTP AF 7000 MP

MAG flux cored wire on NiCrMoW base for heat resistant surfacings on hot working tools

Application field

The metal powder flux cored wire **UTP AF 7000 MP** 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. Good resistance against thermal shock. Easily machinable.

Hardness of the pure weld deposit

untreated	200 HB
workhardened	400 HB

Weld metal analysis in %

C	Si	Mn	Cr	Mo	W	Fe	Ni
0,05	0,3	1,0	16,0	16,0	4,0	7,0	balance

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.

Current type : DC (+) **Welding position :**

PA

Shielding gas : I 1 (Argon), I 3 (Ar + He), M 12 (Ar + CO_2) 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	110 - 180	20 - 30
1,6*	150 - 250	20 - 30

* available on request

Standard : DIN 8555 : MF 23-GF-200-CKTZ

UTP AF 5520 Co

MAG flux cored wire on NiCrCoMoTiAl base for surfacings on hot working tools with extreme thermal loads, age-hardenable

Application field

The metal powder flux cored wire **UTP AF 5520 Co** 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.

Hardness of the pure weld metal

untreated	220 HB
workhardened resp. after being age-hardened	400 HB

Weld metal analysis in %

C	Cr	Co	Mo	Ti	Al	W	Fe	Ni
0,03	18,5	11,5	5,0	2,5	1,5	1,0	2,5	balance

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.

Current type : DC (+) **Welding position :** 

PA

Shielding gas : I 1 (Argon), I 3 (Ar + He), M 12 (Ar + CO_2) 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6* 2,4*	150 - 250 300 - 400	20 - 30 24 - 30

* available on request

Standard : DIN 8555: E 20-UM-250 CKTZ

UTP 7010

Basic coated 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	Fe	Co
0,1	0,5	1,2	21,0	11,0	14,0	2,0	balance

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 electrode vertically and with a short arc. Select lowest possible amperage, in order to reduce dilution with the base metal. Re-dry electrodes that have got damp for 2h/300° C.

Current type : DC (+) **Welding positions :** PA PB

Current adjustment :

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

Approval

TÜV

Standard : DIN 8555 : E 20-UM-300-CKTZ

UTP CELSIT 721

Rutile coated electrode on Cobalt base, core wire alloyed

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. 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	ca. 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 electrode vertically and with a short arc and lowest possible amperage. Re-dry electrodes that have become damp for 2h/300° C

Current type : DC (+) / AC

Welding position : PA

Current adjustment :

Electrodes	Ø mm x L	3,2 x 350	4,0 x 350	5,0 x 400*
Amperage	A	80 – 120	110 – 140	130 – 180

* available on request

Standard :
DIN 8555 : E 20-UM-300-CKTZ

UTP CELSIT 721 HL

Rutile coated high efficiency 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. 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 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 (+) / DC (–) / AC **Welding position :** PA

Current adjustment :

Electrodes	Ø mm x L	2,0 x 300*	2,5 x 350*	3,2 x 450*	4,0 x 450*	5,0 x 450*
Amperage	A	40 – 60	70 – 90	100 – 140	130 – 180	180 – 220

* available on request

Standards : DIN 8555 : E 20-UM-40-CSTZ
AWS A5.13 : E CoCr-A

UTP CELSIT 706

Rutile coated electrode on Cobalt base, core wire alloyed

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. 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 600° C approx. 33 HRC

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 (+) / AC **Welding position :** PA

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

Standards :

DIN 8555 : E 20-UM-40-CSTZ
AWS A5.13 : E CoCr-A

UTP CELSIT 706 HL

Rutile coated 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. 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 310 HV_{15}
at 600° C 270 HV_{15}
at 700° C 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 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 (+) / DC (–) / AC **Welding position :** PA

Current adjustment :

Electrodes	Ø mm x L	2,0 x 300*	2,5 x 350*	3,2 x 450*	4,0 x 450*	5,0 x 450*
Amperage	A	40 – 60	70 – 90	100 – 130	130 – 160	170 – 210

* available on request

Standards : DIN 8555 : E 20-UM-40-CSTZ
AWS A5.13 : E CoCr-A

UTP CELSIT V

Basic coated 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. Machining by grinding or with tungsten carbide cutting tools.

Hardness of the pure weld deposit 40 - 42 HRC
Hardness at 600° C approx. 33 HRC

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 position :** PA

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

Approval

TÜV

UTP CELSIT 712

Standards : DIN 8555 : E 20-UM-50-CSTZ
AWS A5.13 : ~E CoCr-B

Rutile coated 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. 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 600° C approx. 40 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 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 (+) / AC **Welding position :** PA

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

Standards :

DIN 8555 : E 20-UM-50-CSTZ
AWS A5.13 : E CoCr-B

UTP CELSIT 712 HL

Rutile coated high efficiency electrode on Cobalt base

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. 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	370 HV_{15}
	at 600° C	350 HV_{15}
	at 700° C	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 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 (+) / DC (–) / AC

Welding position : PA

Current adjustment :

Electrodes	Ø mm x L	2,0 x 300*	2,5 x 350*	3,2 x 450*	4,0 x 450*	5,0 x 450*
Amperage	A	40 – 60	70 – 90	100 – 130	130 – 160	180 – 220

* available on request

Standards :
DIN 8555 : E 20-UM-55-CSTZ
AWS A5.13 : ~E CoCr-C

UTP CELSIT 701

Rutile coated electrode on Cobalt base, core wire alloyed

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. 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 electrode vertically with a short arc and lowest possible amperage. Re-dry electrodes that have become damp for 2h/300° C.

Current type : DC (+) / AC **Welding instruction :** PA

Current adjustment :

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

Standard :
DIN 8555 : E 20-UM-55-CSTZ

UTP CELSIT 701 HL

Rutile coated high efficiency electrode on Cobalt base

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. 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	450 HV_{15}
	at 600° C	400 HV_{15}
	at 700° C	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 electrode vertically with a short arc and lowest possible amperage. Re-dry electrodes that have become damp for 2 h / 300° C.

Current type : DC (+) / DC (–) / AC **Welding position :** PA

Current adjustment :

Electrodes	Ø mm x L	2,0 x 200*	2,5 x 350*	3,2 x 450*	4,0 x 450*	5,0 x 450*
Amperage	A	40 – 60	70 – 90	100 – 130	130 – 160	180 – 220

* available on request

Standard : DIN 8555 : E 20-UM-55-CGTZ

UTP CELSIT 755

Basic coated high efficiency electrode on Cobalt base against extreme heat wear

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.

The overeutectic Cobalt hardalloy has a high content of primary carbides (65 %) in an austenitic structure, 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	55 HRC
at 500° C	390 HV_{15}
at 600° C	290 HV_{15}
at 700° C	190 HV_{15}

Weld metal analysis in %

C	Si	Mn	Cr	Nb	Ti	Fe	Co
5,5	1,4	1,4	25	6,5	1,5	6	balance

Welding instruction

Clean welding area. Preheating is generally not required. Hold electrode vertically with a short arc and lowest possible amperage. Re-dry 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

Current adjustment :

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

Standard : DIN 8555 : E 20-UM-60-CGTZ

UTP CELSIT 760

Basic coated electrode on Cobalt base for heat resistant claddings

Application field

UTP CELSIT 760 is suitable for high wear resistant claddings on constructional parts subject to combination of abrasion, erosion and corrosion at elevated temperatures up to 1000° C, such as sintering crushers, high temperature mixers and conveyor screws.

The cobalt alloy with high content of the alloying elements of chromium and tungsten has a very high content of wear resistant carbides, increasing the risk of stress-cracking in the weld metal.. Very good oxidation resistance.

Welding properties

UTP CELSIT 760 has good welding properties and a good bead appearance. Positional welding is possible to a limited extent.

Hardness of the pure weld deposit		60 HRC
elevated temperature hardness	at 500° C	45 HRC
	at 600° C	43 HRC
	at 700° C	40 HRC

Weld metal analysis in %

C	Cr	W	Fe	Co
2,3	36	20	2,5	balance

Welding instruction

Clean welding area. Preheating on austenitic and ferritic materials is generally not required, unless stress crackings are acceptable. Otherwise preheating temperature of 500 – 600° C and very slow cooling. Hold electrode vertically 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 PF PC

Current adjustment :

Electrodes	Ø mm x L	3,2 x 350*	4,0 x 350*
Amperage	A	70 – 110	90 – 130

* available on request

Standard :
DIN 8555 : G/WSG 20-G0-300-CKTZ

UTP A CELSIT 721

CoCrMo alloyed rod for TIG and gas welding

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, working parts on turbines and power plants, hot working tools with frequent changes of high thermal load. Excellent gliding characteristics, very good polishability, high toughness, nonmagnetic.

Hardness of the pure weld deposit:	30 - 32 HRC
workhardened	approx. 45 HRC
elevated temperature hardness at 600° C	approx. 240 HB

Weld metal 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.

Current type : **DC (–)**

Shielding gas : I 1 (Argon)
For oxy-acetylene welding use acetylene excess (reducing flame)

Availability and recommended parameters for TIG welding

Rods	Ø mm x L	3,2 x 1000	4,0 x 1000*	5,0 x 1000*
Amperage	A	70 – 110	100 – 130	130 – 170

* available on request

UTP A CELSIT 706 V

CoCrW alloyed rod for TIG and gas welding

Standards :

DIN 8555	:	G/WSG 20-G0-40-CSTZ
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. 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
elevated temperature hardness at 600° C	approx. 33 HRC

Weld metal 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.

Current type : **DC (–)**

Shielding gas : I 1 (Argon)
for oxy-acetylene welding use acetylene excess (reducing flame)

Availability and recommended parameters for TIG welding

Rods	Ø mm x L	3,2 x 1000	4,0 x 1000*	5,0 x 1000*
Amperage	A	70 – 110	100 – 130	130 – 170

* available on request

Approval

TÜV according to KTA 1408.1/8041.00

UTP A CELSIT 712 SN

CoCrW-alloyed welding wire for TIG- and gas welding

Standards :
DIN 8555 : G/WSG 20-G0-50-CSTZ
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. Excellent gliding characteristics, good polishability, slightly magnetic. Machinable by grinding and with tungsten carbide tools.

Hardness of the pure weld deposit: 48 - 50 HRC
elevated temperature hardness at 600° C approx. 40 HRC

Weld metal 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.

Current type : **DC (–)**

Shielding gas : I 1 (Argon)
for oxy-acetylene welding use acetylene excess (reducing flame)

Availability and recommended parameters for TIG welding

Rods	Ø mm x L	3,2 x 1000	4,0 x 1000*	5,0 x 1000*
Amperage	A	70 – 110	100 – 130	120 – 170

* available on request

Standards :
DIN 8555 : G/WSG 20-G0-55-CSTZ
AWS A5.13 : ~R CoCr-B

UTP A CELSIT 701 N

CoCrW-alloyed rod for TIG and gas welding

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. Excellent gliding characteristics, good polishability, slightly magnetic. Machinable by grinding and with tungsten carbide tools.

Hardness of the pure weld deposit:	54 - 56 HRC
elevated temperature hardness at 600° C	approx. 42 HRC
elevated temperature 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.

Current type : DC (–)

Shielding gas : I 1 (Argon)
for oxy-acetylene welding use acetylene excess (reducing flame)

Availability and recommended parameters for TIG welding

Rods	Ø mm x L	3,2 x 1000*	4,0 x 1000*	5,0 x 1000*
Amperage	A	70 – 110	100 – 130	130 – 170

* available on request

Standard : DIN 8555 : MF 20-GF-300-CKTZ

UTP AF CELSIT 721

CoCrMo-alloyed MIG flux cored wire for wear, corrosion and heat resistant build-ups.

Application field

The metal powder cored wire **UTP AF CELSIT 721** is used for crack resistant buildups on structural parts subject to a combination of compression, impact, 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 on turbine and power units, hot working tools with high alternating thermal load. Excellent gliding properties, polishable and tough, non-magnetic.

Hardness of the pure weld deposit:	30 - 35 HRC
after workhardening	approx. 45 HRC
elevated temperature hardness at 600° C	approx. 240 HB

Approximate analysis of the weld deposit in %

C	Cr	Mo	Ni	Co
0,25	28,0	5,5	2,8	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.

Current type : DC (+) **Welding position :** PA

Shielding gases : I 1, I 3, M 12 18 - 20 l / min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	120 - 250	22 - 32
1,6	150 - 350	23 - 35

* available on request

Standard : DIN 8555 : MF 20-GF-40-CSTZ

UTP AF CELSIT 706

CoCrW-alloyed MIG flux cored wire for wear, corrosion and heat resistant hard-facing.

Application field

The metal powder wire **UTP AF CELSIT 706** 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. Excellent gliding characteristics, good polishability, high toughness, nonmagnetic. Machinable by grinding or with tungsten carbide tools.

Hardness of the pure weld deposit: 38 - 40 HRC
elevated temperature hardness at 600° C approx. 32 HRC

Approximate analysis of the weld deposit in %

C	Cr	W	Co
0,8	26,5	4,7	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.

Current type : DC (+) **Welding position :**  PA

Shielding gases : I 1, I 3, M 1 18 - 20 l / min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2* 1,6	120 - 250 150 - 350	22 - 32 23 - 35

* available on request

Standard : DIN 8555 : MF 20-GF-50-CSTZ

UTP AF CELSIT 712

CoCrW-alloyed MIG flux cored wire for wear, abrasion, corrosion and heat resistant hardfacing.

Application field

The metal powder cored wire **UTP AF CELSIT 712** 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. Machinable by grinding or with tungsten carbide tools.

Hardness of the pure weld deposit: 48 - 50 HRC

Approximate analysis of the weld deposit in %

C	Cr	W	Co
1,6	29,0	8,5	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.

Current type : DC (+) **Welding position :** PA

Shielding gases : I 1, I 3, M 12 18 - 20 l / min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	120 - 250	22 - 32
1,6*	150 - 350	23 - 35

* available on request

Standard : DIN 8555 : MF 20-GF-55-CSTZ

UTP AF CELSIT 701

CoCrW-alloyed MIG flux cored wire for wear corrosion and heat resistant hard-facing

Application field

The metal powder cored wire UTP AF CELSIT 701 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. Excellent gliding characteristics, good polishability, slightly magnetic. Machinable by grinding or with tungsten carbide tools.

Hardness of the pure weld deposit: 54 - 56 HRC
elevated temperature hardness at 600° C approx. 42 HRC
elevated temperature hardness at 800° C approx. 34 HRC

Approximate analysis of the weld deposit in %

C	Cr	W	Co
2,3	32,0	13,0	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.

Current type : DC (+)

Shielding gases : I 1, I 3, M 12 18 - 20 l / min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,2*	120 - 250	22 - 32
1,6*	150 - 350	23 - 35

* available on request

Standard : DIN 8555 : MF 20-GF-60-CGTZ

UTP AF CELSIT 760

CoCrW-alloyed MIG flux cored wire for heat resistant claddings

Application field

The cobalt based flux cored wire **UTP AF CELSIT 760** is suitable for high wear resistant claddings on constructional parts subject to a combination of abrasion, erosion and corrosion at elevated temperatures (600 - 1000° C), such as high temperature mixers, sintering crushers and conveyor screws. The cobalt alloy with high content of the alloying elements of chromium and tungsten has a very high content of wear resistant carbides. Due to this, stress cracks in the weld metal can be arised. Very good oxidation resistance.

Hardness of the pure weld deposit	**56 HRC**
elevated temperature hardness at 400° C	47 HRC
500° C	45 HRC
600° C	42 HRC
700° C	38 HRC

Approximate analysis of the weld deposit in %

C	Cr	W	Fe	Co
2,8	26,5	11,5	2,7	balance

Welding instruction

Clean welding area. Preheating on austenitic and ferritic materials is generally not required, unless stress crackings are acceptable. Otherwise preheating temperature > 600° C and very slow cooling. Welding with pushing technique, if possible with pulsed arc and approx. 20 mm wire stickout.

Current type : DC (+) **Welding position :**

PA

Shielding gases : I 1 (Argon), M 12 (Ar + CO_2) 18 - 20 l/min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V
1,6*	200 - 250	28 - 30

* available on request

If it can be welded – we know how.

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)

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UTP 63

Standards : Material No. : 1.4370
EN 1600 : E 18 8 Mn R 32
DIN 8555 : E 8-UM-200-KRZ
EN 14700 : E 1.10

Rutile coated, fully austenitic CrNiMn-stick electrode. Universally applicable

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 characteristics 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.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule	Hardness HB
> 350	> 600	> 40	> 60	appr. 200 untreated appr. 350 workhardening

Approximate 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 electrode vertically with a short arc. Re-dry electrodes that have got damp for 2 h / 250 - 300° C.

Current type : DC (+) / AC **Welding positions :** PA PB PC PE PF

Current adjustment :

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

Standards : Material No. : 1.4370
EN 1600 : E 18 8 Mn R 53
DIN 8555 : E 8-UM-200-KRZ
EN 14700 : E 1.10

UTP 630

Synthetic rutile coated CrNiMn-stick electrode. Universally applicable.

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.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule	Hardness HB
> 350	> 600	> 40	> 60	appr. 200 untreated appr. 350 workhardened

Approximate 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 electrode vertically with a short arc. Re-dry electrodes that have got damp for 2 h / 250 - 300° C.

Current type : DC (+) / AC **Welding positions :** PA PB

Current adjustment :

Electrodes	Ø mm x L	2,5 x 250	3,2 x 350	4,0 x 400	5,0 x 450
Amperage	A	80 – 100	100 – 130	130 – 180	150 – 200

UTP 6302

Standards :

Material No.	:	~1.4370
EN 1600	:	E 18 8 Mn R 32
DIN 8555	:	E 8-UM-200-KRZ
EN 14700	:	E 1.10

Rutile coated CrNiMn-stick electrode. Universally applicable.

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.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule	Hardness HB
> 390	> 580	> 35	> 70	approx. 200

Approximate 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 electrode vertically with a short arc. Re-dry electrodes that have got damp for 2 – 3 h / 250 – 300° C.

Current type : DC (+) / AC

Welding positions : PA PB PC PE PF

Current adjustment :

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

Standards : Material No. : ~1.4337
EN 1600 : ~E 29 9 R 32
DIN 8555 : ~E 9-UM-250-KR
EN 14700 : E 1.11

UTP 65

Rutile coated austenitic-ferritic-special electrode with optimal welding and mechanical properties

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 characteristics 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.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Hardness HB
620	800	22	approx. 240

Approximate 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 electrode as vertically as possible. Re-dry electrodes that have got damp for 2 h / 120 – 200° C.

Current type : DC (+) / AC **Welding positions :** PA PB PC PE PF

Current adjustment :

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
Amperage	A	35 – 50	45 – 65	60 – 80	80 – 130	110 – 150
Electrodes	Ø mm x L	5,0 x 350				
Amperage	A	120 – 200				

* available on request

Approval : DB

Standards : Material No. : 1.4337
EN 1600 : ~E 29 9 R 12
DIN 8555 : ~E 9-UM-250-KR
EN 14700 : E 1.11

UTP 65 D

Rutile coated austenitic-ferritic special electrode with high mechanical properties for joinings and surfacings

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.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Hardness HB
> 640	> 800	> 20	appr. 260

Approximate 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 electrode vertical and weld with a short arc, use stringer beads or slight weaving, as applicable. Re-dry electrodes that have got damp for 2 h / 120 – 200° C.

Current type : DC (+) / AC **Welding positions :** PA PB PC PE PF

Current adjustment :

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
Amperage	A	35 – 45	45 – 60	55 – 75	75 – 115	100 – 145
Electrodes	Ø mm x L	5,0 x 350				
Amperage	A	120 – 195				

* available on request

Standards : Material No. : ~1.4337
EN 1600 : E 29 9 R 73
DIN 8555 : E 9-UM-250-KR
EN 14700 : E 1.11

UTP 651

Synthetic austenitic-ferritic electrode for joining and surfacing on hardly weldable steels.
160 % recovery.

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.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule	Hardness HB
> 600	> 750	> 20	> 60	approx. 240

Approximate weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
0,05	0,9	0,6	29,0	9,0	1,0	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 electrodes that have got damp for 2 h / 250 – 300° C.

Current type : DC (+) / AC **Welding positions :** PA PB

Current adjustment :

Electrodes	Ø mm x L	1,5 x 250*	2,0 x 300*	2,5 x 350	3,2 x 350
Amperage	A	30 – 60	50 – 70	70 – 100	100 – 140

* available on request

Standards : Material No. : ~1.4459
EN 1600 : ~E 23 12 2 LR 32
DIN 8555 : E 9-UM-250-CKZ
EN 14700 : E 1.11

UTP 653

Rutile coated austenitic special electrode with high mechanical values and excellent welding properties

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.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule	Hardness HB
> 500	> 700	> 25	> 60	appr. 240 (untreated) appr. 350 (workhardened)

Weld metal analysis in %

C	Si	Mn	Cr	Ni	Mo	Fe
0,12	0,8	1,0	24,0	13,0	3,5	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 electrode. Hammering of the welding joint increases the tensile strength of the weld metal. Re-dry electrodes that have got damp for 2 h / 120 – 200° C.

Current type : DC (+) / AC **Welding positions :** PA PB PC PE PF

Current adjustment :

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

* available on request

Approval : DB

Standards :

Material No.	:	2.4648
DIN 1736	:	EL-NiCr19Nb
DIN EN ISO 14172	:	E Ni 6082 (NiCr20Mn3Nb)
AWS A5.11	:	E NiCrFe-3 (mod.)

UTP 68 HH

Basic coated, fully austenitic NiCr-stick electrode, universally applicable.

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!

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule	Hardness HB
> 390	> 620	> 35	> 80	approx. 180

Weld metal analysis in %

C	Si	Mn	Cr	Fe	Nb	Ni
0,03	0,4	5,0	19,0	3,0	2,0	balance

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 electrodes. Re-drying for 2 – 3 h / 250 – 300° C.

