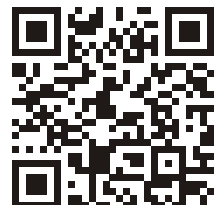




- Solid wire electrodes
- Flux cored wire electrodes
- TIG
- Gas welding rods
- MMA
- Submerged-arc welding
- Packaging

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# Bescheinigung

über die laufende Überwachung eines Herstellers von Schweißzusätzen  
gemäß VdTÜV-Merkblatt Schweißtechnik 1153:2017  
**Eignungsprüfung von Schweißzusätzen**

**EWM GmbH**  
**Dr. Günter-Henle-Str. 8**  
**D – 56271 Mündersbach – Deutschland**

hat nachgewiesen, dass eine werksinterne Produktionskontrolle der eignungsgeprüften Schweißzusätze durchgeführt wird. Eine Überprüfung der werksinternen Aufzeichnungen und Prüfungen im Rahmen der Qualitätssicherung wurden vom Sachverständigen des TÜV Rheinland Industrie Service durchgeführt. Das Ergebnis der Überprüfung genügt den Anforderungen des VdTÜV-Merkblattes.

Die Voraussetzung für die Auflistung der Schweißzusätze im VdTÜV-Kennblatt 1000 ist somit gegeben.

**Die Bescheinigung ist gültig bis 31. August 2024**

Zur Verlängerung der Gültigkeit ist eine wiederholende Überprüfung nach VdTÜV-Merkblatt Schweißtechnik 1153:2017 durchzuführen.

Köln, 04. Oktober 2021  
Rev. 01 / 29. September 2023

TÜV Rheinland Industrie Service GmbH  
Am Grauen Stein, D-51105 Köln

Tel. +49-(0) 221 806 - 2250  
Fax +49-(0) 221 806 - 1354  
e-mail: makowka@de.tuv.com



Zertifizierstelle für Schweißzusätze

*A. Makowka*  
i.A. Dipl.-Ing. A. Makowka

# Zertifikat

## Konformität der werkseigenen Produktionskontrolle

gemäß Verordnung (EU) Nr. 305/2011: System 2+

Zertifikatsnummer: **0035-CPR-C921**

Geltungsbereich: In Übereinstimmung mit der Verordnung (EU) Nr. 305/2011 des Europäischen Parlaments und des Rates vom 9. März 2011 (Bauprodukten-verordnung - CPR), gilt dieses Zertifikat für das Bauprodukt:

**Schweißzusatz** (Zusätze und Pulver)

für das Schmelzschweißen metallischer Werkstoffe zur Verwendung in Metallbauwerken oder Metall-/Betonverbundbauwerke:

**Drahtelektroden nach: EN ISO 14341, EN ISO 14343, EN ISO 16834, EN ISO 14171, EN ISO 21952**

**Schweißstäbe, Schweißdrähte nach:**

**EN ISO 636, EN ISO 14341, EN ISO 14343, EN ISO 16834, EN ISO 20378, EN ISO 21952**

**Stabelektroden nach: EN ISO 2560, EN ISO 3580, EN ISO 3581**

**Fülldrahtelektroden nach: EN ISO 17632, EN ISO 17633**

**Schweißpulver nach EN ISO 14174**

Name und Anschrift des Herstellers: **EWM GmbH  
Dr. Günter-Henle-Str. 8  
D – 56271 Mündersbach**

Prüfgrundlage: Dieses Zertifikat bescheinigt, dass alle Vorschriften über die Bewertung und Überprüfung der Leistungsbeständigkeit beschrieben im Anhang ZA der harmonisierten Norm:

**EN 13479:2017**

entsprechend System 2+ angewendet werden und dass die werkseigene Produktionskontrolle alle darin beschriebenen Anforderungen erfüllt.

Gültigkeitsdauer: Dieses Zertifikat wurde erstmalig am **15. August 2012** ausgestellt und bleibt solange gültig, wie die in der harmonisierten Norm genannten Prüfmethoden und/oder Anforderungen an die werkseigene Produktionskontrolle, zur Bewertung der Leistung der erklärten Merkmale nicht ändern und das Produkt und die Herstellbedingungen im Werk nicht wesentlich geändert werden, jedoch längstens bis **31. August 2024**.