Current type : DC (+)

Welding positions :

PA PB PC PE PF

Current adjustment :

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	35 – 45	40 – 65	70 – 100	100 – 120	130 – 150

* available on request

Approvals :

TÜV, TÜV Vienna

UTP 6218 Mo

Rutile-basic coated NiCrMo high performance electrode

Standards :

Material No.	:	~2.4621
DIN 1736	:	~EL-NiCr20Mo9Nb (mod.)
DIN EN ISO 14172	:	~E Ni 6625 ~(NiCr22Mo9Nb)
EN 14700	:	E 2.2

Application field

The nickel base special 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.

Mechanical properties of the weld metal

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Hardness HB
> 420	> 680	> 35	approx. 240 untreated approx. 450 workhardened

Weld metal analysis in %

C	Si	Mn	Fe	Cr	Mo	Nb	Ni
0,03	0,6	0,6	3,0	17,0	7,0	2,5	balance

Welding instruction

Clean welding area carefully. Use only dry electrodes. Re-drying for 2 - 3 h / 250 - 300° C. Guide electrode steeply with a short arc and little weaving. Opening angle of 70 - 80°.

Current type : DC (+) / AC

Welding positions : PA PB

Current adjustment :

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 electrode. 150 % recovery

Standards :

Material No.	:	~2.4807
DIN 1736	:	EL-NiCr15FeMn (mod.)
DIN 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.

Mechanical properties of the weld metal in %

Yield strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A %	Impact strength K_v Joule	Hardness HB
> 380	> 620	> 30	> 80	approx. 180 untreated approx. 350 workhardened

Weld metal analysis in %

C	Si	Mn	Fe	Cr	Mo	Nb	Ni
0,08	0,6	4,0	5,0	17,0	1,5	2,0	balance

Welding instruction

Clean the weld area thoroughly to join pore and crack-free. Opening angle of seam 70 - 80°. Weld electrode with slight tilt and with a short arc. In order to keep the heat input low, the 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 electrodes must be redried for 2 - 3 hours at 250 - 300° C and then welded out of a warm electrode carrier.

Current type : DC (+) **Welding positions :** PA PB

Current adjustment :

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 electrode for metallic materials

Application field

The strongly coated chamfering 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 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 : DC (–) / AC

Current adjustment :

Electrodes	Ø mm x L	2,5 x 350*	3,2 x 350	4,0 x 400
Amperage	A	150 – 250	200 – 300	250 – 400

* available on request

UTP 82 Ko

Carbon 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 (+)

Current adjustment :

Electrodes	Ø mm x L	6,5 x 305	8,0 x 305	9,5 x 305
Amperage	A	250 – 350	350 – 500	500 – 650

UTP rods and wires for gas shielded-arc welding. Special alloys

UTP designation Material No. EN 12 072 AWS A5.9	Approx wire analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A_5 Hardness	Application field Parent metals Shielding gas EN 439	Supply TIG 1000 lg Ø mm	Supply MIG/MAG Ø mm	Appro- val
UTP A 63 1.4370 W/G 18 8 Mn ER 307 (mod.)	C 0,08 Si 0,8 Cr 19,5 Ni 9,0 Mn 6,5	> 370 MPa > 600 MPa > 40 % approx. 200 HB	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. Scale resistant up to 850° C, cold-tough to -110° C. Workhardening. Shielding gases: TSG: I 1 Argon 100 % MSG: mixed gases M13, M12	1,0* 1,6 2,0 2,4 3,2*	0,8* 1,0 1,2 1,6*	TÜV DB
UTP A 651 1.4337 W/G 29 9 –	C 0,10 Si 0,4 Mn 1,6 Cr 30 Ni 9	> 650 MPa > 750 MPa > 25 % approx. 240 HB	Joining and surfacing of steels of difficult weldability, repair of hot and cold working steels, cushioning layers. Scale resistant up to 1150° C. Crack and wear resistant, stainless, creep resistant and workhardening. Shielding gases: TSG: I 1 Argon 100 % MSG: mixed gases M13, M12	1,2* 1,6 2,0 2,4 3,2*	0,8* 1,0* 1,2* 1,6*	–

* available on request

If it can be welded – we know how.

Group 4

Welding consumables for cast iron materials

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  - stick electrodes
  - solid rods and wires
  - flux cored wires

Group 4

Welding consumables for cast iron materials

Group 4

Welding consumables for cast iron materials

Electrodes for cast iron materials

Solid rods and wires for cast iron materials

Flux cored wire for cast iron materials

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

<u>Hot welding</u>

Hot welding is being done with 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 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 electrode UTP 82 AS, by grinding or by chiselling. The gouging 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 : DIN 8573 : E Ni-BG 22
ISO 1701 : E Ni
AWS A5.15 : E Ni-CI

UTP 8

Graphite-basic coated 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	Fe	Ni
1,2	0,5	balance

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 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 electrode diameter. Remove 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 :**

PA PB PF PC PE

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350
Amperage	A	60 – 80	80 – 100	110 – 140

Approvals

DB No. 62.138.01, ÖBB

UTP 8 C

Cast iron cold-welding electrode with graphite lime-type coating and pure nickel core wire

Standards : DIN 8573 : E Ni-BG 2 2
ISO 1071 : E Ni
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	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB
approx. 220	approx. 460	approx. 25	approx. 180

Weld metal analysis in %

C	Fe	Ni
0,9	1,5	balance

Welding instructions

Remove casting skin in weld area and clean welding spot. The surface has to be examined for cracks and defects. Weld electrode with short arc and steep 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 PF PC PE

Current adjustment :

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

Standards : DIN 8573 : E NiCu-BG 1 2
ISO 1071 : E NiCu-2
AWS A5.15 : ~E NiCu-B

UTP 8 Ko

Graphite-basic coated 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 electrode is also suitable for out of position welding.

Hardness of the pure weld deposit

approx. 160 HB

Weld metal analysis in %

C	Fe	Cu	Ni
0,8	1,0	30,0	balance

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 PF PC

Current adjustment :

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 : DIN 8573 : E Ni-BG 1 2
ISO 1071 : E Ni
AWS A5.15 : E Ni-CI

UTP 8 NC

Cast iron cold-welding 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 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	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB
approx. 220	approx. 490	approx. 30	approx. 180

Weld metal analysis in %

C	Fe	Ni
1,0	1,0	balance

Welding instruction

Remove outer casting skin and clean weld area. Weld 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 :** PA PB PF PC PE

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 350*
Amperage	A	60 – 80	80 – 110	110 – 140

* available on request

Standards : DIN 8573 : E Ni-BG 2 2
ISO 1071 : E Ni
AWS A5.15 : E Ni-CI

UTP 88 H

Graphite-basic coated 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	Fe	Cu	Ni
0,8	0,7	2,0	2,0	balance

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 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 electrode immediately and peen the weld deposit carefully.

Current type : DC (–) / AC **Welding positions :** PA PB

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300*	3,2 x 350*	4,0 x 350*
Amperage	A	60 – 80	90 – 110	110 – 130

* available on request

Standards : DIN 8573 : E Ni-BG 2 2
ISO 1071 : E Ni
AWS A5.15 : E Ni-CI

UTP 888

Graphite-basic pure nickel electrode with high recovery

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	Fe	Ni
0,8	0,5	balance

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 PF PC PE

Current adjustment :

Electrodes	Ø mm x L	2,5 x 300	3,2 x 350	4,0 x 350*
Amperage	A	60 – 80	80 – 110	110 – 130

* available on request

Standards : DIN 8573 : E NiFe-1 BG 23
ISO 1071 : E NiFe
AWS A5.15 : E NiFe-CI

UTP 83 FN

Graphite-basic coated ferro-nickel 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 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 spatterfree deposit of perfect appearance. The weld deposit is easily machinable with cutting tools, tough and crack-resistant.

Hardness of the 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 amperage 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

Current adjustment :

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

Approval

ÖBB

Standards : DIN 8573 : E Ni-BG 2 2 (mod.)
ISO 1071 : E Ni
AWS A5.15 : E Ni-CI (mod.)

UTP 84 FN

Graphite-basic coated ferro-nickel-electrode with high deposition rate

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 electrode **UTP 84 FN** has a good deposit efficiency and a spatter free weld behaviour. The soft, pulsing arc leads to a good electrode pickup also regarding aged cast iron with a high crack resistance.

Hardness of the weld metal

approx. 180 HB

Weld metal analysis in %

C	Fe	Cu	Ni
1,1	8,0	0,5	balance

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

Current adjustment :

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

Standards : DIN 8573 : E NiFe-1 BG 2 3
ISO 1071 : E NiFe
AWS A5.15 : E NiFe-CI

UTP 85 FN

Graphite-basic coated ferro-nickel electrode with high depositon rate

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 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

Current adjustment :

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

UTP 86 FN

Standards : DIN 8573 : E NiFe-1 BG 12
ISO 1071 : E NiFe
AWS A5.15 : E NiFe-Cl

Graphite-basic coated ferro-nickel 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 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_e MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB
> 340	> 500	> 18	approx. 220

Weld metal analysis in %

C	Fe	Ni
1,2	45,0	balance

Welding instruction
UTP 86 FN is preferably welded on DC (negative polarity) or on AC. When welding on DC (neg. po-larity), a deep penetration is reached (advantage for fillet welds). Positional weldings are easier with AC. Prior to welding, remove the casting skin. Hold electrode vertically and with short arc. When welding crack-suscepible cast iron grades, the deposit may be peened for the purpose of stress relief.

Current type : DC (–) / AC **Welding positions :**

PA PB PF PC PE

Current adjustment :

Electrodes	Ø mm x L	2,5 x 350	3,2 x 350	4,0 x 350
Amperage	A	65 – 80	90 – 110	100 – 130

Approval
DB AG, No. 62.138.05

Standards : DIN 8573 : E NiFe-1 BG 23
ISO 1071 : E NiFe
AWS A5.15 : E NiFe-CI

UTP GNX-HD

Graphite-basic coated ferro-nickel 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_e MPa	Tensile strength R_m MPa	Elongation A_5 %	Hardness HB
> 340	> 500	> 18	approx. 220

Weld metal analysis in %

C	Ni	Fe
1,1	55,0	balance

Welding instruction

Remove outer casting skin in welding area. Apply steep 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 PF PC

Current adjustment :

Electrodes	Ø mm x L	2,5 x 250*	3,2 x 350	4,0 x 350*
Amperage	A	60 – 90	90 – 120	110 – 150

* available on request

Standards : DIN 8573 : E Fe-1
ISO 1071 : E Fe
AWS A5.15 : ~E St

UTP 81

Ferro-based 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 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 electrode UTP 82 AS to prepare the weld spot. Use a steep 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 PF PC

Current adjustment :

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

Standard : DIN 8573 : E Fe-2

UTP 807

Special 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 electrode guidance without weaving. Good weld overlapping to avoid heat accumulation (maximum 60° C).

Current type : DC (+)

Welding positions : PA PB PF PC PE

Current adjustment :

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

Standards : DIN 8573 : E FeC-G-BG 40
AWS A5.15 : E CI-B

UTP 5 D

Graphite-basic coated 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

Tensile strength $R_{p0,2}$ MPa	Hardness HB
350 – 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 position :** PA

Current adjustment :

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

Standard : DIN 8573 : MSG NiFe-2

UTP A 8051 Ti

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. 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 %	Impact strength K_v Joule
> 300	> 500	> 25	approx. 200

Weld metal analysis in %

C	Mn	Ni	Fe	Ti
0,1	3,5	55,0	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.

Recommended parameters for MIG/MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,2	140 – 180	25 – 30

Shielding gas: Argon, mixed gas M 12 (Argon + 2,5 % CO_2) 18 - 20 l / min

Availability

TIG rods	Ø mm x 1000 mm	1,6*	2,4*	
MIG wire	Ø mm	0,8*	1,0*	1,2

* available on request

Standards : DIN 8573 : MSG NiFe-1
Material No. : 2.4560

UTP A 8058

Ferro-nickel MIG/MAG wire for joining and surfacing on nodular cast iron

Application field

UTP A 8058 is particularly suited for joining and surfacing on nodular cast iron as GGG 40 – GGG 70 and for mixed joints with unalloyed and low alloyed steel. The weld metal 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	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.

Shielding gas: Argon, mixed gas M 12 (Argon + 2,5 % CO_2) 18 – 20 l / min

Recommended parameters for MAG welding

Wire Ø mm	Welding current A	Welding voltage V
1,2	140 – 180	25 – 30

other sizes on request

Standards : DIN 8573 : G FeC-1-G0
ISO 1701 : FeC-1
AWS A5.15 : R-CI

UTP 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.

Hardness of the pure weld metal: approx. 200 HB

Weld metal analysis in %

C	Si	Mn
3,2	3,5	0,6

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.

Flux : UTP Flux 5 (powder form, do not mix with water)

Availability: cast bare rods in Ø 4, 6, 8, 10 x 500 mm on request

Standard : DIN 8573 : MF NiFe-1-S

UTP AF 8051 Mn

Ferro-nickel flux cored wire for MAG-welding on cast iron materials

Application field

The MAG flux-cored wire **UTP AF 8051 Mn** 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.

Mechanical properties of the weld metal

Yield strength R_e MPa	Tensile strength R_m MPa	Elongation A_5 %
320	600	25

Weld metal analysis in %

C	Si	Mn	Fe	Ni
0,3	0,2	10,0	45	balance

Welding instruction

Welding area has to be machined to a metallic bright. Preheating of solid cast iron parts to 150 – 250°C.

Shielding gases EN 439 : Ar (I 1) Ar + O_2 (M12) Ar + CO_2 (M21) 12 – 15 l / min

Availability and recommended parameters

Wire Ø mm	Welding current A	Welding voltage V	Stick out mm
1,2*	110 – 180	20 – 30	20 max.
1,6*	150 – 250	20 – 30	20 max.

* available on request

Group 5

Welding consumables for copper and copper alloys

Index

- **Welding consumables for copper and copper alloys**
  - stick electrodes
  - solid rods and wires

Group 5

Welding consumables for copper and copper alloys

Group 5

Welding consumables for copper and copper alloys

Stick electrodes for welding copper and copper alloys

Solid rods and wires for welding copper and copper alloys

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 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 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 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

If it can be welded – we know how.

UTP 39

Basic coated pure copper electrode

Standards : Material No. : 2.1363
DIN 1733 : EL-CuMn2
AWS A5.6 : ~ECu

Application field

The pure copper electrode **UTP 39** is suitable for joining and surfacing all commercial pure copper grades according to DIN 1787 such as

	Material No.
OF-Cu	2.0040
SE-Cu	2.0070
SW-Cu	2.0076
SF-Cu	2.0090

Welding characteristics and special 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 $\frac{S \cdot m}{mm^2}$	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 thick-ness, and keep temperature during welding. Keep the arc short with steep (vertical up) electrode guidance. Choose the biggest possible diameter of the electrode . Apply only dry electrodes. Rebaking for 2 – 3 h at 150° C.

Current type : DC (+) **Welding positions :** PA PB

Current adjustment :

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

Approval : DB

Standards : Material No. : 2.1027
DIN 1733 : EL-CuSn13
AWS A5.6 : –

UTP 320

Basic coated bronze electrode with 13 % 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:

DIN 1705 and 17662	**Material No.**
G-CuSn 8	2.1030
G-CuSn 5 ZnPb	2.1096.01
G-CuSn 7 ZnPb	2.1090.01
G-CuSn 10 Zn	2.1086.01

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	13

Welding instruction

Clean welding area thoroughly. Ignite electrode inclined with scratch start. For wall thickness of > 8 mm a preheating of 100 – 250° C is neccessary. Hold electrode vertically and weave slightly. Use only dry electrodes. Re-drying 2 – 3h at 150° C.

Current type : DC (+) **Welding positions :** PA PB

Current adjustment :

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

Standards : Material No. : 2.1368
DIN 1733 : EL-CuMn14Al
AWS A5.6 : E CuMnNiAl

UTP 34 N

Basic coated complex aluminium-bronze electrode with 13 % Mn

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 cracking.

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. 400	approx. 650	> 20	approx. 220	approx. 3	940 - 980

Weld metal analysis in %

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

Welding instruction

Clean the weld zone thoroughly. Bigger workpieces are preheated to about 150 - 250° C, guide the electrode vertically and weave slightly. Use only dry electrodes. Re-drying 2 – 3 h at 150° C.

Current type : DC (+) **Welding positions :** PA PB

Current adjustment :

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

Approval : DB

Standards : Material No. : 2.0837
DIN 1733 : EL-CuNi30Mn
AWS A5.6 : E CuNi

UTP 387

Basic coated copper-nickel electrode 70/30

Application field

The cupro-nickel base electrode **UTP 387** is used for joining and surfacing alloys of similar compositions with up to 30 % nickel, as well as non-ferrous alloys and steels of different nature. The seawater-resistant weld metal enables this special 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	Fe	Cu
0,03	0,3	1,2	30	0,6	balance

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 degreased. Fuse the arc strike point again by bringing the electrode back, in order to obtain a good bond. Keep the arc short.

Current type : DC (+)

Welding positions :

PA PB PF PC PE

Current adjustment :

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, GL, C

UTP stick electrodes for welding copper and copper alloys

UTP desigation Material No. DIN EN 14640 AWS A5.7	Weld metal analysis %		Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A_5 Hardness El. conductivity Melting range	Application field Base metals	Supply Electrodes Ø x length mm Current type	Amperage A Welding positions	Appro-vals
UTP 32 2.1025 EL–CuSn7 ECuSn-C	Sn Cu	7 93	– approx. 300 MPa > 30 % approx. 100 HB approx. 7 S · m/mm² 910 – 1040° C	Basic-coated tin-bronze 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.	2,5 x 350* 3,2 x 350 4,0 x 450 = +	60 – 80 80 – 100 100 – 120 PA, PB	–
UTP 34 2.0926 EL–CuAl9 E CuAl-A2	Al Fe Si Cu	8,0 1,0 < 0,7 bal.	– approx. 450 MPa > 20 % approx. 130 HB – 1030 – 1040° C	Basic coated aluminium-bronze 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 iron materials and steel.	2,5 x 350* 3,2 x 350* 4,0 x 350* = +	80 – 100 100 – 120 120 – 140 PA, PB	–
UTP 3422 2.0930 EL–CuAl9Ni2Fe –	Si Mn Ni Fe Al Cu	0,6 1,6 2,7 1,7 8,3 bal.	400 MPa 650 MPa 8 % approx. 180 HB – 1030 – 1050° C	Basic coated multi-alloyed aluminium-bronze 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.	2,5 x 350* 3,2 x 350* 4,0 x 350* = +	75 – 90 90 – 110 120 – 140 PA, PB	–

* available on request

UTP stick electrodes for welding copper and copper alloys

UTP designation Material No. DIN 1733 / 8555 AWS A5.6	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A_5 Hardness	Application field Base metals	Supply Electrodes Ø x length mm Current type	Amperage A Welding positions	Appro-val
UTP 343 – E 31-UM-300-CN ~E CuAl C	Al 12,0 Fe 3,0 Cu balance	– – – approx. 300 HB	Basic coated bronze build-up 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.	2,5 x 250* 3,2 x 350* 4,0 x 350* = +	50 – 70 70 – 90 90 – 110 PA, PB	–
UTP 389 2.0877 EL–CuNi10Mn –	Cu < 0,03 Si < 0,4 Mn 1,5 Ni 10,0 Fe 1,5 Ti < 0,5 Cu balance	240 MPa 320 MPa 25 % –	Basic copper-nickel electrode for joining and surfacing of alloys of similar nature with a nickel content up to 10 %.	2,5 x 300* 3,2 x 350* 4,0 x 400* = +	55 – 70 80 – 100 110 – 130 PA, PB, PF, PC, PE	TÜV

* available on request

UTP solid rods and wires for welding copper and copper alloys

UTP designation Material No. DIN EN 14640 AWS A5.7	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A_5 Hardness El. conductivity Melting range	Application field Base metals Shielding gas EN 439 I 1 argon 100 % R 2 argon / helium	Supply TIG rods 1000 lg Ø mm	Supply MIG wires Ø mm	Appro- val
UTP A 38 2.1211 S Cu 1897 (CuAg1)	Ag 1,0 Mn < 0,2 Ni < 0,3 Cu bal.	80 MPa 200 MPa 20 % 60 HB 30 – 45 S · m/mm² 1020 – 1060° C	Oxygen free copper types according to DIN 1787 OF-Cu, SE-Cu, SW-Cu, SF-Cu. Viscous weld puddle, fine grained structure, high electrical conductivity. Equipment (machine) construction, pipe lines, conductor rails. Preheating is necessary on wall thickness of 3 mm and more (maximum 600° C).	1,6* 2,0* 2,4* 3,2*	1,0* 1,2* 1,6*	–
UTP A 381 2.1006 S Cu 1898 (CuSn1) ER Cu	Sn 0,8 Mn 0,25 Ni < 0,3 Si 0,3 Cu bal.	50 MPa 200 MPa 30 % 60 HB 15 – 20 S · m/mm² 910 – 1025° C	Oxygen free copper types according to DIN 1787 OF-Cu, SE-Cu, SW-Cu, SF-Cu. Fluid weld pool. Machine - and pipe line construction. Preheating is necessary on wall thickness of 3 mm and more (max. 600° C).	1,6* 2,0* 2,4* 3,2*	0,8* 1,0* 1,2 1,6*	–

* available on request

UTP solid rods and wires for welding copper and copper alloys

UTP designation Material No. DIN EN 14640 AWS A5.7	Weld metal analysis %			Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A_5 Hardness El. conductivity Melting range	Application field Base metals Shielding gas EN 439, I 1 argon 100 %	Supply TIG rods 1000 lg Ø mm	Supply MIG wire Ø mm	Appro-val
UTP A 383 – special alloy –	Si Mn Sn Cu	 < 	1,8 1,0 0,2 bal.	140 MPa 280 MPa 50 % 90 HB – 1030 - 1050° C	CuSiMnSn inert gas welding wire with 1,8 % Si for MIG/TIG-brazing. 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).	1,6* 2,0* 2,4* 3,2*	1,0* 1,2* 1,6*	–
UTP A 384 2.1461 S Cu 6560 (CuSi3Mn1) ER CuSi-A	Si Mn Fe Sn Cu	 < < 	2,9 1,0 0,3 0,2 bal.	120 MPa 350 MPa 40 % 80 HB 3 – 4 S · m/mm² 965 – 1035° C	Copper silicon and copper manganese alloys according to DIN 17666 such as CuSi2Mn, CuSi3Mn, CuMn2, CuMn5, copper zinc alloys, copper zinc lead alloys and for MIG brazing on coated steel plates	1,6 2,0 2,4 3,2	0,8 1,0 1,2 1,6	–
UTP A 32 2.1022 S Cu 5180 (CuSn6P) ER CuSn-A	Sn P Fe Cu	 < < 	7,0 0,3 0,1 bal.	150 MPa 300 MPa 20 % 80 HB 7 – 9 S · m/mm² 910 – 1040° C	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.	1,6* 2,0* 2,4* 3,2*	1,0* 1,2* 1,6*	–