Köln, 04. Oktober 2021  
Rev.01 / 29. September 2023

TÜV Rheinland Industrie Service GmbH  
Notifizierte Stelle für Bauprodukte  
(NB 0035)  
Am Grauen Stein, 51105 Köln, Deutschland  
e-mail: is@de.tuv.com



  
i.A. Dipl.-Ing. A. Makokwa  
Zertifizierungsstelle für Bauprodukte

Rev.3

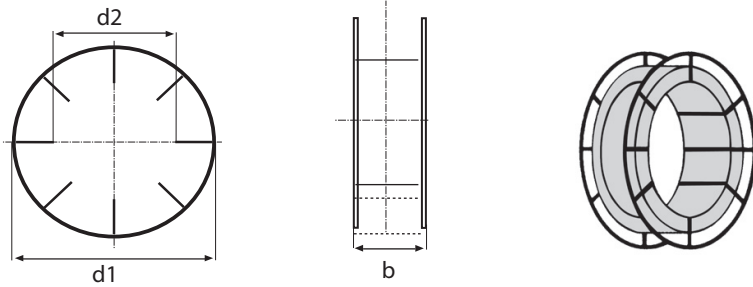
# Welding filler metals

## Technical information

### Delivery forms

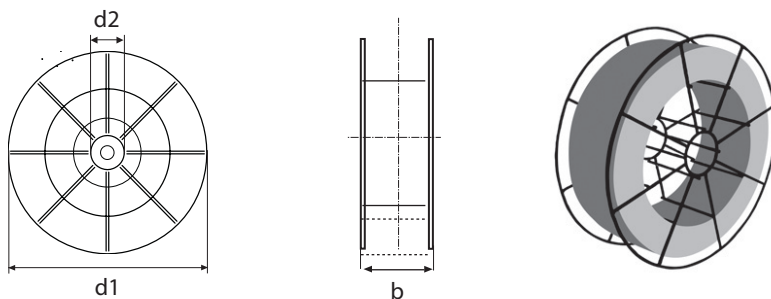
#### Wire electrodes

#### Wire basket spools



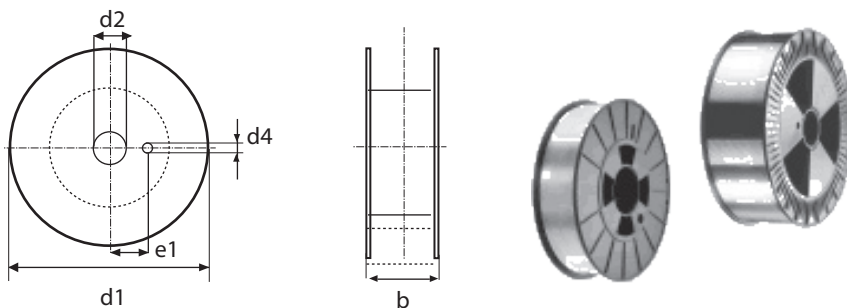
Standard designation		Outer diameter (d1)	Inner diameter (d2)	Outer width (b)	Weight in kg
<b>DIN EN ISO 544</b>	<b>B 300</b>	300	180	103	15/16/18
<b>DIN 8559</b>	<b>K 300</b>				

#### Wire baskets



Standard designation		Outer diameter (d1)	Inner diameter (d2)	Outer width (b)	Weight in kg
<b>DIN EN ISO 544</b>	<b>BS 300</b>	300	50,5	103	15/16/18
<b>DIN 8559</b>	<b>K 300 (without adapter)</b>				

#### Plastic spools



Standard designation		Outer diameter (d1)	Inner diameter (d2)	Outer width (b)	Tapped hole		Weight in kg
					d4	e1	
<b>DIN EN ISO 544</b>	<b>S200</b>	200	50,5	55	10	44,5	5
	<b>S300</b>	300	51,5	103	10	44,5	15
<b>DIN 8559</b>	<b>D200</b>	200	50,5	55	10	44,5	5
	<b>D300</b>	300	51,5	103	10	44,5	15

#### Drum container



	d1	H
<b>Fass 100</b>	590	900
<b>Fass 250</b>	510	800
<b>Fass 275</b>	510	800
<b>Fass 450</b>	590	970

### Abbreviations

#### Test certificates in accordance with EN 10204

Type		Certificate content	Certificate confirmation
2.1	Factory certification	Confirmation of agreement with the order	Manufacturer
2.2	Inspection certificate	Confirmation of agreement with the order stating the results of non-specific testing	Manufacturer
3.1	Acceptance test certificate	Confirmation of agreement with the order stating the results of specific testing	The manufacturer's inspectors independent of the production department.
3.2	Acceptance test certificate	Confirmation of agreement with the order stating the results of specific testing	The manufacturer's inspectors independent of the production department and the customer's appointed inspectors or the inspectors named in the official regulations.

#### Approval and acceptance authorities




ABS	American Bureau of Shipping
BV	Bureau Veritas
CE	Conformité Européenne
CWB	Canadian Welding Bureau
DB	Deutsche Bahn
DNV	Det Norske Veritas
GL	Germanischer Lloyd
LR	Lloyd's Register of Shipping
NK	Nippon Kaiji Kyōkai
TÜV	Technischer Überwachungsverein

**!** The current scope of the permit for individual welding consumables should always be requested if necessary. Separate copies may be provided.

#### Acceptance authorities

AWS	American Welding Society
BS	British Standard
DIN	Deutsche Industrienorm
EN	Europäische Norm
ISO	International Standards Organization

#### Power symbols

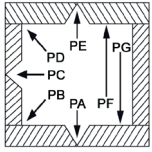
	Direct current (negatively charged electrode)
	Direct current (positively charged electrode)
	Alternating current

# Welding filler metals

## Technical information

### Welding positions

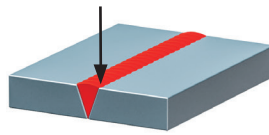
In accordance with DIN EN ISO 6947 (ASME Code Section IX)



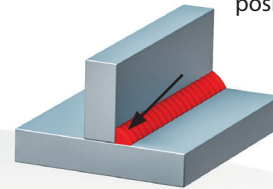
PA (1G, 1F)	Flat position
PB (2F)	Horizontal
PC (2G)	Horizontal to vertical wall
PD (4F)	Horizontal overhead
PE (4G)	Overhead
PF (3G, 3F)	Vertical up
PG (3G, 3F)	Vertical down

! The welding position is obtained from the position of the workpiece to be welded and the accessibility of the welding torch or the electrode to the weld seam

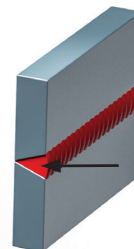
PA  
Horizontal welding of butt and fillet welds (flat position)



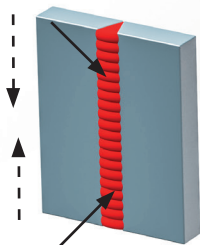
PB  
Horizontal welding of fillet welds (horizontalvertical position)



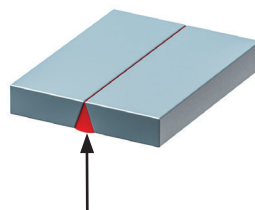
PC  
Horizontal position (horizontal welding to vertical wall)



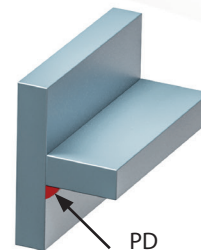
PG  
Vertical-down position or vertical-down welding (vertical welding from the top to the bottom)



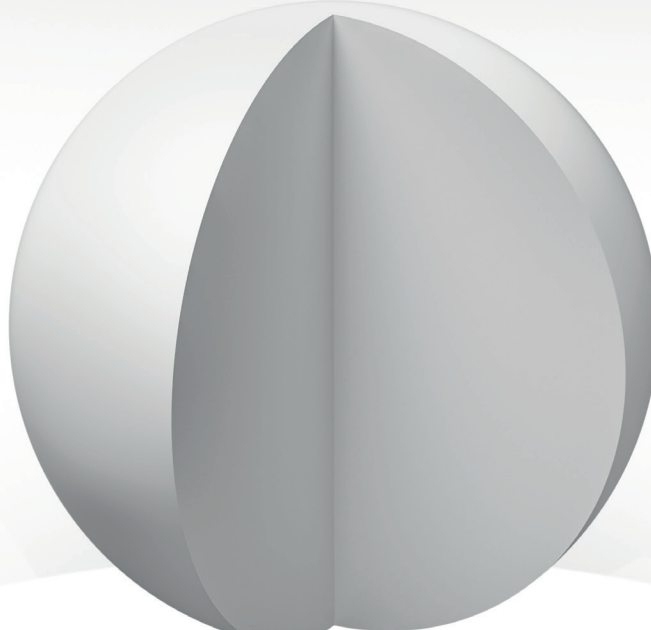
PF  
Vertical-up position or vertical-up welding (vertical welding from the bottom to the top)