* available on request

UTP solid rods and wires for welding copper and copper alloys

UTP designation Material No. DIN EN 14640 AWS A5.7	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A_5 Hardness El. conductivity Melting range	Application field Base metals Shielding gas EN 439, I 1 argon 100 %	Supply TIG rods 1000 lg Ø mm	Supply MIG wires Ø mm	Appro- vals
UTP A 320 2.1056 S Cu 5410 (CuSn12P)	Sn 12,0 P < 0,35 Fe < 0,1 Cu bal.	140 MPa 300 MPa 25 % 150 HB 5 – 6 S · m/mm² 825 – 990° C	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.	1,6* 2,0* 2,4* 3,2*	1,0* 1,2* 1,6*	–
UTP A 385 – special alloy –	Al 4,5 Mn 0,5 Ni 0,5 Cu bal.	190 MPa 340 MPa 50 % 100 HB – 1043 – 1074° C	Suitable for MIG brazing of coated steel plates in the auto body construction and for corrosion resistant constructions with coated plates of all sorts. The weld deposit is corrosion resistant and has good strength and very good toughness properties.	1,6* 2,0* 2,4* 3,2*	1,0* 1,2*	–

* available on request

UTP solid rods and wires for welding copper and copper alloys

UTP designation Material No. DIN EN 14640 AWS A5.7	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A_5 Hardness Melting range	Application field Base metals Shielding gas EN 439, I 1 argon 100 %	Supply TIG rods 1000 lg Ø mm	 MIG wires Ø mm	Appro- vals
UTP A 34 2.0921 S Cu 6100 (CuAl8) ER CuAl-A 1	Al 8,0 Ni < 0,8 Mn < 1,0 Fe < 0,5 Cu bal.	180 MPa 400 MPa 40 % 120 HB 1030 – 1040° C	Copper aluminium alloys (aluminium bronzes) with 5 - 9 % Al, copper-zinc alloys (brass and special brass). Weld cladding on cast iron materials and steel.	1,6* 2,0 2,4 3,2	0,8* 1,0 1,2 1,6*	GL
UTP A 3422 2.0922 S Cu 6327 (CuAl8Ni2)	Al 8,5 Fe 1,5 Ni 2,5 Mn 1,8 Cu bal.	300 MPa 650 MPa 25 % 160 HB 1030 – 1050° C	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.	1,6* 2,0* 2,4* 3,2*	0,8* 1,0 1,2 1,6*	GL
UTP A 3423 2.0922 S Cu 6327 (CuAl8Ni2)	Mn 2,0 Ni 2,0 Fe 2,0 Al 8,0 Cu bal.	300 MPa 550 MPa 25 % 160 HB 1030 – 1050 °C	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.	1,6* 2,0* 2,4* 3,0*	1,0* 1,2* 1,6*	–

* available on request

UTP solid rods and wires for welding copper and copper alloys

UTP designation Material No. DIN EN 14640 AWS A5.7	Weld metal analysis %		Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A_5 Hardness El. conductivity Melting range	Application field Base metals Shielding gas EN 439, I 1 argon 100 %	Supply TIG rods 1000 lg Ø mm	Supply MIG wires Ø mm	Appro-vals
UTP A 3444 2.0923 S Cu 6328 (CuAl9Ni5) ER CuNiAl	Al Fe Ni Mn Cu	9,0 3,5 4,5 1,0 bal.	400 MPa 700 MPa 15 % 200 HB 4 S · m/mm² 1015 – 1045° C	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.	1,6* 2,0* 2,4* 3,2*	1,0* 1,2* 1,6*	TÜV
UTP A 34 N 2.1367 S Cu 6338 (CuMn13Al7) ER CuMnNiAl	Al Mn Fe Ni Cu	7,5 13,0 2,5 2,5 bal.	400 MPa 650 MPa 20 % 220 HB 3 – 5 S · m/mm² 945 – 985° C	Copper aluminium alloys with a high Mn content. Weld cladding on cast iron and steel. Mixed joints. It has good gliding pro-perties, is seawater resistant and cavitation resistant. Ship propellers, water turbines, armatures, drawing tools.	1,6* 2,0* 2,4* 3,2*	0,8* 1,0* 1,2 1,6	DB
UTP A 3436 S Cu 6329 (CuAl11Ni6) -	Al Ni Fe Mn Cu	11,0 6,0 3,0 1,5 bal.	– – – 280 HB 4 S · m/mm²	Multi type aluminium bronzes for wear resi-stant surfacing on copper aluminium wrought alloys according to DIN 17665, cast aluminium bronzes according to DIN 1714 and steel.		1,2* 1,6	–

* available on request

UTP solid rods and wires for welding copper and copper alloys

UTP designation Material No. DIN EN 14640 AWS A5.7	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Hardness El. conductivity Melting range	Application field Base metals Shielding gas EN 439, I 1 argon 100 %	Supply TIG rods 1000 lg Ø mm	Supply MIG wires Ø mm	Appro- vals
UTP A 387 2.0837 S Cu 7158 (CuNi30) ER CuNi	Ni 30,0 Fe 0,6 Mn 0,8 Ti < 0,5 C < 0,05 Cu bal.	> 200 MPa > 360 MPa > 30 % 120 HB 3 S · m/mm^2 1180 – 1240° C	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.	1,2* 1,6 2,0 2,4 3,2*	0,8* 1,0* 1,2 1,6*	TÜV GL C
UTP A 389 2.0873 S Cu 7061 (CuNi10)	Ni 10,0 Fe 1,35 Mn 0,8 Ti < 0,5 C < 0,05 Cu bal.	> 150 MPa > 300 MPa > 30 % 100 HB 5 S · m/mm^2 1100 – 1145° C	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.	1,6 2,0 2,4 3,2*	0,8* 1,0* 1,2* 1,6*	–

* available on request

Group 6

Welding consumables for welding stainless, acid - and heat resistant steels

Index

- **Stainless and acid resistant welding consumables**
- **Heat resistant welding consumables**

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  - **solid rods and wires**
  - **flux cored wires**
  - **wires and fluxes for submerged arc welding**

Group 6

Welding consumables for welding stainless, acid - and heat resistant steels

Group 6

Welding consumables for welding stainless, acid - and heat resistant steels

Stick electrodes for stainless and acid resistant steels

Solid rods and wires for stainless and acid resistant steels

Flux cored wires for stainless and acid resistant steels

Combinations of wires and fluxes for submerged-arc welding for stainless and acid resistant steels

Stick electrodes for heat resistant steels

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Solid rods and wires for heat resistant steels

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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 against 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	Electrodes	TIG rods / MIG wires	Flux cored wires
1.4000	X 6 Cr 13	66	A 66	–
1.4002	X 6 CrAl 13	66	A 66	–
1.4003	X 2 Cr 11	66	A 66	–
1.4006	(G) X 10 Cr 13	66	A 66	–
1.4008	G–X 7 CrNiMo 12-1	6635	A 6635	AF 6635
1.4016	X 6 Cr 17	660	A 660	–
1.4021	X 20 Cr 13	66	A 66	–
1.4024	X 15 Cr 13	66	A 66	–
1.4027	G–X 20 Cr 14	66	A 66	–
1.4057	X 20 CrNi 17 2	660	A 660	–
1.4059	G–X 22 CrNi 17	660	A 660	–
1.4107	G–X 8 CrNi 12	6635	A 6635	AF 6635
1.4120	G–X 20 CrMo 13	68	A 68	AF 68
1.4122	G–X 35 CrMo 17	68	A 68	AF 68
1.4301	X 5 CrNi 18 10	68 LC	A 68 LC	AF 68 LC
1.4303	X 4 CrNi 18 12	68 LC	A 68 LC	AF 68 LC
1.4306	X 2 CrNi 19 11	68 LC	A 68 LC	AF 68 LC
1.4308	G–X 5 CrNi 19 10	68 LC	A 68 LC	AF 68 LC
1.4311	X 2 CrNiN 18 10	68 LC	A 68 LC	AF 68 LC
1.4312	G–X 10 CrNi 18 8	68 LC	A 68 LC	AF 68 LC
1.4313	X 3 CrNiMo 13 4	6635	A 6635	AF 6635
1.4313	G–X 5 CrNi 13 4	6635	A 6635	AF 6635

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Electrodes	TIG rods / MIG wires	Flux cored wires
1.4335	X 1 CrNi 25 21	2522 Mo	A 2522 Mo	–
1.4340	G–X 40 CrNi 27 4	6804	A 6804	–
1.4347	G–X 6 CrNi 26 7	6809 MoKb	A 6808 Mo	–
1.4362	X 2 CrNiN 23 4	6808 Mo	A 6808 Mo	–
1.4401	X 5 CrNiMo 17 12 2	68 MoLC	A 68 MoLC	AF 68 MoLC
1.4404	X 2 CrNiMo 17 13 2	68 MoLC	A 68 MoLC	AF 68 MoLC
1.4405	G–X 5 CrNiMo 16 5	68 MoLCKb	A 68 MoLC	AF 68 MoLC
1.4406	X 2 CrNiMoN 17 12 2	1915 HST	A 1915 HST	–
1.4407	G–X 5 CrNiMo 13 4	6635	A 6635	AF 6635
1.4408	G–X 5 CrNiMo 19 11 2	68 MoLCKb	A 68 MoLC	AF 68 MoLC
1.4409	G–X 2 CrNiMoN 18 10	68 MoLCKb	A 68 MoLC	AF 68 MoLC
1.4413	X 3 CrNiMo 13 4	6635	A 6635	AF 6635
1.4414	G–X 4 CrNiMo 13 4	6635	A 6635	AF 6635
1.4418	X 4 CrNiMo 16 5	6655 MO	–	–
1.4420	X 5 CrNiMo 18 11	68 MoLC	A 68 MoLC	AF 68 MoLC
1.4429	X 2 CrNiMoN 17 13 3	1915 HST	A 1915 HST	–
1.4435	X 2 CrNiMo 18 14 3	68 MoLC	A 68 MoLC	AF 68 MoLC
1.4436	X 5 CrNiMo 17 13 3	68 MoLC	A 68 MoLC	AF 68 MoLC
1.4437	G–X 6 CrNiMo 18 12	68 MoLCKb	A 68 Mo	AF 68 MoLC
1.4438	X 2 CrNiMo 18 15 4	1817	A 1817	–
1.4439	X 2 CrNiMoN 1713 5	1817	A 1817	–
1.4439	G–X 3 CrNiMoN 17 13 5	1817	A 1817	–

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Electrodes	TIG rods / MIG wires	Flux cored wires
1.4446	G–X 2 CrNiMoN 17 13 4	1817	A 1817	–
1.4448	G–X 6 CrNiMo 17 13	1817	A 1817	–
1.4460	X 3 CrNiMoN 27 5 2	6810 MoKb	A 6810 Mo	–
1.4462	X 2 CrNiMoN 22 5 3	6808 Mo	A 6808 Mo	–
1.4463	G–X 6 CrNiMo 24 8 2	6808 MoKb	A 6808 Mo	–
1.4465	X 1 CrNiMoN 25 25 2	2522 Mo	A 2522 Mo	–
1.4466	X 1 CrNiMoN 25 22 2	2522 Mo	A 2522 Mo	–
1.4467	X 2 CrMnNiMoN 26 5 4	2522 Mo	A 2522 Mo	–
1.4468	G–X 2 CrNiMoN 25 6 3	6810 MoKb	A 6810 Mo	–
1.4469	G–X 2 CrNiMoN 26 7 4	6810 MoKb	A 6810 Mo	–
1.4500	G–X 7 NiCrMoCuNb 25 20	1925	A 1925	–
1.4505	X 4 NiCrMoCuNb 20 18 2	1925	A 1925	–
1.4506	X 5 NiCrMoCuTi 20 18	1925	A 1925	–
1.4510	X 6 CrTi 17	660	A 660	–
1.4511	X 6 CrNb 17	660	A 660	–
1.4512	X 2 CrTi 12	66	A 66	–
1.4515	G–X 2 CrNiMoCuN 26 6 3	6807 MoCuKb	–	–
1.4517	G–X 3 CrNiMoCuN 26 6 3 3	6809 MoCuKb	–	–
1.4520	X 2 CrTi 17	660	A 660	–
1.4521	X 2 CrMoTi 18 2	68 MoLC	A 68 MoLC	AF 68 MoLC

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Electrodes	TIG rods / MIG wires	Flux cored wires
1.4531	G–X 2 NiCrMoCuN 20 18	1925	A 1925	–
1.4536	G–X 2 NiCrMoCuN 25 20	1925	A 1925	–
1.4538	G–X 1 NiCrMoCuN 25 20 5	1925	A 1925	–
1.4539	X 1 NiCrMoCu 25 20 5	1925	A 1925	–
1.4541	X 6 CrNiTi 18 10	68	A68	–
1.4546	X 5 CrNiNb 18 10	68	A68	–
1.4550	X 6 CrNiNb 18 10	68	A68	–
1.4552	G–X 5 CrNiNb 19 11	68 NbKb	A68	–
1.4558	X 2 NiCrAlTi 32 20	2133 Mn	A 2133 Mn	–
1.4571	X 6 CrNiMoT1 17 12 2	68 Mo	A 68 Mo	–
1.4577	X 3 CrNiMoTi 25 25	2522 Mo	A 2522 Mo	–
1.4580	X 6 CrNiMoNb 17 12 2	68 Mo	A68Mo	–
1.4581	G–X 5 CrNiMoNb 19 11 2	68 MoNbKb	A 68 Mo	–
1.4583	X 10 CrNiMoNb 18 12	68 Mo	A68Mo	–
1.4585	G–X 7 CrNiMoCuNb 18 18	1925	A 1925	–
1.4586	X 5 NiCrMoCuNb 22 18	1925	A 1925	–
1.4589	X 5 CrNiMoTi 15 2	68 Mo	A 68 Mo	–
1.4710	G–X 30 CrSi 6	68 HKb	A68 H	–
1.4712	X 10 CrSi 6	68 H	A68 H	–
1.4713	X 10 CrAl 7	68 H	A68 H	–
1.4720	X 7 CrTi 12	68 H	A68 H	–

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Electrodes	TIG rods / MIG wires	Flux cored wires
1.4724	X 10 CrAl 13	68 H	A 68 H	–
1.4729	G–X 40 CrSi 13	68 HKb	A 68 H	–
1.4740	G–X 40 CrSi 17	68 H	A 68 H	–
1.4742	X 10 CrAl 18	68 H	A 68 H	–
1.4745	G–X 40 CrSi 23	68 HKb	A 68 H	–
1.4746	X 8 CrTi 25	68 H	A 68 H	–
1.4749	X 18 CrN 28	68 H	A 68 H	–
1.4762	X 10 CrAl 24	68 H	A 68 H	–
1.4776	G–X 40 CrSi 29	68 HKb	A 68 H	–
1.4815	G–X 8 CrNi 19 10	6820	A 6820	–
1.4821	X 20 CrNiSi 25 4	6804	A 6804	–
1.4822	G–X 40 CrNi 24 5	6804	A 6804	–
1.4823	G–X 40 CrNiSi 27 4	6804	A 6804	–
1.4825	G–X 25 CrNiSi 18 9	68 HKb	A 68 H	–
1.4826	G–X 40 CrNiSi 22 9	68 HKb	A 68 H	–
1.4827	G–X 8 CrNiNb 19 10	68 HKb	A 68 H	–
1.4828	X 15 CrNiSi 20 12	68 H	A 68 H	–
1.4832	G–X 25 CrNiSi 20 14	68 HKb	A 68 H	–
1.4833	X 7 CrNi 23 14	68 H	A 68 H	–
1.4835	X 10 CrNiSiN 21 11	68 H	A 68 H	–
1.4837	G–X 40 CrNiSi 25 12	2535 Nb	A 2535 Nb	–
1.4840	G–X 15 CrNi 25 20	68 HKb	A 68 H	–

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Electrodes	TIG rods / MIG wires	Flux cored wires
1.4841	X 15 CrNiSi 25 20	68 H	A 68 H	–
1.4842	X 12 CrNi 25 20	68 H	A 68 H	–
1.4845	X 12 CrNi 25 21	68 H	A 68 H	–
1.4847	X 8 CrNiAlTi 20 20	68 H	A 68 H	–
1.4848	G–X 40 CrNiSi 25 20	2535 Nb	A 2535 Nb	–
1.4849	G–X 40 NiCrSiNb 38 18	2535 Nb	A 2535 Nb	–
1.4852	G–X 40 NiCrSiNb 35 25	2535 Nb	A 2535 Nb	–
1.4855	G–X 30 CrNiSiNb 24 24	2535 Nb	A 2535 Nb	–
1.4857	G–X 40 NiCrSi 35 25	2535 Nb	A 2535 Nb	–
1.4859	G–X 10 NiCrNb 32 20	2133 Mn	A 2133 Mn	–
1.4861	X 10 NiCr 32 20	2133 Mn	A 2133 Mn	–
1.4862	X 8 NiCrSi 38 18	068 HH	A 068 HH	AF 068 HH
1.4864	X 12 NiCrSi 36 16	2133 Mn	A 2133 Mn	–
1.4865	G–X 40 NiCrSi 38 18	2535 Nb	A 2535 Nb	–
1.4876	X 10 NiCrAlTi 32 20	2133 Mn	A 2133 Mn	–
1.4878	X 12 CrNiTi 18 9	6820	A 6820	–
1.4941	X 8 CrNiTi 18 10	6820	A 6820	–
1.4943	X 4 NICrTI 25 15	68 H	A 68 H	–
1.4948	X 6 CrNi 18 11	6820	A 6820	–
1.4949	X 3 CrNiN 18 11	6820	A 6820	–
1.4958	X 5 NiCrAlTi 31 20	2133 Mn	A 2133 Mn	–
1.4959	X 8 NiCrAlTi 32 21	2133 Mn	A 2133 Mn	–

Table for use

Base materials to UTP welding consumables

Material No.	DIN designation	Electrodes	TIG rods / MIG wires	Flux cored wires
1.6901	G–X 8 CrNi 18 10	68 Kb	A 68	–
1.6902	G–X 6 CrNi 18 10	68 Kb	A 68	–
1.6905	G–X 5 CrNiNb 18 10	68 NbKb	A 68	–
1.6907	X 3 CrNiN 18 10	68 Kb	A 68	–
1.6909	X 5 CrMnNiN 18 9	1915 HST	A 1915 HST	–
1.6967	X 3 CrNiMoN 18 14	1915 HST	A 1915 HST	–
1.6982	G–X 3 CrNi 13 4	6635	A 6635	AF 6635
1.6983	G–X 3 CrNiMo 16 5	6655 Mo	–	–

UTP 68

Stabilized electrode for CrNi-steels

Standards :

Material No.	:	1.4551
EN 1600	:	E 19 9 Nb R 3 2
DIN 8556	:	E 19 9 Nb R 26
AWS A5.4	:	E 347-17

Application field

The rutile coated welding 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 electrode is also applicable for the 2nd layer on cladded CrNi steels.

Base materials

DIN designation	Material No.	AISI
X5 CrNi 18 10	1.4301	304
G-X10CrNi 18 8	1.4312	
X6 CrNiTi 18 10	1.4541	321
X6 CrNiNb 18 10	1.4550	347
G-X5 CrNiNb 18 9	1.4552	

Welding characteristics and special properties of the weld metal

The 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	10	0,25	balance

Welding instruction

Weld electrode slightly inclined with a short arc. Re-drying 2 hours at 120 – 200° C.

Current type : DC (+) / AC

Welding positions : PA PB PC PE PF

Current adjustment :

Electrodes	Ø mm x L	1,5 x 250*	2,0 x 250	2,5 x 300	3,2 x 350	4,0 x 400
Amperage	A	25 – 40	40 – 60	50 – 90	80 – 120	110 – 160
Electrodes	Ø mm x L	5,0 x 450				
Amperage	A	140 – 200				

* available on request

Approvals : TÜV, TÜV Vienna, ABS, GL

Standards : Material No. : 1.4316
EN 1600 : E 19 9 L R 3 2
DIN 8556 : E 19 9 L R 26
AWS A5.4 : E 308 L - 17

UTP 68 LC

Low carbon electrode for CrNi steels

Application field

The rutile coated 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 against intercristaline corrosion and can be used for working temperatures up to + 350° C.

Base materials

DIN designation	Material No.	AISI
X5 CrNi 18 10	1.4301	304
X2 CrNi 18 11	1.4306	304 L
X2 CrNiN 18 10	1.4311	
G-X10 CrNi 18 8	1.4312	
X6 CrNiTi 18 10	1.4541	321

Welding characteristics and special properties of the weld metal

The 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	10	balance

Welding instruction

The 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

Current adjustment :

Electrodes	Ø mm x L	1,5 x 250*	2,0 x 250	2,5 x 300	3,2 x 350	4,0 x 400
Amperage	A	25 – 40	40 – 60	50 – 90	80 – 120	110 – 160
Electrodes	Ø mm x L	5,0 x 450*				
Amperage	A	140 – 200				

* available on request

Approvals : TÜV, ABS, GL, C, TKK

UTP 68 Mo

Stabilized electrode for CrNiMo steels

Standards : Material No. : 1.4576
EN 1600 : E 19 12 3 Nb R 3 2
DIN 8556 : E 19 12 3 Nb R 26
AWS A5.4 : E 318 - 16

Application field

The rutile coated 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

DIN designation	Material No.	AISI
X5 CrNiMo 17 12 2	1.4401	316
X2 CrNiMo 17 13 2	1.4404	
G-X6 CrNiMo 18 10	1.4408	
X5 CrNiMo 17 13 3	1.4436	
X6 CrNiMoTi 17 12 2	1.4571	316 Ti
X6 CrNiMoNb 17 12 2	1.4580	316 Cb
G-X5 CrNiMoNb 18 10	1.4581	
X10 CrNiMoNb 18 12	1.4583	

Welding characteristics and special properties of the weld metal

The 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	Ni	Mo	Nb	Fe
0,025	0,8	0,6	18	12	2,7	0,25	balance

Welding instruction

Clean the weld zone and above all degrease it. Keep a short arc. Weld with dry electrodes. Re-dry for 2 h at 120 – 200° C.

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

Current adjustment :

Electrodes	Ø mm x L	1,5 x 250*	2,0 x 250	2,5 x 300	3,2 x 350	4,0 x 400
Amperage	A	25 – 40	40 – 60	50 – 90	80 – 120	120 – 160
Electrodes	Ø mm x L	5,0 x 450*				
Amperage	A	140 – 200				

* available on request

Approval : TÜV

Standards : Material No. : 1.4430
EN 1600 : E 19 12 3 L R 3 2
DIN 8556 : E 19 12 3 LR 26
AWS A5.4 : E 316 L-17

UTP 68 MoLC

Low carbon electrode for CrNiMo steels

Application field

The rutile coated 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 against intercristalline corrosion and can be used for working temperatures up to + 400°C.

Base materials

DIN designation	Material No.	AISI
X5 CrNiMo 17 12 2	1.4401	316
X2 CrNiMo 17 13 2	1.4404	
X5 CrNiMo 17 13 3	1.4436	
X6 CrNiMoTi 17 12 2	1.4571	316 Ti
X10 CrNiMoTi 18 12	1.4573	316 Ti
X6 CrNiMoNb 17 12 2	1.4580	316 Cb
X10 CrNiMoNb 18 12	1.4583	

Welding characteristics and special properties of the weld metal

The electrode is weldable in all positions except vertical down. The 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	12	2,8	balance

Welding instruction

The 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

Current adjustment :

Electrodes	Ø mm x L	1,5 x 250*	2,0 x 250	2,5 x 300	3,2 x 350	4,0 x 400
Amperage	A	25 – 40	40 – 60	50 – 90	80 – 120	120 – 160
Electrodes	Ø mm x L	5,0 x 450*				
Amperage	A	140 – 200				

* available on request

Approvals : TÜV, TÜV Vienna, ABS, DB, GL, DNV, C

Standards : Material No. : ~1.4332
EN 1600 : E 23 12 L R 3 2
DIN 8556 : E 23 12 L R 26
AWS A5.4 : E 309 L-17

UTP 6824 LC

Low carbon CrNi-electrode for dissimilar metal joints and claddings

Application field

The rutile coated 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

DIN designation	Material No.
X6 CrNiTi 18 10	1.4541
X6 CrNiNb 18 9	1.4550
X10 CrNiMoNb 18 12	1.4583
X10 CrSi 6	1.4712
X10 CrAl 13	1.4724
X10 CrAl 13	1.4742
G-X25 CrNiSi 18 9	1.4825
G-X40 CrNiSi 22 9	1.4826
X15 CrNiSi 20 12	1.4828

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

Welding characteristics and special properties of the weld metal

The 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 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.

Curren type : DC (+) / AC **Welding positions :**

Current adjustment :

Electrodes	Ø mm x L	2,0 x 250*	2,5 x 300	3,2 x 350	4,0 x 400	5,0 x 450*
Amperage	A	40 – 60	60 – 80	80 – 110	110 – 140	140 – 180

* available on request

Approvals : TÜV, GL, C, DNV

UTP stick electrodes for stainless and acid resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %	Yield strength Tensile strength Elongation Impact strength Hardness	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Appro- vals
UTP 66 1.4009 E 13 B 22 E 13 B 20+ ~E 410-15 UTP 66 W rutile type E 410-16	C < 0,05 Si 0,5 Mn 0,5 Cr 13,0	450 MPa 650 MPa 25 % – 360 HB (tempering 2 h/760° C)		Basic coated 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 Re-drying: 2 – 3 h at 250 – 300° C.	2,5 x 250* 3,2 x 350* 4,0 x 400*	60 – 80 80 – 110 110 – 140 = + PA, PB, PC, PE, PF	–
UTP 660 1.4015 E 17 B 42 E 17 B 20+ E 430-15	C 0,08 Si 0,4 Mn 0,6 Cr 17,0	350 MPa 550 MPa 20 % – 260 HB (tempering 2 h/770° C)		Basic coated 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 Re-drying: 2 – 3 h at 250 – 300° C.	2,5 x 250* 3,2 x 350* 4,0 x 350*	60 – 80 90 – 110 110 – 140 = + PA, PB, PC, PE PF	–

* available on request

UTP stick electrodes for stainless and acid resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analyse %		Yield strength Tensile strength Elongation Impact strength Hardness	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Appro- val
UTP 6615 1.4018 EZ 13 1 B 4 2 E 13 1 B 20+ ~E 410-15	C Si Mn Cr Ni	0,05 0,3 0,8 13,0 1,0	550 MPa 720 MPa 15 % 50 J –		Basic coated 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. Re-drying: 2 – 3 h at 250 – 300° C.	2,5 x 250* 3,2 x 350* 4,0 x 400*	60 – 80 90 – 110 110 – 140 = + PA, PB, PC, PE PF	–
UTP 6635 1.4351 E 13 4 B 4 2 E 13 4 B 20+ E 410 NiMo	C Si Mn Cr Ni Mo	0,03 0,25 0,8 13,0 4,0 0,45	650 MPa 760 MPa 15 % 55 J –		Basic coated electrode for joining and surfacing on stainless martensitic CrNi steels / cast steels, e. g. 1.4313, 1.4407, 1.4413, 1.4414	2,5 x 350* 3,2 x 300 4,0 x 450 5,0 x 450*	60 – 80 70 – 100 110 – 160 150 – 190 = + PA, PB, PC, PE, PF	TÜV

* available on request

UTP stick electrodes for stainless and acid resistant

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Appro- vals
UTP 6655 Mo – EZ 17 5 1 B 4 2 E 17 5 Mo B 20+ –	C Si Mn Cr Ni Mo	0,03 0,3 0,6 16,5 5,0 1,0	700 MPa 900 MPa 15 % 40 J		Basic coated 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 Re-drying: 2 – 3 h at 250 – 300° C.	2,5 x 300* 3,2 x 350* 4,0 x 400*	60 – 80 90 – 110 110 – 140 = + PA, PB PC, PE PF	–
UTP 683 LC 1.4430 E 19 12 3 LR 7 3 E 19 12 3 LMPR 36 180 E 316 L-26	C Si Mn Cr Ni Mo	0,025 0,8 0,6 19,0 12,0 2,6	370 MPa 550 MPa 35 % 50 J		Rutile coated, synthetic high performance 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, 1.4550, 1.4580	1,5 x 250* 2,0 x 300 2,5 x 350 3,2 x 350 4,0 x 350*	40 – 60 50 – 80 70 – 120 110 – 160 140 – 220 = + / ~ PA, PB	DB

* available on request

UTP stick electrodes for stainless and acid resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %	Yield strength Tensile strength Elongation Impact strength	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Approva l
UTP 68 TiMo 1.4430 E 19 12 3 LR 7 3 E 19 12 3 LMPR 36 180 E 316 L-26	C 0,025 Si 0,8 Mn 0,6 Cr 19,0 Ni 12,0 Mo 2,6	370 MPa 550 MPa 35 % 50 J		Rutile coated synthetic high performance 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, 1.4550, 1.4580	1,5 x 250* 2,0 x 300 2,5 x 350 3,2 x 350 4,0 x 350*	40 – 60 50 – 80 70 – 120 110 – 160 140 – 220 = + / ~ PA, PB	TÜV
UTP 684 MoLC 1.4430 E 19 12 3 LR 15 E 19 12 3 LR 26 E 316 L-17	C 0,025 Si 0,8 Mn 0,9 Cr 19,0 Ni 12,0 Mo 2,8	> 350 MPa > 540 MPa > 25 % > 47 J		Electrode for welding on low-carbon and chemical resistant CrNiMo steels of the same nature in vertical-down position. Base materials: 1.4404, 1.4435, 1.4401, 1.4436, 1.4571, 1.4573, 1.4580, 1.4583	2,5 x 300 3,2 x 350	75 – 85 105 – 115 = + PG	TÜV GL DNV C

* available on request

UTP stick electrodes for stainless and acid resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Appro-vals
UTP 6807 MoCuKb – E 25 9 3 Cu N LB 42 E 25 10 3 Cu L B 20+ –	C 0,03 Si 0,5 Mn 1,2 Cr 25,0 Ni 10,0 Mo 3,0 Cu 1,0 N 0,25	700 MPa 850 MPa 25 % 60 J	Basic coated electrode with austenitic/ferritic deposit for joining and building up on corrosion resistant Duplex steels and cast steels with addition of Cu. The deposit is highly resistant against stress corrosion cracking and against crevice corrosion in high chloride containing medias (halogenides). Base material: 1.4515	2,5 x 300* 3,2 x 350* 4,0 x 400*	50 – 75 70 – 110 90 – 150 = + PA, PB, PC, PE PF	–
UTP 6808 Mo – E 22 9 3 N LR 3 2 ~E 22 9 3 LR 26 E 22 09-17	C 0,025 Si 0,9 Mn 0,9 Cr 22,5 Ni 9,5 Mo 3,0 Cu 0,8 N 0,2	> 540 MPa > 680 MPa > 22 % 47 J (+ 20° C) 45 J (– 40° C)	Rutile basic coated electrode for joining and surfacing on corrosion resistant steels / cast steels with an austenitic-ferritic structure (Duplex steels). Base materials: 1.4347, 1.4460, 1.4462, 1.4463	2,5 x 300 3,2 x 350 4,0 x 400 5,0 x 400	40 – 75 70 – 120 110 – 150 130 – 200 = + / ~ PA, PB, PC, PE, PF	TÜV C

* available on request

UTP electrodes for stainless and acid resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %		Yield strength Tensile strength Elongation Impact stength	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Appro- vals
UTP 6809 Mo – E 22 9 3 Cu N LR 3 2 E 22 9 3 Cu LR 26 –	C Si Mn Cr Ni Mo Cu N	< 0,03 0,85 0,8 23,0 9,0 3,0 2,0 0,12	570 MPa 740 MPa > 25 % 50 J		Rutile basic coated electrode for joining and surfacing on corrosion resistant steels and cast steels with an austenitic-ferritic structure (Duplex-steels). Base materials: 1.4460, 1.4462, 1.4460Cu.	2,5 x 300 3,2 x 350 4,0 x 400 5,0 x 400	50 – 75 70 – 110 90 – 150 130 – 200 = + / ~ PA, PB, PC, PE, PF	TÜV
UTP 6809 MoCuKb – E 25 9 3 Cu N LB 42 E 25 10 3 Cu L B 20+ –	C Si Mn Cr Ni Mo Cu N	0,025 0,5 1,2 25,0 9,5 3,0 3,0 0,2	650 MPa 850 MPa 25 % 45 J		Basic coated 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 against crevice corrosion and stress corrosion cracking in high chloride containing medias. Base material: 1.4517	2,5 x 300* 3,2 x 350* 4,0 x 400*	50 – 80 70 – 110 90 – 150 = + PA, PB, PC, PE PF	–

* available on request

UTP stick electrodes for stainless and acid resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Appro-val
UTP 6810 MoKb – E 25 9 4 N LB 42 ~E 25 10 4 LB 20 –	C 0,03 Si 0,55 Mn 1,5 Cr 25,5 Ni 9,5 Mo 4,3 N 0,25	720 MPa 850 MPa 22 % 70 J (+20° C) 45 J (–50° C) –	Basic coated low-carbon electrode for joining and surfacing on high corrosion resistant steels and cast steels with austenitic-ferritic structure (Super-Duplex steels).	2,5 x 300* 3,2 x 350 4,0 x 400 5,0 x 450	50 – 75 70 – 110 90 – 150 130 – 200 = + PA, PB, PC, PE, PF	–
UTP 6824 MoLC – E 23 12 2 L R 3 2 ~E 23 12 3 L R 26 ~E 309 MoL-17	C 0,03 Si 0,8 Mn 1,5 Cr 23,0 Ni 12,0 Mo 2,8	> 490 MPa > 670 MPa > 25 % > 47 J	Low-carbon CrNiMo-electrode for dissimilar metal joints and claddings on the following base materials: 1.4401, 1.4404, 1.4580, 1.4571.	2,0 x 250* 2,5 x 300 3,2 x 350 4,0 x 400 5,0 x 450*	40 – 60 60 – 80 80 – 120 100 – 160 140 – 220 = + / ~ PA, PB, PC, PE, PF	C

* available on request

UTP stick electrodes for stainless and acid resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Appro-vals
UTP 1817 1.4440 E 18 16 5 N LR 3 2 E 18 16 5 L R 26 ~E 317 L-16	C 0,025 Si 0,8 Mn 1,0 Cr 18,0 Ni 17,0 Mo 4,0 N 0,1	350 MPa 550 MPa 35 % 80 J	Rutile coated 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	2,5 x 300* 3,2 x 350* 4,0 x 400* 5,0 x 450*	40 – 80 70 – 100 90 – 130 120 – 150 = + / ~ PA, PB, PC, PE PF	TÜV
UTP 1915 HST 1.4455 E 20 16 3 Mn N L B 42 E 20 16 3 Mn L B 20+ –	C 0,025 Si 0,4 Mn 5,7 Cr 21,0 Ni 16,0 Mo 3,0 N 0,18	450 MPa 640 MPa 30 % 80 J	Basic coated 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	2,5 x 300* 3,2 x 350* 4,0 x 400*	50 – 75 70 – 110 80 – 120 = + PA, PB, PC, PE, PF	Stac

* available on request

UTP stick electrodes for stainless and acid resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Imact strength K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Appro-vals
UTP 1925 1.4519 E 20 25 5 Cu N L R 3 2 E 20 25 5 LCuR 26 ~E 385-16	C 0,025 Si 0,8 Mn 1,5 Cr 20,0 Ni 25,0 Mo 4,5 Cu 1,5	400 MPa 580 MPa 30 % 70 J	Rutile basic coated electrode for joining and surfacing on stainless steels and cast steels with high corrosion resistance to reducing media. Base materials: 1.4500, 1.4505, 1.4506, 1.4539	2,5 x 300 3,2 x 350 4,0 x 400	50 – 70 70 – 110 90 – 140 = + / ~ PA, PB, PC, PE, PF	TÜV TÜV Vienna TTK
UTP 2522 Mo – E 25 22 2 N LB 4 2 E 25 22 L Mn B 20+ –	C 0,03 Si 0,25 Mn 5,5 Cr 25,0 Ni 22,0 Mo 2,5 N 0,15	400 MPa 620 MPa 30 % 80 J	For joining and surfacing of high corrosion resistant CrNiMo-steels and cast steels. Highly resistant against 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.	2,5 x 250* 3,2 x 350* 4,0 x 400*	50 – 75 70 – 110 90 – 130 = + PA, PB, PC, PE PF	

* available on request

UTP electrodes for stainless and acid resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %			Yield strength Tensile strength Elongation Impact strength	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding- positions	Appro- vals
UTP 3320 LC									
–	C	<	0,03	> 350 MPa		Rutile coated electrode. It is suited for joining and surfacing on the same type and similar composition of high corrosion resistant roll - and cast iron materials, such as material 2.4660 NiCr20CuMo (alloy 20).	2,5 x 300*	50 – 70	–
–	Si	<	0,3	> 520 MPa			3,2 x 350*	70 – 90	
–	Mn		1,5	> 30 %			4,0 x 350*	90 – 110	
E 320 LR - 15	Cr		20,0	> 50 J				= + / ~	
	Ni		34,0					PA, PB, PC, PE PF	
	Mo		2,5						
	Nb	<	0,4						
	Cu		3,5						
	Fe		balance						

* available on request

UTP TIG rods and MIG wires for stainless and acid resistant steels

UTP designation Material No. EN 12072 DIN 8556 AWS A5.9	Weld metal analysis %		Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v Hardness	Application field Base materials	Supply TIG rods 1000 lg Ø mm	Supply MIG wires Ø mm	Appro- val
UTP A 66 1.4009 G(W) 13 (Si) SGX8 Cr 14 ~ER 410	C Si Mn Cr	0,1 0,8 0,8 14,5	450 MPa 650 MPa 15 % – 280 – 360 HB	Stainless steels with 13 – 14 % Cr, z. B. 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.	2,0* 3,2*	1,2* 1,6*	–
UTP A 660 1.4502 G(W) Z 17 Ti SGX8 CrTi 18 ~ER 430	C Si Mn Cr Ti	0,06 0,5 0,5 17,5 0,5	– – – – 200 – 280 HB approx. 120 HB (at 500° C)	Stainless steels with 13 – 18 % Cr, z. B. 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	1,6 2,0 2,4	1,0 1,2 1,6*	–
UTP A 6635 1.4351 G(W) 13 4 (Si) SGX3 CrNi 13 4 ~ER 410 NiMo	C Si Mn Cr Ni Mo	0,03 0,7 0,7 13,5 4,5 0,55	600 MPa 800 MPa 15 % 40 J after 8 h / 600° C	For joining and building up on identical and similar martensitic CrNi cast steels for the water turbine- and compressor construction with steels such as 1.4313 and 1.4008	1,6 2,0 2,4 3,2*	1,0* 1,2	TÜV

* available on request

UTP TIG rods and MIG wires for stainless and acid resistant steels

UTP designation Material No. EN 12072 DIN 8556 AWS A5.9	Weld metal analysis %		Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v	Application field Base materials	Supply TIG rods 1000 lg Ø mm	Supply MIG wires Ø mm	Appro-vals
UTP A 68 1.4551 G(W) 19 9 Nb(Si) SGX5 CrNiNb 19 9 ER 347 (Si)	C Si Mn Cr Ni Nb	0,03 0,4** 1,5 19,5 9,5 0,55	420 MPa 600 MPa 30 % 100 J	Joining and surfacing in chem. apparatus and vessel construction for working temperatures of – 196° C up to 400° C. Base materials: 1.4301, 1.4312, 1.4543, 1.4541, 1.4550, 1.4552, 1.4878, 1.6902, 1.6905, 1.6907 Shielding gas: I 1 (argon)	1,6 2,0 2,4 3,2*	0,8* 1,0 1,2 1,6*	TÜV TÜV Vienna
UTP A 68 LC 1.4316 G(W) 19 9 L(Si) SGX2 CrNi 19 9 ER 308 L (Si)	C Si Mn Cr Ni	0,02 0,4** 1,5 20,0 10,0	400 MPa 600 MPa 35 % 100 J	Joining and surfacing in chem. apparatus and vessel construction for working temperatures of – 196° C up to 400° C. Base materials: 1.4301, 1.4302, 1.4541, 1.4550, 1.6902, 1.6905, 1.6907 Shielding gas: I 1 (argon)	1,6 2,0 2,4 3,2*	0,8* 1,0 1,2 1,6*	TÜV C
UTP A 68 Mo 1.4576 G(W) 19 12 3 Nb(Si) SGX5 CrNiMoNb 19 12 ER 318 (Si)	C Si Mn Cr Ni Mo Nb	0,03 0,4** 1,5 19,0 11,5 2,8 0,55	460 MPa 680 MPa 35 % 100 J	Joining and surfacing 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: 1.4571, 1.4573, 1.4580, 1.4581, 1.4583 Shielding gas: I 1 (argon)	1,6 2,0 2,4 3,2*	0,8* 1,0 1,2 1,6*	TÜV

* available on request

** MIG/MAG wires with Si-content of 0,65 – 1,0

UTP TIG rods and MIG wires for stainless and acid resistant steels

UTP designation Material No. EN 12072 DIN 8556 AWS A5.9	Weld metal analysis %		Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v	Application field Base materials	Supply TIG rods 1000 lg Ø mm	 MIG wires Ø mm	Appro- vals
UTP A 68 MoLC 1.4430 G(W) 19 12 3 L(Si) SGX2 CrNiMo 19 12 ER 316 L (Si)	C Si Mn Mo Cr Ni	0,02 0,4** 1,5 2,8 18,5 12,0	420 MPa 600 MPa 35 % 100 J	Joining and surfacing of low-carbon, corrosion resistant CrNiMo steels exposed to high corrosion for working temperatures up to + 350° C. Chemical apparatus and vessels. Base materials: 1.4404, 1.4435, 1.4580, 1.4571 Shielding gas: I 1 (argon)	1,6 2,0 2,4 3,2*	0,8* 1,0 1,2 1,6*	TÜV C GL
UTP A 6808 Mo ~1.4462 G(W) 22 9 3 N L SGX2 CrNiMo 22 8 3 ER 22 09	C Si Mn Cr Ni Mo N	0,015 0,25 1,5 22,8 9,2 3,0 0,14	600 MPa 800 MPa 30 % 80 J	Joining and surfacing of corrosion resistant steels as well as cast steel with austenitic-ferritic structure (Duplex steel). Working temperature: up to 250° C. Base materials: 1.4347, 1.4460, 1.4462 Joining with non- and low-alloyed steels is possible.	1,6* 2,0 2,4	1,0 1,2 1,6	TÜV