PE  
Overhead welding or overhead position



PD  
Horizontal overhead position



### Classification of shielding gases

In accordance with DIN EN ISO 14175

Main groups		Components in volume percent					
Main group	Sub-group	Oxidising		Inert		Reduced	Slow-responding
		CO <sub>2</sub>	O <sub>2</sub>	Ar	He	H <sub>2</sub>	N <sub>2</sub>
I	1			100			
	2				100		
	3			Rest	0,5 < He < 95		
M1	1	0,5 < CO <sub>2</sub> < 5		Rest*		0,5 < H <sub>2</sub> < 5	
	2	0,5 < CO <sub>2</sub> < 5		Rest*			
	3		0,5 < O <sub>2</sub> < 3	Rest*			
	4	0,5 < CO <sub>2</sub> < 5	0,5 < O <sub>2</sub> < 3	Rest*			
M2	0	5 < CO <sub>2</sub> < 15		Rest*			
	1	15 < CO <sub>2</sub> < 25		Rest*			
	2		3 < O <sub>2</sub> < 10	Rest*			
	3	0,5 < CO <sub>2</sub> < 5	3 < O <sub>2</sub> < 10	Rest*			
	4	5 < CO <sub>2</sub> < 15	0,5 < O <sub>2</sub> < 3	Rest*			
	5	5 < CO <sub>2</sub> < 15	3 < O <sub>2</sub> < 10	Rest*			
	6	15 < CO <sub>2</sub> < 25	0,5 < O <sub>2</sub> < 3	Rest*			
M3	1	25 < CO <sub>2</sub> < 50		Rest*			
	2		10 < O <sub>2</sub> < 15	Rest*			
	3	25 < CO <sub>2</sub> < 20	2 < O <sub>2</sub> < 10	Rest*			
	4	5 < CO <sub>2</sub> < 25	10 < O <sub>2</sub> < 15	Rest*			
	5	25 < CO <sub>2</sub> < 50	10 < O <sub>2</sub> < 15	Rest*			
C	1	100					
	2	Rest	0,5 < O <sub>2</sub> < 30				
R	1			Rest*	0,5 < H <sub>2</sub> < 15		
	2			Rest*	15 < H <sub>2</sub> < 50		
N	1						100
	2			Rest*			0,5 < N <sub>2</sub> < 5
	3			Rest*			5 < N <sub>2</sub> < 50
	4			Rest*	0,5 < H <sub>2</sub> < 10		0,5 < N <sub>2</sub> < 5
	5				0,5 < H <sub>2</sub> < 50		Rest
O	1						
Z	Mixed gases not listed in the table or mixed gases with a composition outside the ranges stated **						

\*Argon may be completely replaced by helium for this classification

\*\* Two mixed gases with the same Z classification may not be replaced with each other

### Stick electrode coating types

Abbreviation	Short description	Definition
R	Rutile	Standard electrode for universal use, fine to average droplet transfer, good mechanical properties, welding positions PA, PB, PC, PE, PF, (PG limited only)
RB	Basic/rutile	Use as a combination of achievable, high toughness values and universal use with increased demands on the welder and the seam finishing work.
B	Basic	Use for the requirement of high mechanical properties, average to coarse droplet transfer, poorly detaching slag, possible in all positions, please allow for baking of the electrodes
RC	Rutile-cellulose	Used as replacement for rutile electrodes, to make welding position PG safer, less slag formation, higher demands on the welder and the finishing work
C	Cellulose	Used mainly for the root pass on pipe connectors (pipeline welding) in position PG, good mechanical properties, average droplets, almost no slag