* available on request   ** MIG/MAG wires with Si-content of 0,65 – 1,0

UTP TIG rods and MIG wires for stainless and acid resistant steels

UTP designation Material No. EN 12072 DIN 8556 DIN 8555	Weld metal analysis %		Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v Hardness	Application field Base materials	Supply TIG rods 1000 lg Ø mm	Supply MIG wires Ø mm	Appro-vals
UTP A 6824 LC 1.4332 G(W) 23 12 L SGX2 CrNi 24 12 ER 309 L (Si)	C Si Mn Cr Ni	0,02 0,4** 1,8 23,0 13,5	400 MPa 590 MPa 30 % 140 J –	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, 1.4401, 1.4404, 1.4541, 1.4550, 1.4571, 1.4580 with carbon steels Shielding gas: I 1 (argon)	1,6 2,0 2,4 3,2*	0,8* 1,0 1,2 1,6*	TÜV C GL
UTP A 6824 MoLC 1.4459 G(W) 23 12 L SGX2 CrNiMo 23 13 W/MSG 9-GZ-200-CKZ	C Si Mn Cr Ni Mo	0,02 0,4 1,5 22,0 14,5 2,5	> 500 MPa > 700 MPa > 25 % – approx. 220 HB	Joining and surfacing of steels of difficult weldability, claddings, cushion layers, repairs on hot working tools. The deposit is hot- and cold workhardening. Shielding gases: TSG : I 1 argon 100 % MSG : mixed gases M 13, M 12	1,6* 2,4*	1,2*	TÜV

* available on request ** MIG/MAG wire with Si-content of 0,65 – 1,0

UTP TIG rods and MIG wires for stainless and acid resistant steels

UTP designation Material No. EN 12072 DIN 8556 AWS A5.9	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply TIG rods 1000 lg Ø mm	 MIG wires Ø mm	Appro- vals
UTP A 1817 ~1.4440 G(W) 18 16 5 N L(Si) ~SGX2 CrNiMnMo 19 16 –	C Si Mn Cr Ni Mo N	0,02 0,4** 5,5 19,0 16,5 4,2 0,15	450 MPa 650 MPa 35 % 120 J		For joining in the construction of chemical equipment and containers. Fully austenitic weld metal with excellent resistance against pitting, crevice and stress corrosion cracking. For working temperatures up to 350° C. Base materials: 1.4429, 1.4435, 1.4438 1.4439, 1.4448, 1.3951, 1.3964	1,6* 2,0* 2,4* 3,2*	0,8* 1,0* 1,2* 1,6*	TÜV
UTP A 1915 HST 1.4455 G(W) 20 16 3 Mn L SGX2 CrNiMnMoN 20 16 –	C Si Mn Cr Ni Mo N	0,02 0,55 7,5 19,5 15,5 2,8 0,15	450 MPa 650 MPa 30 % 100 J		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. Base materials: 1.4311, 1.4406, 1.4435 1.4404, 1.3952, 1.5637, 1.5680, 1.5681, 1.5638	1,6* 2,0* 2,4* 3,2*	0,8* 1,0* 1,2* 1,6*	

* available on request

** MIG/MAG wire with Si-content of 0,65 – 1,0

UTP TIG rods and MIG wires for stainless and heat resistant steels

UTP designation Material No. EN 12072 DIN 8556 AWS A5.9	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply TIG rods 1000 lg Ø mm	 MIG wires Ø mm	Appro-vals
UTP A 1925 1.4519 G(W) 20 25 5 Cu L SGX2 CrNiMoCu 20 25 ER 385	C Si Mn Cr Ni Mo Cu	0,02 0,5 1,7 20,0 25,0 4,5 1,5	400 MPa 600 MPa 35 % 100 J		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.	1,6* 2,0* 2,4* 3,2*	1,0* 1,2* 1,6*	TÜV
UTP A 2522 Mo – G(W) 25 22 2 N L SGX2 CrNiMoN 25 22 2 –	C Si Mn Cr Ni Mo N	0,02 0,3 5,0 25,0 21,5 2,5 0,15	420 MPa 620 MPa 30 % 80 J		Joining and surfacing of corrosion resistant CrNiMo steels. Particularly suited for urea and nitric acid plants. Base materials: 1.4465, 1.4577, 1.4578	2,0* 2,4*	1,2*	TÜV

* available on request

UTP flux cored wires for stainless and acid resistant steels

UTP designation Material No. EN 12073 AWS A5.22	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply spools Ø mm	Approval
UTP AF 6635 1.4351 T 13 4 RM –	C Si Mn Cr Ni Mo	0,025 0,5 1,0 13,0 4,5 0,5	700 MPa 850 MPa 13 % 35 J Tempering 8 h / 580° C		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. Shielding gas: argon with 15 – 20 % CO_2 (M 21) 15 l/min.	1,2*	–
UTP AF 68 LC 1.4316 T 19 9 L RM – ER 308 LT-1	C Si Mn Cr Ni	0,025 0,6 1,5 19,5 10,0	380 MPa 560 MPa 35 % 70 J		Low carbon, CrNi flux-cored wire with rutile slag. The weld metal shows sufficient grain stability up to 350° C and is scaling resistant up to 800° C. Base materials: 1.4301, 1.4303, 1.4306, 1.4308, 1.4312, 1.4541, 1.4543, 1.4550 Shielding gas: argon with 15 – 20 % CO_2 (M 21) 15 l/min.	1,2*	TÜV

* available on request

UTP flux cored wires for stainless and acid resistant steels

UTP designation Material No. EN 12073 AWS A5.22	Weld metal analysis %	Yield strength Tensile strength Elongation Impact strength	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply Spools Ø mm	Appro- vals
UTP AF 68 MoLC 1.4430 T 19 12 3 L RM – ER 316 LT-1	C 0,025 Si 0,6 Mn 1,5 Cr 19,5 Ni 12,5 Mo 2,7	400 MPa 560 MPa 35 % 75 J		Low carbon CrNiMo flux-cored wire with rutile slag for joining and surfacing on CrNiMo- steels and cast steels. The weld metal shows sufficient grain stability up to 400° C and is scaling resistant up to 800° C. Base materials: 1.4401, 1.4404, 1.4406, 1.4435, 1.4436, 1.4571, 1.4580, 1.4583 Shielding gas: argon with 15 – 20 % CO_2 (M 21) 15 l/min.	1,2*	TÜV
UTP AF 6824 LC 1.4332 T 23 12 L RM – ER 309 LT-1	C 0,025 Si 0,6 Mn 1,5 Cr 24,0 Ni 12,0	400 MPa 600 MPa 35 % 60 J		Low carbon flux-cored wire with rutile slag for joining and surfacing alloyed Cr- CrNi steels with non- and low-alloyed steels / cast steels (dissimilar metal joints). Shielding gas: argon with 15 – 20 % CO_2 (M 21) 15 l/min.	1,2*	TÜV

* available on request

UTP combinations of wire and flux for SAW for stainless and acid resistant steels

UTP designation Wire: Material No. AWS A5.9 DIN 8556 Flux: DIN EN 760	Weld metal analysis %	Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v	Application field Base materials	Supply spools Ø mm fluxes	Approval
UTP UP 68 MoLC **UTP UP Fx 68 MoLC** wire: 1.4430 ER 316 L (Si) SGX2 CrNiMo 19 12 flux: SA FB 2 DC	C 0,02 Si 0,6 Mn 1,2 Cr 18,0 Ni 11,6 Mo 2,6 Fe balance	420 MPa 600 MPa 35 % 95 J	UTP UP 68 MoLC in combination with UTP UP Fx 68 MoLC are applied for joining and cladding of stainless steel alloys type 316 L using the submerged arc welding process.	1,6 BS 300 25 kg packing	
UTP UP 6808 Mo **UTP UP Fx 6808 Mo** wire: ~1.4462 ER 22 09 SGX2 CrNiMo 22 8 3 flux: SA FB 2 DC	C 0,02 Si 0,5 Mn 1,2 Cr 22,0 Ni 9,0 Mo 2,8 Ni 0,12 Fe balance	570 MPa 780 MPa 32 % 130 J (RT)	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.	3,0* BS 300 25 kg packing	–

* further diameters are available on request

UTP stick electrodes for heat resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %		Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v	Application field Base materials	Supply Electrodes Ø x Länge mm	Amperage A Current type Welding positions	Appro-vals
UTP 68 Kb 1.4302 – E 19 9 B 20+ E 308 H-15	C Si Mn Cr Ni	0,05 0,3 1,5 19,5 9,5	350 MPa 550 MPa 35 % 70 J	Basic coated 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	2,0 x 250* 2,5 x 300* 3,2 x 350* 4,0 x 400*	40 – 60 50 – 80 90 – 110 100 – 130 = + PA, PB, PC, PE PF	–
UTP 6820 1.4302 E 19 9 R 32 E 19 9 R 26 E 308 H-16	C Si Mn Cr Ni	0,05 0,8 0,9 19,0 9,0	380 MPa 560 MPa 35 % 60 J	Rutile coated electrode for joining and surfacing of heat resistant CrNi steels / cast steels. The deposit is resistant against air and oxidizing gases for working temparatures up to 750° C. Base materials: 1.4301, 1.4948, 1.6901, 1.6902	2,0 x 250* 2,5 x 300* 3,2 x 350* 4,0 x 400*	40 – 60 50 – 90 80 – 110 100 – 140 = + / ~ PA, PB, PC, PE PF	–

* available on request

UTP stick electrodes for heat resistant steels

UTP designation Material No. EN 1600 DIN 8556 AWS A5.4	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength Hardness	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply Electrodes Ø x length mm	Amperage A Current type Welding positions	Appro- vals
UTP 6805 Kb 1.4540 EZ 16 4 Cu B 4 2 E 16 4 Cu B 20+ E 630-15	C Si Mn Cr Ni Cu Nb	0,04 0,4 0,4 16,5 4,5 3,5 0,2	– – – – approx. 35 HRC (after welding) approx. 45 HRC after 4 h/480° C		Basic coated electrode for joinings on base material 1.4540 and surfacings on valve seats and sealing faces. The deposit is age-hardenable. Re-drying: 2 – 3 h at 250 – 300° C.	2,5 x 300* 3,2 x 350* 4,0 x 400*	50 – 75 70 – 110 90 – 150 = + PA, PB, PC, PE PF	–

* available on request

UTP TIG rods and MIG wires for heat resistant CrNi-steels

UTP designation Material No. EN 12072 DIN 8556 AWS A5.9	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength	$R_{p0,2}$ R_m A K_v	Application field Base materials	Supply TIG rods 1000 lg Ø mm	 MIG wires Ø mm	Approval
UTP A 6820 ~1.4302 G(W) 19 9 H SGX5 CrNi 19 9 ER 308 H	C Si Mn Cr Ni	0,05 0,6 1,5 20,0 9,5	400 MPa 580 MPa 35 % 70 J		TIG rods and MIG wires for joining and surfacing of heat resistant CrNi steels / cast steels. The welding deposit has a controlled delta ferrite content and can therefore be used for working temperatures up to 700° C. Base materials: 1.4541, 1.4550, 1.4948, 1.4949	2,0* 2,4*	1,2*	–

* available on request

If it can be welded – we know how.

Group 7

**Silver solders,
brazing alloys,
soft solders, fluxes**

Index

- **Silver solders**
- **Brazing alloys**
- **Soft solders**
- **Fluxes**
- **Various products**

Group 7

**Silver solders,
brazing alloys,
soft solders, fluxes**

Group 7

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, cad-mium-free	351
UTP 306 **UTP 306 M**	AG 102 L-Ag 55 Sn	High-strength silver alloy with 55 % Ag, cadmium-free	351
UTP Trifolie	AG 502 L-Ag 49	Laminated solder with 49 % Ag and copper-middle layer for hard metals, cadmium-free	351

Brazing alloys

	DIN EN 1044 DIN 8513		page
UTP 37	CP 201 L-Cu 8 P	Copper-phosphor brazing alloy with 8 % P	352
UTP 3706	CP 203 L-Cu 6 P	Copper-phosphor brazing alloy with 6 % P	352
UTP 1 **UTP 1 M** **UTP 1 MR**	CU 304 L-CuZn39Sn	Brass type special ductile alloy, particularly for joining hot galvani-zed steel tubes	352
UTP 100	CU 301 L-CuZn40	Brass brazing alloy for universal applications	353
UTP 2 **UTP 2 M** **UTP 2 MR**	CU 305 L-CuNi10Zn42	Ni-containing brass type special brazing alloy for high-strength joi-nings	353
UTP 6 **UTP 6 M** **UTP 6 MR**	Special alloys with 1 % Ag	Ag-containing copper-nickel-zinc brazing alloy for high-strength joi-nings on non- and low-alloyed steels	354
UTP 4	AL 104 L-AlSi 12	AlSi-brazing alloy with low melting point	354

Soft solders and soldering pastes

	DIN EN 29453 DIN 1707		page
UTP 57 **UTP 57 K** **UTP 57 Pa**	5 S-Pb60Sn40 L-PbSn40(S6)	PbSn-alloy 60/40, universally applicable	355
UTP 570 **UTP 570 K** **UTP 570 Pa**	29 S-Sn97Ag3 L-SnAg 5	SnAg-alloy 95/5 used in the food industry	355
UTP 573 **UTP 573 Pa**	24 S-Sn97Cu3 L-SnCu 3	SnCu-alloy 97/3 used for installations	355
UTP 576	25 S-Sn60Pb38Cu2 L-Sn60Pb (Cu)	SnPb-alloy with low working temperature	356
UTP 560	– L-SnZn20	SnZn-alloy with high working temperature	356

Fluxes and various products

	DIN EN 1045 DIN 8511		page
Fluxes for silver solders			
UTP Flux AGF	FH 10 F–SH 1	paste	357
UTP Flux AGX	FH 10 F–SH 1	powder	357
UTP Flux 3 W	FH 10 F–SH 1	powder	357
UTP Flux HF	FH 12 F–SH 1	paste	357

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.

In such cases the UTP Advisory Service is available to our customers at all times.

The information below should help to provide a general overview of the UTP fluxes

Application

After cleaning the brazing zone down to the bright metal and degreasing with tri- or tetrachloroethylene 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)
B	10 % H_2SO_4	(sulphuric acid)
C	10 % HCl	(hydrochloric soda)
D	10 % NaOH	(caustic soda)
E	bis 40 % HNO_3	(nitric acid)

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 Silver solders

UTP designation DIN EN 1044 DIN 8513 DIN EN ISO 3677	Weld metal analysis %	Working temperature Tensile strength R_m El. conductivity	Application field	Supply rods Ø x 500 mm	Fluxes
UTP 36 CP 105 L-Ag 2 P BCu92 PAg645/825	Cu 92 Ag 2 P 6	710° C 250 MPa (on DIN 8525 Cu) 5 Sm/mm²	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. Application fields: electrical engineering industry, water systems with copper pipes and heating - and refrigeration techniques - for working temperatures up to 150° C	1,5* 2,0* 3,0	UTP Flux AGX (for joints of Ni-free copper alloys)
UTP 35 CP 104 L-Ag 5 P BCu89 PAg645/815	Cu 89 Ag 5 P 6	710° C 250 MPa (on DIN 8525 Cu) 6 Sm/mm²	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.	1,5 2,0 3,0	UTP Flux AGX (for joints of copper alloys)
UTP 3515 CP 102 L-Ag 15 P B Cu80AgP645/800	Cu 80 Ag 15 P 5	710° C 250 MPa 7 Sm/mm²	High Ag-containing phosphor-alloy for copper - copper-joints, to be used without flux - for working temperatures up to 150° C. Not to be used for ferrous- and nickel alloys.	1,5* 2,0* 3,0*	UTP Flux AGX (for joints of copper alloys)

* available on request

UTP Silver solders

UTP designation DIN EN 1044 DIN 8513 DIN EN ISO 3677	Weld metal analysis %	Working temperature Tensile strength R_m	Application field	Supply rods Ø x 500 mm	Fluxes
UTP 7 **UTP 7 M** AG 206 L-Ag 20 B-Cu44ZnAg(Si)-690/810	Ag 20 Cu 45 Zn balance	810° C 430 MPa (St 50)	Silver alloy for colour-matching joints on brass, cadmium-free, with good capillary action. For joining steel, stainless steels, nickel and nickel alloys, copper and copper alloys, tungsten carbides, diamonds, both with themselves and with each other.	1,5 2,0 3,0	UTP Flux AGF UTP Flux AGX UTP Flux 3 W
UTP 3030 **UTP 3030 M** AG 204 L-Ag 30 B-Cu38ZnAg-680–765	Ag 30 Cu 38 Zn balance	750° C 430 MPa (S 355)	Cadmium-free silver alloy for joints on steel, copper and copper alloys, nickel and nickel alloys as well as for dissimilar joints. For series production, repair and maintenance.	1,5* 2,0* 3,0*	UTP Flux AGF UTP Flux AGX UTP Flux 3 W
UTP 31 N **UTP 31 NM** AG 306 B-Ag30CuCdZn-600–690	Ag 30 Cu 28 Cd 21 Zn balance	690° C 470 MPa (St 50)	Cadmium-containing silver alloy for joints on steel, copper and copper alloys, nickel and nickel alloys as well as for dissimilar joints. For series production, repair and maintenance.	1,5 2,0 3,0	UTP Flux AGF UTP Flux AGX

* available on request   by adding “M” = flux coated rod

UTP Silver solders

UTP designation DIN EN 1044 DIN 8513 DIN EN ISO 3677	Weld metal analysis %	Working temperature Tensile strength R_m	Application field	Supply rods Ø x 500 mm	Fluxes
UTP 3034 **UTP 3034 M** **UTP 3034 MD** AG 106 L-Ag 34 Sn BCu36AgZnSn-630/730	Ag 34 Cu 36 Sn 3 Zn bal.	710° C 360 MPa (St 37) 480 MPa (St 50)	Cadmium-free silver solder with high tensile strength and good flowing properties for brazed joints with working temperatures up to 200° C. For joining steels, copper and copper alloys, nickel and nickel alloys. Applications are in the food industry.	1,5* 2,0* 3,0*	UTP Flux AGF UTP Flux AGX UTP Flux 3 W
UTP 3040 **UTP 3040 M** **UTP 3040 MD** AG 105 L-Ag 40 Sn B-Ag40CuZnSn-650/710	Ag 40 Cu 30 Sn 2,5 Zn bal.	690° C 450 MPa (St 50)	Cadmium-free silver solder with low working temperature and good flowing properties. For joining steels, stainless steels, copper and copper alloys, nickel and nickel alloys. Applications are in the food industry.	1,5 2,0 3,0	UTP Flux AGF UTP Flux AGX UTP Flux 3 W

* available on request by adding "M" = flux coated rod by adding "MD" = flux coated rod with a minimum amount of flux

UTP Silver solders

UTP designation DIN EN 1044 DIN 8513 DIN EN ISO 3677	Weld metal analysis %	Working temperature Tensile strength R_m	Application field	Supply rods Ø x 500 mm	Fluxes
UTP 3 **UTP 3 M** AG 304 L-Ag 40 Cd B-Ag40ZnCdCu- 595/630	Ag 40 Cu 20 Cd 21 Zn bal.	610° C 480 MPa (St 50)	Cadmium-containing silver solder for joints on steel, stainless steel, nickel and nickel alloys, copper and copper alloys as well as for dissimilar joints. Series production, repair and maintenance. Very low working temperature.	1,5 2,0 3,0	UTP Flux AGF UTP Flux AGX
UTP 3044 **UTP 3044 M** AG 203 L-Ag 44 B-Ag44CuZn-675/735	Ag 44 Cu 30 Zn bal.	730° C 400 MPa (St 37) 480 MPa (St 50)	Cadmium-free silver solder with high tensile strength and good flowing properties for brazed joints up to 300° C. For joining on steel, stainless steel, copper and copper alloys, nickel and nickel alloys. Applications are in the food industry.	1,5* 2,0* 3,0*	UTP Flux AGF UTP Flux AGX UTP Flux 3 W

* available on request by adding "M" = flux coated rod

UTP Silver solders

UTP designation DIN EN 1044 DIN 8513 DIN EN ISO 3677	Weld metal analysis %		Working temperature Tensile strength R_m	Application field	Supply rods Ø x 500 mm	Fluxes
UTP 3046 **UTP 3046 M** AG 104 L-Ag45Sn B-Ag45CuZnSn-640/680	Ag Cu Sn Zn	45 27 3 bal.	670° C 350 MPa (St 37) 430 MPa (St 50)	For gap brazing of steels, stainless steels, copper and copper alloys, nickel and nickel alloys. Working temperatures up to 200° C, resistant to seawater	1,5* 2,0* 3,0*	UTP Flux AGF UTP Flux AGX UTP Flux 3 W
UTP 306 **UTP 306 M** AG 103 L-Ag55Sn B-Ag55CuZnSn-620/655	Ag Cu Sn Zn	55 21 2 bal.	650° C 430 MPa (St 50)	Cadmium-free high-strength silver solder for brazed joining on steel, stainless steel, nickel and nickel alloys, tungsten carbides, both with themselves and with each other. Food industry, high vacuum technology.	1,5 2,0 3,0	UTP Flux AGF UTP Flux AGX UTP Flux 3 W
UTP Trifolie AG 502 L-Ag49 B-Ag49ZnCuMnNi-680/705	Ag Cu Mn Ni Zn	49 27,5 2,5 0,5 bal.	690° C shear strength** 150 – 300 MPa	Laminated high silver containing solder for brazing of wear resistant sheets on unalloyed steel, especially for stress-sensitive tools. Good wetting properties.	strip thickness 0,2 mm* 0,3 mm* 0,4 mm*	UTP Flux AGF UTP Flux AGX UTP Flux 3 W

* available on request
** depending on the Co-content of the carbide tool tip

by adding "M" = flux coated rod

UTP Brazing alloys

UTP designation DIN EN 1044 DIN 8513 DIN EN ISO 3677	Weld metal analysis %	Working temperature Tensile strength R_m	Application field	Supply rods Ø x 500 mm	Fluxes
UTP 37 CP 201 L-Cu8P B-Cu92P-710/770	Cu 92 P 8	710° C 250 MPa (on Cu)	Copper-phosphor brazing rod for joining copper to copper without needing any flux. With flux it can also be used for joining brass and bronze. Not suitable for ferrous- and nickel alloys.	1,5* 2,0* 3,0*	UTP Flux AGX UTP Flux 3 W
UTP 3706 CP 203 L-Cu6P B-Cu94P-710/890	Cu 94 P 6	710° C 250 MPa (on Cu)	Copper-phosphor brazing alloy with wide melting intervall for installations of copper pipes	1,5* 2,0* 3,0*	UTP Flux AGX UTP Flux 3 W
UTP 1 **UTP 1 M** **UTP 1 MR** CU 304 L-CuZn39Sn B-Cu60Zn(Sn)870/900	Cu 60,5 Si 0,35 Sn 0,5 Zn bal.	890° C 420 MPa (St 50)	Brass type special ductile alloy for joining and surfacing on steel, copper, brass, bronzes and grey cast iron. For working temperatures up to 300° C. In combination with a special UTP Flux HLS–B hot galvanized steel tubes can be joined without damaging the zinc layer.	UTP 1 1,5* 2,0 3,0 4,0* UTP 1 M 1,5* 2,0 3,0 4,0* UTP 1 MR 3,2	UTP Flux HLS UTP Flux HLP UTP Flux HLS-B

* available on request by adding "M" = flux coated rod by adding "MR" = flux coated rod with a minimum amount of flux

UTP Brazing alloys

UTP designation DIN EN 1044 DIN 8513 DIN EN ISO 3677	Weld metal analysis %	Working temperature Tensile strength R_m	Application field	Supply rods Ø x 500 mm	Fluxes
UTP 100 CU 301 L-CuZn40 BCu60ZnSi-890/200	Cu 60,0 Si 0,2 Zn balance	900° C 400 MPa (St 50)	Universal brass brazing alloy for joinings on steel, malleable cast steel and copper alloys. Applications are in the production of bicycles, motorcycles and tube structures.	1,5* 2,0 3,0 4,0*	UTP Flux HLS UTP Flux HLP
UTP 2 **UTP 2 M** **UTP 2 MR** CU 305 L-CuNi10Zn42 B-Cu48ZnNi-890/920	Ni 10 Cu 48 Si 0,2 Zn balance	910° C 690 MPa (S 355)	High-strength brazing rod for joining on steel, malleable cast iron and copper alloys. Applications are in the production of bicycles, motorcycles and tube structures.	UTP 2 1,5* 2,0* 3,0* UTP 2 M 2,0* 3,0* UTP 2 MR 3,2*	UTP Flux HLS UTP Flux HLP

* available on request by adding “M” = flux coated rod by adding “MR” = flux coated rod with a minimum amount of flux

UTP Brazing alloys

UTP designation DIN EN 1044 DIN 8513 DIN EN ISO 3677	Weld metal analysis %		Working temperature Tensile strength R_m	Application field	Supply rods Ø x 500 mm		Fluxes
UTP 6 **UTP 6 M** **UTP 6 MR**							
–	Cu	47,0	900° C	High-strength special alloy containing nickel and silver for joints on steel, malleable cast iron, nickel and nickel alloys exposed to severe mechanical loads. Soldering of butt joints on heavily stressed components, sleeveless pipe assembles in vehicle building.	UTP 6	1,5*	UTP Flux HLS
–	Ni	10,0	480 MPa (S 355)			2,0	UTP Flux HLP
–	Si	0,3				3,0*	
	Ag	1,0			UTP 6 M	2,0*	
	Zn	Rest				3,0*	
					UTP 6 MR	3,2*	
UTP 4							
AL-104	Al	88	590° C	Universal aluminium brazing alloy with low melting point for brazing all commercial aluminium casting and forging alloys, expect those containing more than 3 % Mg. Applications are in the vehicle engineering, vessel construction, food industry.		1,5*	UTP Flux 4 Mg
L-AlSi12	Si	12	100 MPa			2,0	
B-Al88Si-575/585						3,0	
						4,0*	

* available on request   by adding “M” = flux coated rod   by adding “MR” = flux coated rod with a minimum amount of flux

UTP Soft solders and soldering pastes

UTP designation DIN EN 29453 DIN 1707 DIN EN ISO 3677	Weld metal analysis %	Working-temperature	Application field	Supply rods Ø x 500 mm	Fluxes
UTP 57 **UTP 57 K** **UTP 57 Pa** 5 S-Pb60Sn40 L-PbSn40(S6) B Pb 60 Sn 183–235	Sn 40,0 Sb 0,2 Pb balance	230° C	UTP 57 - solid wire in ring form, continuous, universally applicable UTP 57 K - flux filled soldering wire UTP 57 Pa - soldering paste, ready for use	1,0* 1,5* 2,0* 3,0*	UTP Flux 57
UTP 570 **UTP 570 K** **UTP 570 Pa** 29 S-Sn97Ag3 L-SnAg5 B Sn 96 Ag 221	Ag 4 Sn balance	220° C	Ag-containing tin solder (lead-, cadmium- and zinc-free) with excellent properties for all non-ferrous and ferrous metals, above all for stain-less steel. Applications are in the food industry.	1,0* 1,5* 2,0* 3,0*	UTP Flux 570 UTP Flux 570 F
UTP 573 **UTP 573 Pa** 24 S-Sn97Cu3 L-SnCu3 –	Cu 3 Sn balance	230 – 250° C	Cu-containing special soft solder for copper tubes in drinking water installations. Recommended by the German plumbers union.	1,5* 2,0* 3,0*	UTP Flux 570 UTP Flux 573

* available on request

UTP Soft solders and soldering pastes

UTP designation DIN EN 29453 DIN 1707 DIN EN ISO 3677	Weld metal analysis %		Working temperature Shear strength	Application field	Supply rods Ø x 500 mm	Fluxes
UTP 576 25 S-Sn60Pb38Cu2 L-Sn60Pb(Cu) B Sn 60 Pb (Cu) 183/190	Sn Pb	60,0 balance	190° C 30 MPa (on Cu) 50 MPa (on S 355)	Soft solder with low working temperature for precision soldering, galvanized fine steels. Electrical industry, electro-tinning.	1,0* 1,5* 2,0* ring form continuous	UTP Flux 570 UTP Flux 570 F UTP Flux 573
UTP 560 – L-SnZn20 B Sn 80 Zn 199/271	Zn Sn	20,0 balance	270° C –	Soft solder with a wide melt interval for repairing defaults on hot galvanized parts.	3,0* 4,0*	UTP Flux 570 UTP Flux 570 F

* available on request

UTP Fluxes

UTP Flux	Group DIN 8511	Groups DIN EN 1045 DIN EN 29 454*	Effective temperature range ° C	Applications	Supply 1/2 and 1/1 boxes
Fluxes for silver solders					
AGF	F–SH 1 (silver solders)	FH 10	500 – 800	Universal silver solder flux	Paste
AGX				Universal silver solder flux	Powder
3 W*				Universal silver solder flux	Powder
HF*	F–SH 1	FH 12	650 – 1000	Silver solder flux for high-frequency induction soldering	Paste
Hartlotflussmittel					
HLP	F–SH 2 (brazing alloys)	FH 21	700 – 950	Universal brazing alloy flux	Powder
HLS				Universal brazing alloy flux	Paste
HLS–B				Special flux for brazing with UTP 1/ UTP 1 MR	Paste
4 Mg	F–LH 1 (aluminium)	FL 10	500 – 700	Universal flux for aluminium casting and forging alloys	Paste

* available on request

UTP Fluxes

UTP Flux	Group DIN 8511	Groups DIN EN 1045 DIN EN 29 454*	Effective temperature range ° C	Applications	Supply 1/2 and 1/1 boxes
Fluxes for welding alloys					
5	special type		800 – 1300	Special flux for oxyacetylene cast iron welding	Powder
34 Sp*	special type		–	Special flux for TIG welding of CuAl-alloys	Paste
Fluxes for soft solders					
570	F–SW 12 (soft solders)	3.1.1.A*	150 – 450	Universal soft solder flux for stainless steels	Liquid (viscous)
570 F				Universal soft solder flux for stainless steels	Liquid
Various products					
Beizpaste CF	Pickling paste for the removal of oxidation colours on austenitic steels. Content: 2 kg				Paste
Herkul	UTP Herkul is a soldering aid. It is mixed with the powder fluxes instead of water, creating a low surface tension so that the flux wets the joint evenly when applied. It is not to be used with aluminium fluxes. Content: 950 ml				Liquid

* 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

Solid rods and wires for aluminium and aluminium alloys

	Standards DIN 1732 Material No.		page
UTP A 493	SG-AlMg 3 3.3536	Aluminium-magnesium 3 %	368
UTP A 495	SG-AlMg 5 3.3556	Aluminium-magnesium 5 %	368
UTP A 495 Mn	SG-AlMg4,5Mn –	Aluminium-magnesium 4,5 % + Mn	369
UTP A 495 MnZr	SG-AlMg4,5MnZr 3.3546	Aluminium-magnesium 4,5 % + Mn and Zr alloyed	369

Solid rods and wires for magnesium alloys

	Standards		page
UTP A 403	Special alloy	Magnesium alloy	370
UTP A 404	Special alloy	Magnesium alloy	370

Solid rods for titanium alloys

	Material No.		page
UTP A 901 Ti	3.7025	Titanium alloy Grade I	371
UTP A 902 Ti	3.7035	Titanium alloy Grade II	371

The welding of Aluminium and Aluminium alloys

The suitable welding processes are

TIG, MIG, manual 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.

If it can be welded – we know how.

UTP Stick electrodes for aluminium and aluminium alloys

UTP designation Material No. DIN 1732 AWS A5.3	Weld metal analysis %		Yield strength Tensile strength Elongation Melting range	$R_{p0,2}$ R_m A	Application field Base materials	Supply Electrodes Ø x length mm Current type	Amperage A Welding- positions	Appro- val
UTP 47 3.0286 EL–Al99,8 ~E 1100	Al others	99,8 0,2 (max.)	> 40 MPa 80 MPa 30 %		Pure aluminium electrode with a special coating for joining and surfacing	2,5 x 350* 3,2 x 350* 4,0 x 350* = +	50 – 70 80 – 100 90 – 130 PA, PB, PF, PC	–
UTP 49 3.0516 EL–AlMn 1 E 3003	Mn Mg Al	1,5 0,2 balance	40 MPa 110 MPa 20 % 648 – 657° C		Aluminium 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 %. Base materials: 3.0506, 3.0515, 3.0525, 3.0526, 3.3535	2,5 x 350 3,2 x 350 4,0 x 350* = +	50 – 70 80 – 100 90 – 130 PA, PB, PF, PC	–

* available on request

UTP Stick electrodes for aluminium and aluminium alloys

UTP designation Material No. DIN 1732 AWS A5.3	Weld metal analysis %		Yield strength Tensile strength Elongation Melting range	$R_{p0,2}$ R_m A	Application field Base materials	Supply Electrodes Ø x length mm Current type	Amperage A Welding- positions	Appro- vals
UTP 485 3.2245 EL–AlSi 5 E 4043	Al Si	95 5	90 MPa 160 MPa 15 % 573 – 625° C		Aluminium electrode with 5 % Si and a special coating for joining and surfacing on aluminium-silicon alloys with a Si content of up to 7 % Si and for joining different Al alloys, e. g. 3.3206, 3.3210, 3.2315, 3.3211, 3.2371, 3.2341, 3.2151	2,5 x 350 3,2 x 350 4,0 x 350* = +	50 – 70 80 – 100 90 – 130 PA, PB, PF, PC	
UTP 48 3.2585 EL–AlSi 12 –	Al Si	88 12	80 MPa 180 MPa 5 % 573 – 585° C		Aluminium 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 Base materials: 3.2581, 3.2583, 3.2383, 3.2381, 3.2373	2,5 x 350 3,2 x 350 4,0 x 350* = +	50 – 70 80 – 100 90 – 130 PA, PB, PF, PC	–

* available on request

UTP TIG rods and MIG wires for aluminium and aluminium alloys

UTP designation Material No. DIN 1732 AWS A5.10	Weld metal analysis %	Yield strength Tensile strength Elongation Melting range	$R_{p0,2}$ R_m A	Application field Base materials Shielding gas: EN 439 I1–argon 100 %	Supply TIG rods 1000 lg Ø mm	 MIG wires Ø mm	Appro- vals
UTP A 47 3.0259 SG–Al99,5 ER 1100	Al 99,5 Si < 0,3 Fe < 0,4	40 MPa 80 MPa 30 % 647 – 658° C		Pure aluminium materials according to DIN 1712, e. g. Al99,5 (3.0255), Al99,7 (3.0275), Al99,8 (3.0285), E Al (3.0257), Al99 (3.0205), as well as aluminium alloys with a Mg-content up to approx. 2 % and a Si-content of 0,5 %.	2,0* 2,5* 3,2*	1,0* 1,2* 1,6*	–
UTP A 47 Ti 3.0805 SG–Al99,5Ti	Al + Ti 99,5 Si < 0,3 Fe < 0,4	> 40 MPa > 70 MPa > 30 %		Joining and surfacing on aluminium materials according to DIN 1712, e .g. Al 99,5, Al 99,7, Al 99,8, Al Mn, E Al Mg Si	2,0 2,5 3,0 4,0	1,0 1,2 1,6	TÜV
UTP A 485 3.2245 SG-AlSi 5 ER 4043	Si 5,0 Mn < 0,2 Fe < 0,4 Al balance	100 MPa 160 MPa 15 % 573 – 625° C		Aluminium-silicon alloy with a Si-content up to 7 % Si also for joining different Al-alloys, e. g. AlMgSi0,5 (3.3206), AlMgSi1 (3.3210), G-AlSi7Mg (3.2371), G-AlSi5Mg (3.2341)	2,0 2,4 3,2	1,0* 1,2 1,6	DB

* available on request

UTP TIG rods and MIG wires for aluminium and aluminium alloys

UTP designation Material No. DIN 1732 AWS A5.10	Weld metal analysis %			Yield strength Tensile strength Elongation Melting range	$R_{p0,2}$ R_m A	Application field Base materials Shielding gas: EN 439 I1–argon 100 %	Supply TIG rods 1000 lg Ø mm	 MIG wires Ø mm	Appro- vals
UTP A 48 3.2585 SG–AlSi 12 ER 4047	Si Mn Fe Al	 < <	12,0 0,3 0,5 bal.	80 MPa 170 MPa 8 % 573 – 585° C		Aluminium-silicon casting alloy with a Si-content up to 7 %, e. g. G–AlSi12 (3.2581), G–AlSi10Mg(Cu) (3.2383), G–AlSi5Mg (3.2373)	2,0 2,4 3,2	1,0* 1,2 1,6	DB
UTP A 493 3.3536 SG-AlMg 3 ~ER 5554	Mg Mn Si Fe Al	 < <	3,0 0,3 0,25 0,4 bal.	100 MPa 200 MPa 20 % 610 – 642° C		Aluminium-magnesium alloy with a Mg-content of 3 % according to DIN 1725, z. B. AlMg1 (3.3315), AlMg2,5 (3.3523), AlMg3 (3.3535), AlMg2,7Mn (3.3537), AlMgSi0,5 (3.3206)	2,0 2,4 3,2	1,0* 1,2 1,6	TÜV DB
UTP A 495 3.3556 SG-AlMg 5 ER 5356	Mg Mn Si Fe Al	 < <	5,0 0,3 0,25 0,4 bal.	120 MPa 250 MPa 25 % 575 – 633° C		Aluminium-magnesium alloy with a Mg-content up to 3 % according to DIN 1725, e. g. AlMg5 (3.3555), AlMg4,5 (3.3345) also for highly loaded joints of lower alloyed Al-Mg-alloys.	2,0 2,4 3,2	1,0* 1,2 1,6	TÜV DB

* available on request

UTP TIG rods and MIG wires for aluminium and aluminium alloys

UTP designation Material No. DIN 1732 AWS A5.10	Weld metal analysis %			Yield strength Tensile strength Elongation Melting range	$R_{p0,2}$ R_m A	Application field Base materials Shielding gas: EN 439 I1–argon 100 %	Supply TIG rods 1000 lg Ø mm	 MIG wires Ø mm	Appro- vals
UTP A 495 Mn									
3.3548 SG–AlMg4,5Mn ER 5183	Mg Mn Si Fe Al	 < < 	5,0 0,8 0,25 0,4 bal.	140 MPa 300 MPa 20 % 574 – 638° C		High strength aluminium-magnesium alloys, e. g. AlMg4,5Mn (3.3547), AlMg4Mn (3.3545), G-AlMg5Si (3.3261)	2,0* 2,5* 3,2*	1,0* 1,2* 1,6*	TÜV DB DNV
UTP A 495 MnZr									
3.3546 SG-AlMg4,5MnZr ER 5087	Mg Mn Cr Zr Al		4,5 0,8 0,25 0,20 bal.	125 MPa 275 MPa 17 %		Aluminium-magnesium alloy with high strength properties for welding AlMg4,5Mn (3.3547), AlMg4Mn (3.3545), G-AlMg5Si (3.3261)	2,0	1,2	DB DNV

* available on request

UTP TIG rods and MIG wires for magnesium alloys

UTP designation	Weld metal analysis %		Yield strength / Tensile strength / Elongation	$R_{p0,2}$ / R_m / A	Application field / Base materials / Shielding gas: EN 439 I1–Argon 100 %	Supply: TIG rods 1000 lg Ø mm	Supply: MIG wires Ø mm	Appro-vals
UTP A 403	Mg Al Zn Mn	bal. 3,0 1,0 0,6	150 MPa 230 MPa 7 %		Maintenance and repair of weldments consisting of magnesium and magnesium alloys	2,0 2,5 3,0	1,2 1,6	
UTP A 404	Mg Al Zn Mn	bal. 5,0 0,2 0,4	120 MPa 230 MPa 10 %		Maintenance and repair of weldments consisting of magnesium and magnesium alloys	2,0 2,5 3,0	1,2 1,6	

* available on request

UTP TIG rods for titanium alloys

UTP designation Material No. AWS A5.16	Weld metal analysis %	Yield strength Tensile strength Elongation	$R_{p0,2}$ R_m A	Application field Shielding gas: EN 439 I1–argon 100 %	Supply TIG rods 1000 lg Ø mm	Appro- vals
UTP A 901 Ti 3.7025 ER Ti1	C < 0,03 Fe < 0,10 O < 0,10 H < 0,005 N 0,0015 Ti balance			Titanium grade 1	1,5 2,0 2,5 3,0	
UTP A 902 Ti 3.7035 ER Ti2	C 0,03 Fe 0,20 O < 0,10 H < 0,008 N 0,020 Ti balance			Titanium grade 2	1,5 2,0 2,5 3,0	

* available on request

If it can be welded – we know how.

Group 9

Welding consumables for low-alloyed steels

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- **Welding consumables for low-alloyed steels**
  - stick electrodes
  - solid rods and wires

Group 9

Welding consumables for low-alloyed steels

Group 9

Welding consumables for low-alloyed steels

Stick electrodes for low-alloyed steels

	Standards EN 499		page
UTP 611	E 42 0 RR 12	Strongly coated rutile electrode, universally applicable	377
UTP 612	E 38 0 RC 11	Medium-strongly coated rutile electrode, ideally for vertical down welds	377
UTP 613 Kb	E 42 5 B 42 H5	Basic-coated structural electrode for highly-stressed welds	377
UTP 614 Kb	E 42 3 B 32 H 10	Basic-coated structural electrode for highly-stressed joints, usable with AC	377
UTP 617	E 38 0 RR 54	Rutile high-performance electro-de with 160 % recovery	378
UTP 62	E 5041Ni Mo B 42 H 5	Basic coated special electrode for high-stressed welds	378
UTP 6020	E 50 0 B 1 2	Basic coated electrode for high-strength tempered fine-grained contructional steels	378
UTP 6025	E 46 82 Ni B 42 H 5	Basic coated electrode	379

Solid rods and wires for low-alloyed steels

UTP stick electrodes for low-alloyed steels

UTP designation EN 499 AWS A5.1	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength		Application field Base materials	Supply Electrodes Ø x length mm	Current type	Appro-vals
UTP 611 E 42 0 RR 12 ~E 6013	C Si Mn	0,07 0,5 0,6	> 380 MPa > 510 MPa > 22 % > 47 J	R_e R_m A K_v	Rutile, strongly coated electrode for joining and surfacing on all kinds of steel structures.	2,0 x 300 2,5 x 350 3,2 x 350 4,0 x 450 5,0 x 450	= – ~	TÜV, ABS DB, BV DNV
UTP 612 E 38 0 RC 11 ~E 6013	C Si Mn	0,05 0,4 0,4	> 390 MPa > 510 MPa > 22 % > 47 J		Medium-strongly coated rutile electrode for steel structures of all kinds, particularly suited for welding at poorly accessible points.	2,0 x 300* 2,5 x 350 3,2 x 350 4,0 x 350	= – ~	TÜV, ABS DB, BV DNV
UTP 613 Kb E 42 5 B42 H5 ~E 7018-1	C Si Mn	0,07 0,4 1,1	> 420 MPa > 510 MPa > 25 % > 120 J		Basic coated electrode for highly-stressed joints on structural-, boiler-, tube- and fine-grained steels.	2,5 x 350 3,2 x 350 4,0 x 350 5,0 x 450	= +	TÜV, ABS DB, BV DNV
UTP 614 Kb E 42 3 B 32 H 10 E 7018	C Si Mn	0,06 0,7 0,9	> 400 MPa > 510 MPa > 22 % > 80 J		Basic coated electrode for highly-stressed joints. Particularly suited for welds in awkward positions.	2,0 x 300 2,5 x 350 3,2 x 450 4,0 x 450 5,0 x 450	= + ~	TÜV DB

* available on request

UTP stick electrodes for low-alloyed steels

UTP designation EN 499 AWS A5.1 / A5.5	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength	R_e R_m A K_{v**}	Application field Base materials	Supply Electrodes Ø x length mm	Current type	Appro- vals
UTP 617 E 38 0 RR 54 E 7024	C Si Mn	0,05 0,4 0,4	390 MPa 510 MPa 22 % 47 J at 0° C		Rutile high-performance electrode with 160 % recovery. High deposition rate, long weldments, especially for fillet welds in flat position.	2,5 x 350* 3,2 x 450* 4,0 x 450*	= – ~	–
UTP 62 E 50 41 NiMoB 42 H 5 E 9018-G	C Si Mn Mo	0,08 0,5 1,6 0,5	> 550 MPa 610 – 780 MPa > 20 % > 120 J		Basic coated special electrode for high-stressed joints, weldable in all positions, except vertical-down, high temperature applications.	2,5 x 350* 3,2 x 450* 4,0 x 450*	= + ~	–
UTP 6020 E 50 0 B 1 2 E 11018 M	C Si Mn Ni Cr Mo	0,06 0,4 1,6 1,8 0,3 0,4	665 MPa 765 MPa 18 % 82 J		Basic coated electrode for high-strength tempered fine-grained steels with R_m up to 900 MPa. Repair welds on high-stressed constructional parts. Weldable in all positions, except vertical-down.	2,5 x 350* 3,2 x 350* 4,0 x 350* 5,0 x 450*	= + ~	–