### Standards and abbreviations

#### DIN EN standards

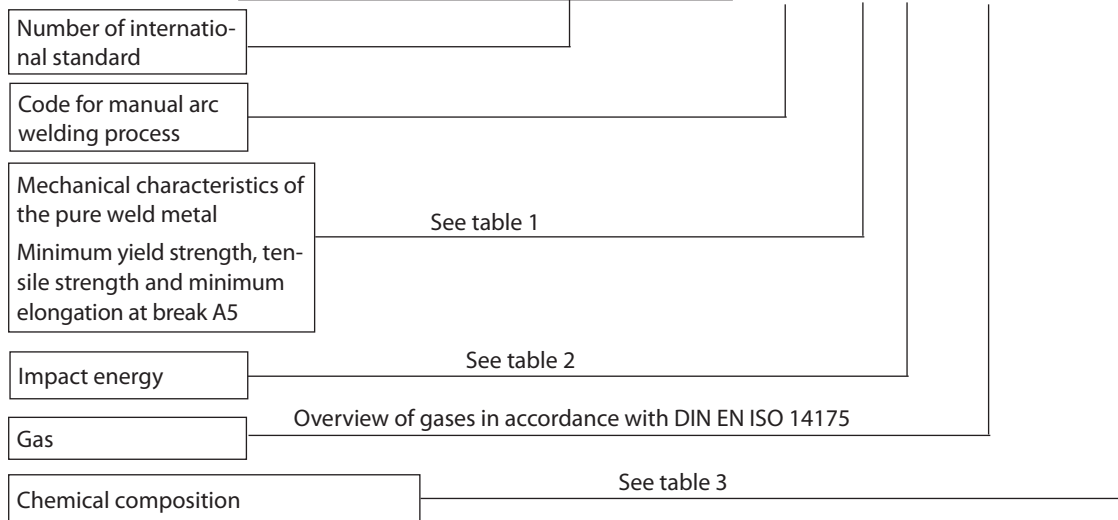
Standard	Standard title
DIN EN 12536	Welding consumables – Rods for gas welding of non alloy and creep-resisting steels – Classification
DIN EN 14700	Welding consumables – Welding consumables for hard-facing
DIN EN ISO 636	Welding consumables – Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels – Classification
DIN EN ISO 1071	Welding consumables – Covered electrodes, wires, rods and tubular cored electrodes for fusion welding of cast iron – Classification
DIN EN ISO 2560	Welding consumables – Covered electrodes for manual metal arc welding of non-alloy and fine-grain steels – Classification
DIN EN ISO 3580	Welding consumables – Covered electrodes for manual metal arc welding of creep-resisting steels – Classification
DIN EN ISO 14172	Welding consumables – Covered electrodes for manual metal arc welding of nickel alloys – Classification
DIN EN ISO 14341	Welding consumables – Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels – Classification
DIN EN ISO 14343	Welding consumables – Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels – Classification
DIN EN ISO 16834	Welding consumables – Wire electrodes, wires, rods and deposits for gas shielded arc welding of high strength steels – Classification
DIN EN ISO 17632	Welding consumables – Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels – Classification
DIN EN ISO 17633	Welding consumables – Tubular cored electrodes and rods for gas shielded and non-gas shielded metal arc welding of stainless and heat-resisting steels – Classification
DIN EN ISO 17634	Welding consumables – Tubular cored electrodes for gas shielded metal arc welding of creep-resisting steels – Classification
DIN EN ISO 18273	Welding consumables – Wire electrodes, wires and rods for welding of aluminium and aluminium alloys – Classification
DIN EN ISO 18274	Welding consumables – Solid wire electrodes, solid strip electrodes, solid wires and solid rods for fusion welding of nickel and nickel alloys – Classification
DIN EN ISO 18276	Welding consumables – Tubular cored electrodes for gas-shielded and non-gas-shielded metal arc welding of high-strength steels – Classification
DIN EN ISO 21952	Welding consumables – Wire electrodes, wires, rods and deposits for gas shielded arc welding of creep-resisting steels – Classification
DIN EN ISO 24373	Welding consumables – Solid wires and rods for fusion welding of copper and copper alloys – Classification
DIN EN ISO 544	Technical delivery conditions for filler materials and fluxes – Type of product, dimensions, tolerances and markings
DIN EN ISO 14175	Welding consumables – Gases and gas mixtures for fusion welding and allied processes
DIN EN ISO 14174	Welding consumables – Fluxes for submerged arc welding and electroslag welding – Classification
DIN EN ISO 24598	Welding consumables – Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of creep-resisting steels
DIN EN ISO 3581	Welding consumables – Covered electrodes for manual metal arc welding of stainless and heat-resisting steels – Classification
DIN EN ISO 26304	Welding consumables – Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of high strength steels – Classification
DIN EN ISO 14171	Welding consumables – Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non alloy and fine grain steels – Classification



### Standardisation example DIN EN ISO 14341-A

Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels

## DIN EN ISO 14341-A-G 46 2 M21 G4Si1



**Table 1**

Code for mechanical characteristics of the pure weld metal			
Code	Minimum yield strength*1 Re (N/mm <sup>2</sup> )	Tensile strength: Rm (N/mm <sup>2</sup> )	Minimum elongation at break A5 (%)
35	355	440-570	22
38	380	470-600	20
42	420	500-640	20
46	460	530-680	20
50	500	580-720	18

\*1 The yield strength is lower yield strength R. If it is not specified, the 0.2 % elongation limit R should be chosen.