* available on request

** ISO-V-test, after welding, min value at RT.

UTP stick electrodes for low-alloyed steels

UTP designation EN 499 AWS A5.1 / A5.5	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength	R_e R_m A K_v	Application fields Base materials	Supply Electrodes Ø x length mm	Current type	Appro- vals
UTP 6025 E 46 82 Ni B 42 H 5 E 8018-C 1	C Si Mn Ni	0,05 0,3 1,0 2,6	460 MPa 540 MPa 24 % 110 J		Basic coated electrode, cold-tough down to – 100° C untreated down to – 140° C tempered all positions, except vertical-down, crack-resistant, ageing resistant. Cold-tough Ni-alloyed steels.	2,5 x 350* 3,2 x 350* 4,0 x 450*	= +	TÜV

* available on request

UTP MIG wires for low-alloyed steels

UTP designation Material No. DIN EN 440 AWS A5.18/5.28	Weld metal analysis %		Yield strength Tensile strength Elongation Impact strength	$R_{p0,2}$ R_m A K_v	Application field Base materials Shielding gas: EN 439 M1 – M3 and CO_2	Supply MIG wires Ø mm	Appro- vals
UTP A 118 1.5125 G3Si1 ER 70 S–6	C Si Mn	0,10 0,9 1,5	410 MPa 540 MPa 24 % 78 J		MIG wire for universal applications in the boiler - and container construction and in mechanical engineering (machine construction). It is weldable with mixed gas and CO_2. St 37 - St 52, sheets plates H I, H II, 17Mn4; tube steels St 35 St 45, St 35 8; St 45.8; fine grained construction steels up to StE 420.	0,8* 1,0* 1,2* 1,6*	–
UTP A 119 1.5130 G4Si1 ER 70 S–6	C Si Mn	0,08 0,9 1,7	460 MPa 560 MPa 24 % 80 J		MIG wire for construction welding with higher requirements. It is weldable with mixed gas and CO_2. It is also suited for out-of-position welding in the short-arc parameter range. Low spatter losses. St 37 - St52, boiler sheets H , H II, 17Mn4, 19Mn5; tube steels St 35, St45, St35.8, St 45 8; fine-grained construction steels up to StE 420.	0,8* 1,0* 1,2* 1,6*	–

* available on request

UTP TIG rods and MIG wires for low-alloyed steels

UTP designation DIN EN 12534 AWS A5.28	Weld metal analysis %		Yield strength $R_{p0,2}$ Tensile strength R_m Elongation A Impact strength K_v	Application field Base materials Shielding gas: EN 439 M1, M2	Supply TIG rods 1000 lg Ø mm	 MIG wires Ø mm	Appro- vals
UTP A 6020 G Mn4Ni1,5CrMo ER 100S-G	C Si Mn Cr Ni Mo Fe	0,10 0,50 1,60 0,30 1,40 0,30 bal.	670 – 755 MPa 760 – 810 MPa 20 % > 70 J at RT	Rods and wires, medium alloyed, used in quenched and tempered and thermic treated fine grain construction steels such as StE 620 – 690. Naxtra GS, 70 QStE 690 TM. It is weldable with shielding gas M 21 or CO_2	2,0* 2,5* 3,2*	1,0* 1,2* 1,6*	TÜV DB DNV
UTP A 6025 G Mn2Ni2 ER 80 S–Ni 2	C Si Mn Ni	0,10 0,6 1,1 2,5	500 MPa 600 MPa 22 % 120 J 80 J / – 40° C untreated	Cold tough sheets and tube steels used in the refrigeration industry and fine grain steels for operating temperatures down to – 80°C 12 Ni 14 G1, X 12 Ni 514 Ni6, P–,S275NL2 – P–,S500QLI; 13 MnNi 6-3. Container- and pipeline construction, machine parts	2,0* 2,4* 3,0*	0,8* 1,0* 1,2*	TÜV

* available on request

If it can be welded – we know how.

Group 10

Plasma- and 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

Please ask for our detailed brochure

“UTP Powder Range for Surface Coating”.

Group 10

Plasma- and flame spraying powders

Group 10

Plasma- and flame spraying powders

UTP EXOBOND flame spraying powders

UTP UNIBOND flame spraying powders

UTP HA-BOND flame spraying powders

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UTP PTA metal powders

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If it can be welded – we know how.

UTP EXOBOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition in %	Hardness index	Characteristics and application fields
UTP EB–1001 5.1 – 106/36	– 106 + 36 µm	Al 5,0 Ni balance	150 – 190 HB	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	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	Corrosion resistant base layer for subsequent coats, resistant to high temperatures. Corrosion resistant “one-step”-surfaces.
UTP EB–1005* 1.5 – 45/5,6	– 45 + 5,6 µm	Mo and traces	510 HV	Dense and hard surfaces, abrasive wear, metal-to-metal sliding; piston rings, pistons, cylinders.
UTP EB–1020* 1.9 – 106/45	– 106 + 45 µm	Al and traces	30 HB	Corrosion protection in industrial and maritime environments, heat corrosion, machining of defective aluminium workpieces.

* These qualities are not stocked as standard, available on request

UTP EXOBOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition (in %)	Hardness index	Characteristics and application fields
UTP EB–1025 –	– 125 µm	Zn > 99,5	23 HB	Active corrosion protection on steel under atmospheric stresses
UTP EB–1030* 1.8 – 160/45	– 160 + 45 µm	Cu > 99,5	85 HRB	Coatings providing good electrical conductivity;electrical control buses, creation of soldering surfaces, electrical industry
UTP EB–1050* 11.11 – 45/5.6	– 45 + 5.6 µm	Co 12 WC 88	800 HV	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 bal.	160 – 230 HV	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 bal.	350 – 380 HB	Oxidation stability at moderate temperatures, high wear resistance; camshafts, bearings of rollings, cylinder liners, valve stems, hydraulic pistons, sliding ways etc

* These qualities are not stocked as standard, available on request

UTP EXOBOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition (in %)	Hardness index	Characteristics and application fields
UTP EB–2003 8.1 – 120/36	– 120 + 36 µm	Al 10,0 Cu balance	130 HB	Good sliding and emergency running properties; rollers, bearing journals, slideways.
UTP EB–2005 –	– 106 + 36 µm	Ni, Cr, Si, B, Fe, Al with the addition of tungsten carbide	400 HV (matrix)	Abrasion resistance for micro-particle surfacings, good oxidation stability; ventilator blades.
UTP EB–2007 6.5 – 106/36	– 106 + 36 µm	C 0,02 Si 0,7 Cr 17,0 Ni 12,5 Mo 2,2 Fe balance	180 HB	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	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 index	Characteristics and application fields
UTP EB–4010 –	– 125 + 45 µm	C 0,2 Si 0,7 Cr 16,0 Ni 2,0 Mn 0,7 Fe balance	260 – 350 HV	Chromium steel alloy with high oxidation stability, good machinability; coatings on bearing journals, shafts, piston 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	"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 index	Characteristics and application fields
UTP UB 5–2525 A* 2.3 – 125/36	– 125 + 36 µm	C 0,05 Fe 0,4 B 1,8 Si 2,8 Ni balance	230 HV	Well suited to machine cutting; mould construction, glass industry.
UTP UB 5–2540 2.10 – 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	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.
UTP UB 2–2650* 2.24 – 125/45	– 125 + 45 µm	C 0,75 Ni 13,0 Cr 19,0 B 1,7 Fe 3,0 Si 2,5 W 7,5 Co balance	400 – 460 HV	Resistant to changes in temperature, impact and corrosion; valve seats, knife edges, shears and scissor blades, friction bearings, hot punching tools.

* These qualities are not stocked as standard; available on request

UTP UNIBOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition (in %)	Hardness index	Characteristics and application fields
UTP UB 5–2550* 2.12 – 125/45	– 125 + 45 µm	C 0,45 Cr 11,0 B 2,2 Si 3,7 Fe 3,0 Ni balance	50 HRC	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 B 3,7 Cr 16,5 Fe 2,9 Cu 3,0 Mo 3,0 Ni balance Si 4,2	55 – 60 HRC	Toughened coatings; valve stems, mixer and stirrer shafts, bearing seats, wearing rings, pump shafts, impellers.
UTP UB 5–2760 2.16 – 125/45	– 125 + 45 µm	C 0,75 Fe 3,5 Cr 15,0 B 3,2 Si 4,4 Ni balance	60 HRC	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)	High abrasion resistance; stirrers, mixer blades, mould edges, extruder screws.

* These qualities are not stocked as standard; available on request.

UTP UNIBOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition (in %)	Hardness index	Characteristics and application fields
UTP UB 5–2756 X4* –	– 125 + 45 µm	NiCrBSi with the addition of 45 % tungsten carbide	55 HRC (matrix)	Special mixing powder with high abrasive wear resistance, also particularly suited for thin coating thickness applications, 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)	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)	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.

* These qualities are not stocked as standard; available on request

UTP HABOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition (in %)	Hardness index	Characteristics and application fields
UTP HA – 032* ~8.4 – 80/40	– 80 + 40 µm	Cu 89 Sn 11	140 – 190 HB	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 bal.	170 – 240 HV	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 bal.	205 – 260 HV	Repair surfacing, high impact resistance, press moulds, bearings, pump vanes.
UTP HA – 3 G –	– 106 + 20 µm	C 0,02 Fe 0,3 B 1,1 Si 2,3 others Ni balance	190 – 250 HV	For special applications in the glass industry. It is usable for repair coating and new coating on pre moulds and ready moulds. Orifices and blow heads. It is also suited for applications in machine factories, in steel works and in the mining industry. Suitable on steel surfacing, casting steel, grey cast steel and stainless steels.

* These qualities are not stocked as standard; available on request.

UTP HABOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition (in %)	Hardness index	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	Good wettability and smooth surfaces; surfacing on cast parts, moulds in the glass industry.
UTP HA – 2 2.3 – 106/20	– 106 + 20 µm	C 0,05 Fe 0,5 Si 3,0 B 1,6 Ni balance	260 – 310 HV	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.
UTP HA – 2 G –	– 106 + 20 µm	C 0,02 Fe 0,2 Si 2,4 B 0,7 others Ni balance	210 – 260 HV	For special applications in the glass industry such as water marks, guide rings, neck moulds, ground moulds, blow heads, funnel shapes and ground end shapes. Suitable also for wave shapes, valve cones and gear wheels. Suited for surfacing on grey cast iron, cast steel, steel and stainless steel.

UTP HABOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition (in %)	Hardness index	Characteristics and application fields
UTP HA – 2321* ~2.10 – 71/20	– 71 + 20 µm	C 0,3 Cr 7,0 B 1,3 Si 3,5 Fe 3,0 Ni balance	35 HRC	Good resistance to corrosion and oxidation at raised temperatures; surfacing of glass moulds, pressing moulds, bearing seats, shaft and seal sections in the chemical industry.
UTP HA – 5–79* –	– 106 + 20 µm	NiCrBSiFeCuSn	33 – 39 HRC	For the hot process with high oxidation -, heat -, and corrosion resistance, such as dies, pressing tools, cams, eccentric wheels or eccentric press, etc.
UTP HA – 5 2.10 – 106/20	– 106 + 20 µm	C 0,25 Fe 2,5 Cr 7,5 Si 3,5 B 1,8 Ni balance	40 HRC	Good resistance to corrosion and wear even at high operating temperatures; drawing dies, forging dies, tools in the plastics industry, ejector pins.

* These qualities are not stocked as standard; available on request.

UTP HABOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition (in %)	Hardness index	Characteristics and application fields
UTP HA – 06 2.24 – 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	Resistant to changes in temperature, impact and corrosion; valve seats, knife edges, shears and scissor blades, friction bearings, hot punching tools.
UTP HA – 6* 2.12 – 106/20	– 106 + 20 µm	C 0,45, Cr 11,0, Ni balance, B 2,3, Si 3,8, Fe 2,9	50 HRC	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 2.16 – 106/20	– 106 + 20 µm	C 0,75, Fe 3,5, Cr 15,0, Ni balance, B 3,2, Si 4,5	60 HRC	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)	High level of protection against abrasive wear; slicing machine blades, conveyor chains, kneader parts.

* These qualities are not stocked as standard; available on request.

UTP HABOND flame spraying powders

UTP designation EN 1274	Grain size	Chemical composition (in %)	Hardness index	Characteristics and application fields
UTP HA – 8 SS –	– 106 + 20 µm	NiCrCoFeBSi with the addition of 55 % tungsten carbide	60 HRC (matrix)	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)	Metal tungsten melting carbide mixing powder for thermal spraying and simultaneous melting for the automatic coating process such as hardfacing of wear intensive surfaces.

* 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 index	Characteristics and application fields
UTP PTA 2-701.10 7.1 – 150/50	– 150 + 50 µm	Cr	30,0	Fe	2,0	53 HRC	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
		W	13,0	Si	1,0		
UTP PTA 2-701.11 7.1 – 200/63	– 200 + 63 µm	C	2,4	Ni	2,0		
		Co	balance				
UTP PTA 2-706.10 7.2 – 150/50	– 150 + 50 µm	Cr	29,0	Ni	2,0	41 HRC	
		W	4,0	Fe	1,0		
UTP PTA 2-706.11 7.2 – 200/63	– 200 + 63 µm	C	1,0	Si	1,0		
		Co	balance				
UTP PTA 2-708.10 7.6 – 150/50	– 150 + 50 µm	Cr	26,0	C	1,7	45 HRC	
		Ni	23,0	Fe	2,0		
UTP PTA 2-708.11 7.6 – 200/63	– 200 + 63 µm	W	12,0	Si	1,0		
		Co	balance				
UTP PTA 2-712.10 7.3 – 150/50	– 150 + 50 µm	Cr	29,0	C	1,5	48 HRC	
		W	9,0	Fe	2,0		
UTP PTA 2-712.11 7.3 – 200/63	– 200 + 63 µm	Co	balance	Si	1,5		

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 index	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	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	Highly wear-resistant, preferred for protection against mineral wear with low impact; feed screws, excavator teeth.
UTP PTA 5-068HH.10 ~3.4 – 150/50 **UTP PTA 5-068HH.11** ~3.4 – 200/63	– 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	Buffer layer preferred for stellite qualities, corrosion-resistant; pressure vessel construction, petrochemical industry, power plants.
UTP PTA 5-776.10 3.5 – 150/50 **UTP PTA 5-776.11** 3.5 – 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	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.

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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 cm²)	J
K_v (DVM)	Impact strength acc. to DVM (Deutscher Verband für Materialprüfung) specimen with round notch (impact section 0,7 cm²)	J

MPa = Megapascal
J = Joule

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/m^3] :	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/m^3] :	5.72
melting point [°C]:	817
lattice width [A] :	4.14
atomic radius [A] :	1.39

Chemical symbol: As

Also restricts 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/m^3] :	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/m^3] :	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/m^3] :	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/m^3] :	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/m^3] :	
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/m^3] :	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/m^3] :	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/m^3] :	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/m^3] :	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/m^3] :	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/m^3] :	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/m^3] :	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/m^3] :	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/m^3] :	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		**Chemical symbol: Pb**
ordinal number:	82	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.
crystal structure:	kfz	
density [kg/m^3] :	11.36	
melting point [°C]:	327	
lattice width [A] :	4.95	
atomic radius [A] :	1.75	
E-module [103 MPa] :	16.2	
SULPHUR		**Chemical symbol: S**
ordinal number:	16	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.
crystal structure:	ortho-rhomb.	
density [kg/m^3] :	2.07	
melting point [°C]:	119	
atomic radius [A] :	1.27	
ANTIMONY		**Chemical symbol: Sb**
ordinal number:	51	A steel parasite, as it generally significantly reduces toughness properties; restricts the gamma phase.
crystal structure:	rhomb.	
density [kg/m^3] :	6.62	
melting point [°C]:	630	
lattice width [A] :	4.5	
atomic radius [A] :	1.59	
E-module [103 MPa] :	54.9	
SELENIUM		**Chemical symbol: Se**
ordinal number:	34	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.
crystal structure:	rhomb.	
density [kg/m^3] :	4.19	
melting point [°C]:	221	
atomic radius [A] :	1.40	

SILICON

ordinal number:	14
crystal structure:	diamond
density [kg/m^3] :	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/m^3] :	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/m^3] :	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/m^3] :	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.

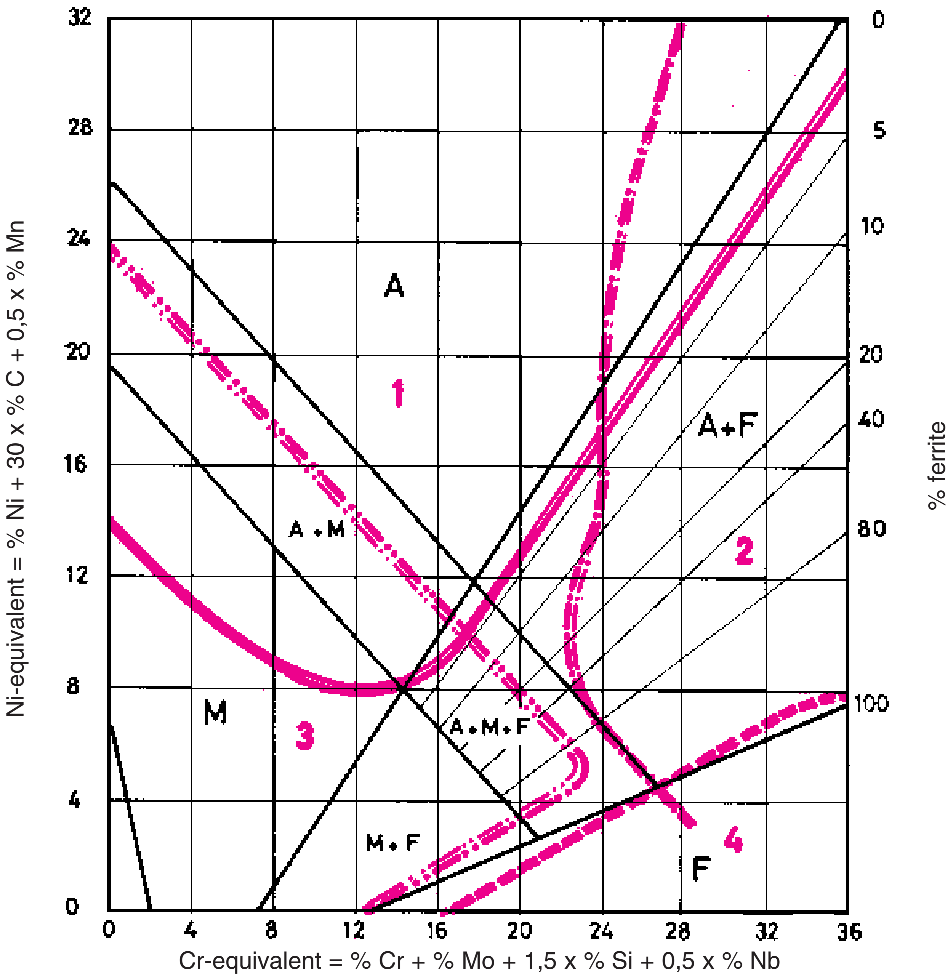
In corrosion resistant steels, it reduces resistance to a lesser degree than sulphur.

Contents up to 0.2 % improve the machinability.

TITANIUM		**Chemical symbol: Ti**
ordinal number:	22	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.
crystal structure:	hexagonal	
density [kg/m^3] :	4.50	
melting point [°C]:	1660	
lattice width [A]:	2.95/4.7	
atomic radius [A] :	1.47	
E-module [103 MPa]:	106	
TUNGSTEN		**Chemical symbol: T (German W)**
ordinal number:	74	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 ultrahard 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.
crystal structure:	cubic, bc	
density [kg/m^3] :	19.3	
melting point [°C]:	3410	
lattice width [A]:	3.16	
atomic radius [A] :	1.39	
E-module [103 MPa]:	368	
VANADIUM		**Chemical symbol: V**
ordinal number:	23	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.
crystal structure:	cubic, bc	
density [kg/m^3] :	5.96	
melting point [°C]:	1890	
lattice width [A]:	3.03	
atomic radius [A] :	1.34	
E-module [103 MPa]:	127	
ZIRCONIUM		**Chemical symbol: Zr**
ordinal number:	40	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.
crystal structure:	hexagonal	
density [kg/m^3] :	6.49	
melting point [°C]:	1852	
lattice width [A]:	3.23/5.1	
atomic radius [A] :	1.60	
E-module [103 MPa]:	92.2	

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/m^2], [MPa]	1	[N/mm^2]
1 [lbf/in]	6.895* 10^3	[N/m^2]
1 [tonf/in]	15.444* 10^6	[N/m^2]
1 [ksi]	6.895	[N/mm^2]
1 [bar]	1* 10^5	[N/m^2]
1 [Torr] (1mmHg)	133.322	[N/mm^2]

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 [ft^3/h]	0.4719	[l/min]
1 [ft^3/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/cm^2]	0.8	[J]
1 [ft.lb/in^2]	0.168122	[J]

Hydrogen Content :

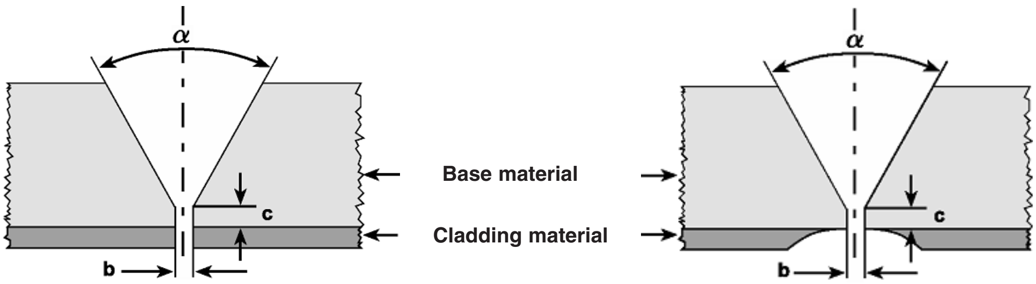
source	target	
1 [ppm H]	1/0.9	[ml/100g] H
1 [cal/g]	4.1868	[kJ/kg]

Groove preparation

For the base material side the grooves are prepared, according to choice, in a V or U form. The included angle α 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

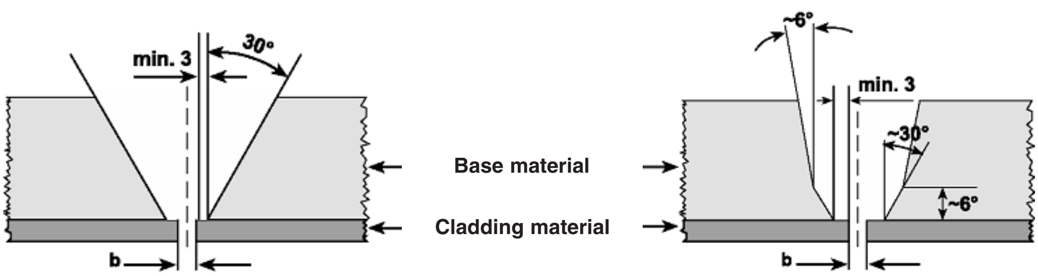
Finish A **Finish B**



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**



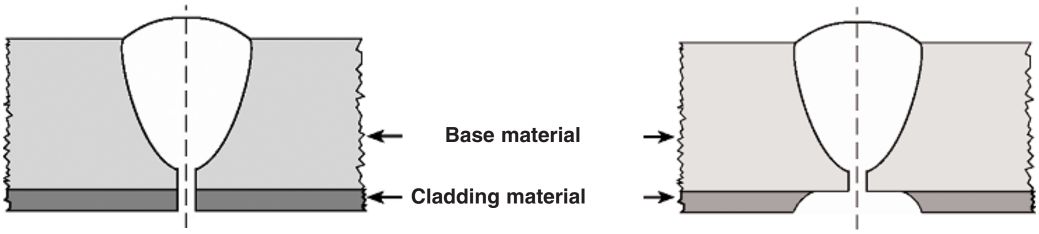
The safety distance of min 3 mm is indispensable for both finishes in order to avoid that the dilution of the weld deposit with the base material affects the clad joint. Size b is aligned in accordance with the chosen weld process.
Welding of the seam: the whole seam is welded with the consumable for 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.

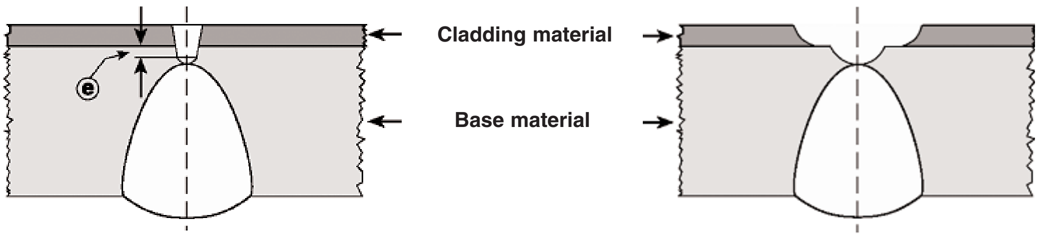
1) Welding of parent material

Finish A **Finish B**



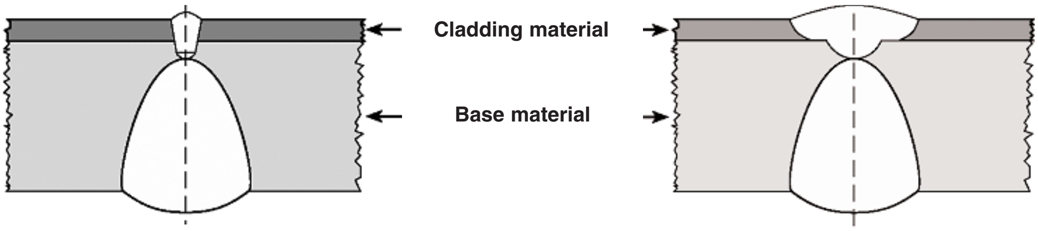
The parent material is welded with suitable matching or similar consumable.
The cladding must not be melted by the root layer.

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.

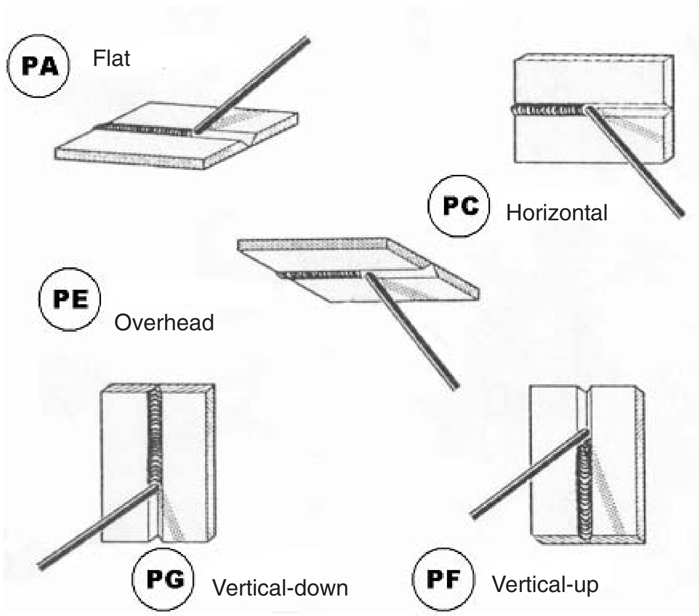
3) Welding of cladding



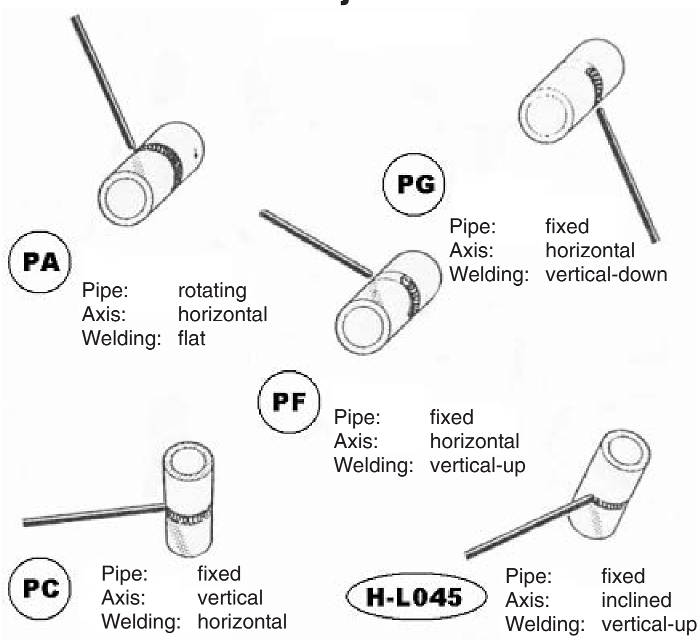
Finish welding of the joint on the clad side with a consumable matching to or higher alloyed than the cladding, which is sufficient to meet the demands made on the cladding with regard to durability.

Welding positions according to DIN EN 287

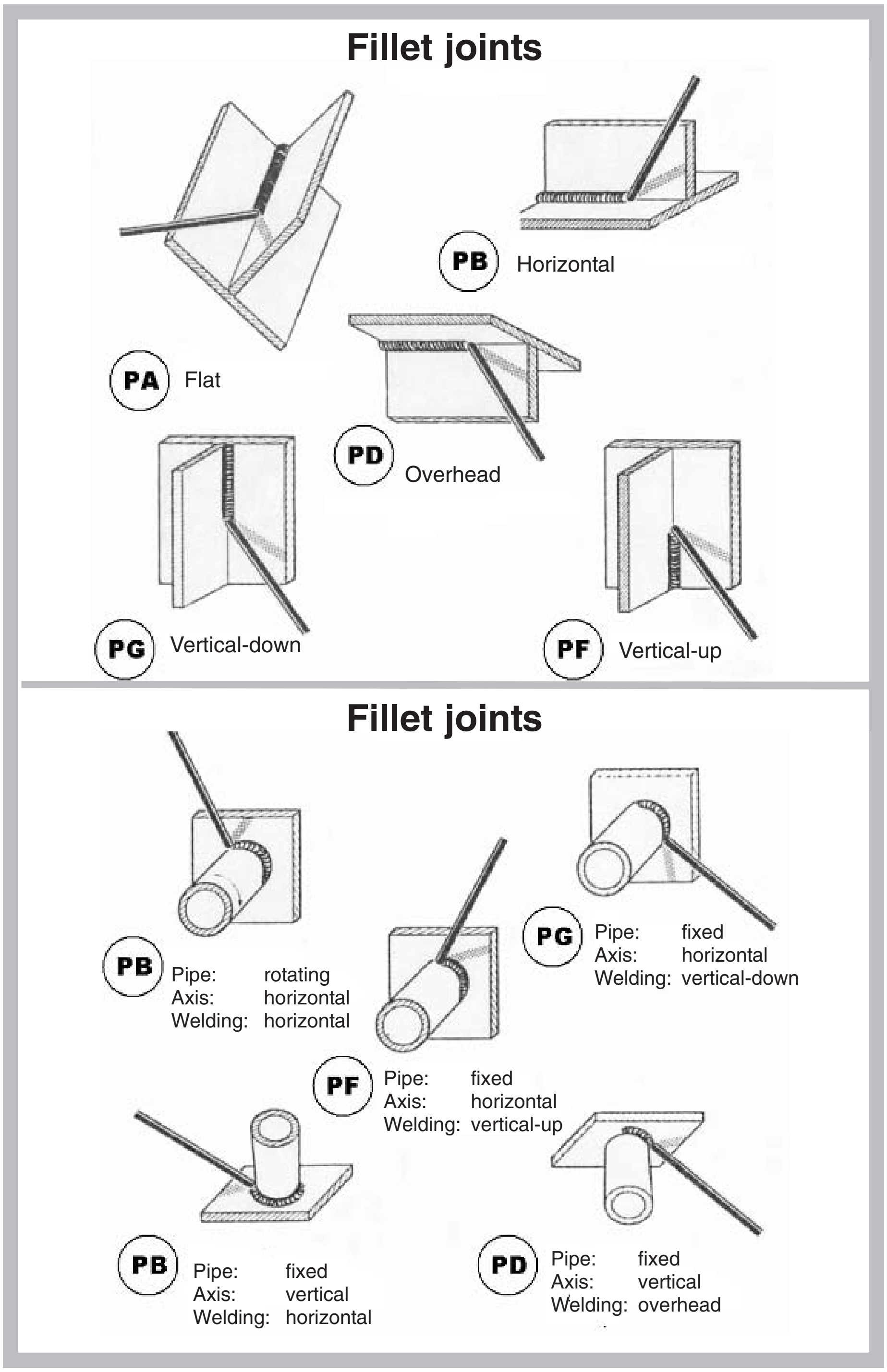
Butt joints



Butt joints



Welding positions according to DIN EN 287



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

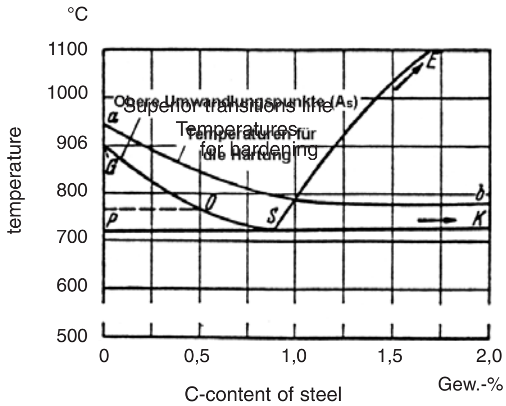
2 Flame with excess oxygen (oxidizing)

3 Flame with excess acetylene (reducing or carburizing)

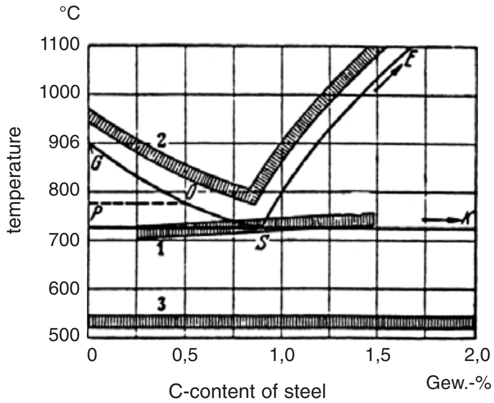
Average flame temperature with different gas-combinations:

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 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

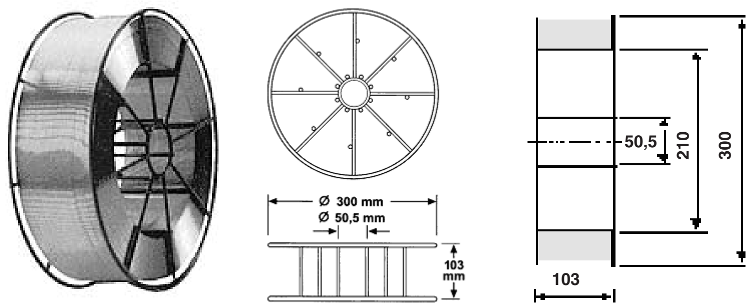
All certificates issued in conformity with EN 10 204 must be paid for and are charged separately.

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 continuous production records
Inspection certificate “3.1”	The manufacturer’s authorized representative independent of the manufacturing department	Specific test results determined from the consignment or representative lot of this consignment
Inspection certificate “3.2”	The purchaser’s authorized representative	Specific test results determined from the consignment or representative lot of this consignment

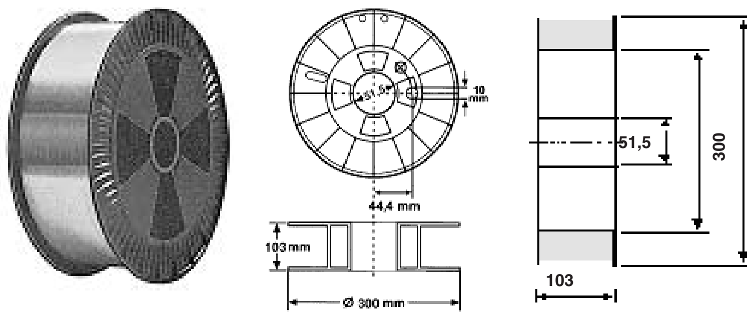
Forms of Supply

Wire Basket Spool



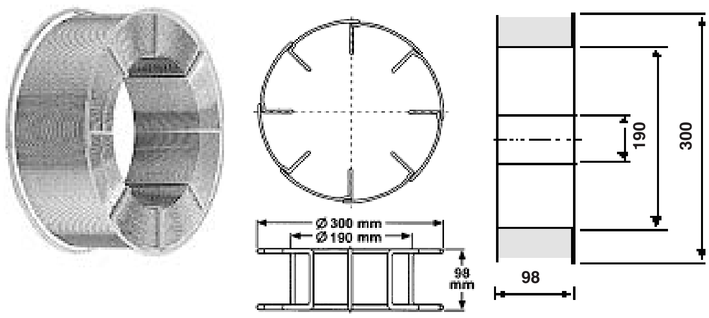
DIN EN ISO 544		Content kg of wire	Packaging
BS 300	Layer winding. The spool is made of plastified wire.	7 • 7,5 • 15 18 • 20	outer carton

MIG Spool (Plastic)



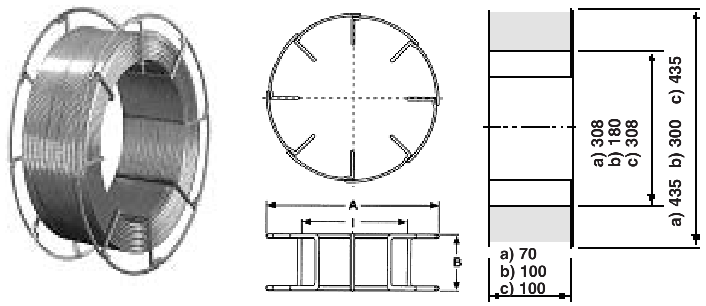
DIN EN ISO 544	Outer diameter	Center hole diameter	Overall width	Driving hole		Content Kg of wire	Packaging
				diameter	distance to center		
S 100	100	16,5	45	–	–	0,7	outer carton
S 200	200	50,5	55	10	44,5	5	
S 300	300	51,5	103	10	44,4	7 • 7,5 12 • 15	

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**	**Nickel** **Nickel alloys**	**Copper**	**Brass**	**German silver**	**Bronzes**	**Aluminium and Al-alloys (up to 3 % Mg content)** **Al-cast**
Aluminium and Al-alloys (up to 3 % Mg content) **Al-cast**							4 + 57 P	4 + 57 P			48, 49, 4
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	80 M, 80 Ni, 1, 34 N, 3, 6 3040	34 N, 320, 39 34, 80 M, 1, 6 35, 3, 3040 570	34 N, 320, 39 34, 80 M, 1, 6 35, 3, 3040 570	34 N, 320 32, 34, 1, 6 3, 3040 570, 7	34 N, 34, 32 320, 1, 3, 6 7, 3040, 570	
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	80 Ni, 80 M 34 N, 68 HH 2, 306	39, 34 N, 387 1, 2, 3, 3040 7, 570	34 N, 34 387, 1, 3 3040, 7, 570	34 N, 2, 3 3040, 387 570, 7		
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	34 N, 34 1, 3, 3040, 306, 570, 7	34 N, 34 387, 1, 3 3040, 7, 570	34 N, 320 1, 3, 3040, 570, 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	80 Ni, 80 M 68 HH, 34 N 1, 2, 306, 3 3040, 570	39, 38, 35, 37, 3, 3040 570				
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	80 Ni, 80 M 68 HH 3, 3040 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 medium 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										

Approvals of UTP consumables

(Data 01.07.06)

UTP Type	TÜV	KTA	ABS	DB	GL	BV	DNV	C	VdS
068 HH	Z	Z	Z		Z	Z	Z	Z	
A 068 HH	Z	Z	Z		Z		Z	Z	
AF 068 HH	Z								
UP 068 HH + UP Fx 068 HH	Z								
1					Z				Z
8				Z					
8 C				Z					
A 34					Z				
34 N				Z					
A 34 N				Z					
39				Z					
A 47 Ti	Z			Z					
A 48				Z					
A 63	Z			Z					
65				Z					
68	Z		Z		Z				
A 68	Z								
68 HH	Z								
68 LC	Z		Z		Z			Z	
A 68 LC	Z							Z	
AF 68 LC	Z								
68 Mo	Z								
A 68 Mo	Z								
68 MoLC	Z		Z	Z	Z		Z	Z	
A 68 MoLC	Z				Z			Z	
AF 68 MoLC	Z								
68 TiMo	Z								
A 73 G 3	Z								
A 73 G 4	Z								
80 M	Z		Z		Z			Z	
A 80 M	Z		Z		Z			Z	
80 Ni	Z								
A 80 Ni	Z		Z						
86 FN				Z					
A 118	Z			Z					
A 119	Z			Z					
387	Z				Z			Z	
A 387	Z				Z			Z	
389	Z								

Approvals of UTP consumables

(Data 01.07.06)

UTP Type	TÜV	KTA	ABS	DB	GL	BV	DNV	C	VdS
A 485				Z					
A 493	Z			Z					
A 495	Z			Z					
A 495 Mn	Z			Z			Z		
A 495 MnZr				Z			Z		
611	Z			Z			Z		
612	Z		Z	Z		Z	Z		
613 Kb	Z		Z	Z		Z	Z		
614 Kb	Z			Z	Z				
653				Z					
A 661	Z								
683 LC				Z					
684 MoLC	Z				Z		Z	Z	
A 703	Z								
704 Kb	Z							Z	
A 704	Z							Z	
759 Kb	Z							Z	
A 759	Z				Z			Z	
776 Kb	Z							Z	
A 776	Z							Z	
1817	Z								
A 1817	Z								
1925	Z								
A 1925	Z								
2133 Mn	Z							Z	
A 2133 Mn	Z							Z	
A 2522 Mo	Z								
2535 Nb								Z	
A 2535 Nb								Z	
3127 LC	Z								
A 3127 LC	Z								
A 3128 Mo	Z								
A 3133 LC	Z								
A 3422					Z				
A 3444	Z								
4225	Z								
A 4225	Z								
5020 Mo	Z								
A 5020 Mo	Z								
6025	Z								

Approvals of UTP consumables

(Data 01.07.06)

UTP Type	TÜV	KTA	ABS	DB	GL	BV	DNV	C	VdS
A 6025	Z								
6170 Co	Z								
A 6170 Co	Z								
A 6202 Mo	Z								
6222 Mo	Z		Z		Z	Z	Z	Z	
A 6222 Mo	Z		Z		Z		Z	Z	
UP 6222 Mo + UP Flux 6222 Mo	Z								
A 6225 Al	Z								
6635	Z								
A 6635	Z								
6808 Mo	Z							Z	
A 6808 Mo	Z				Z				
6809 Mo	Z								
6824 LC	Z				Z		Z	Z	
A 6824 LC	Z				Z			Z	
AF 6824 LC	Z								
6824 MoLC								Z	
A 6824 MoLC	Z								
7010	Z	Z							
7013 Mo						Z			
7015	Z	Z			Z		Z	Z	
7015 HL	Z					Z			
7015 Mo	Z				Z		Z	Z	
7200				Z					
CELSIT V	Z	Z							
A CELSIT 706V	Z	Z							
CHRONOS				Z					
DUR 350				Z					
DUR 600				Z					

Approval companies:

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
	C	Vereinigung voor Controlle op Ladgebied Controlas
	VdS	Verband der Sachversicherer

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.

Edition: August 2006

If it can be welded – we know how.