**Table 2**

Code for impact energy	
Symbol/number	Minimum Charpy impact 47 J at °C
Z	no requirements
A	+ 20
0	0
2	- 20
3	- 30
4	- 40
5	- 50
6	- 60

**Table 3**

Codes and chemical analysis of wire electrodes									
Abbreviated symbol	Chemical analysis in % (m/m) <sup>a, b</sup>								
	C	Si	Mn	P	S	Ni	Mo	Al	Ti and Zr
G0	Any other agreed composition								
G2Si1	0,06-0,14	0,5-0,8	0,9-1,3	0,025	0,025	0,15	0,15	0,02	0,15
G3Si1	0,06-0,14	0,7-1,0	1,3-1,6	0,025	0,025	0,15	0,15	0,02	0,15
G4Si1	0,06-0,14	0,8 1,2	1,6-1,9	0,025	0,025	0,15	0,15	0,02	0,15
G3Si2	0,06-0,14	1,0-1,3	1,3-1,6	0,025	0,025	0,15	0,15	0,02	0,15
G2Ti	0,04-0,14	0,4-0,8	0,9 -1,4	0,025	0,025	0,15	0,15	0,05-0,2	0,05-0,25
G3Ni1	0,06-0,14	0,5-0,9	1,0-1,6	0,02	0,02	0,8-1,5	0,15	0,02	0,15
G2Ni2	0,06-0,14	0,4-0,8	0,8-1,4	0,02	0,02	2,1-2,7	0,15	0,02	0,15
G2Mo	0,08-0,12	0,3-0,7	0,9 -1,3	0,02	0,02	0,15	0,4-0,6	0,02	0,15
G4Mo	0,06-0,14	0,5-0,8	1,7-2,1	0,025	0,025	0,15	0,4-0,6	0,02	0,15
GG2Al	0,08-0,14	0,3-0,5	0,9-1,3	0,025	0,025	0,15	0,15	0,35-0,75	0,15

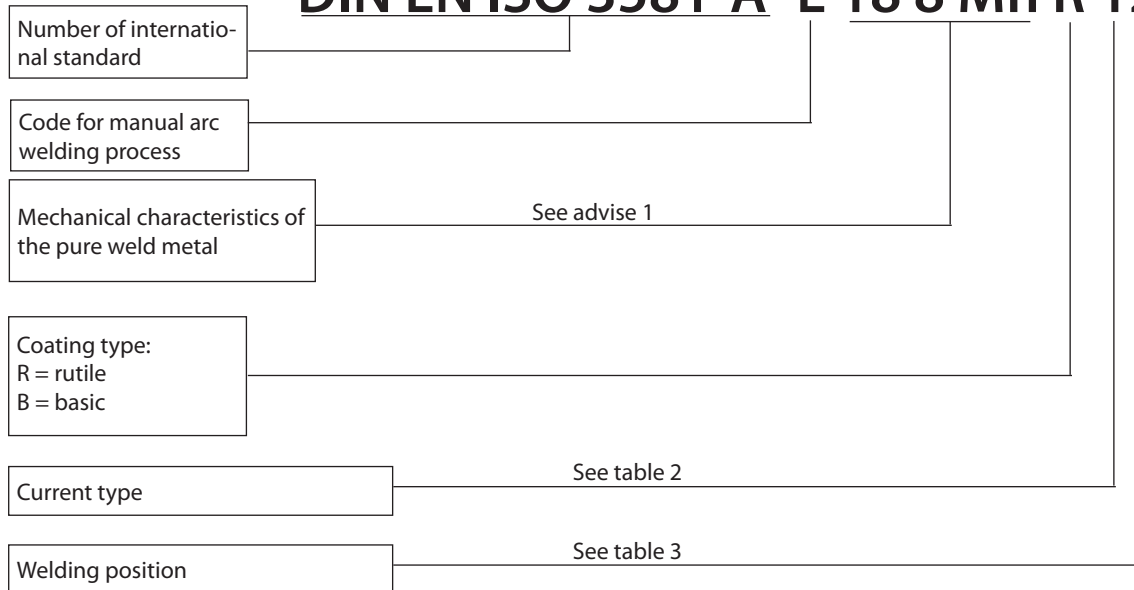
<sup>a</sup> Single values shown in the table are maximum values.

<sup>b</sup> Consumables for which the chemical composition is not listed in this table shall be symbolized similarly and prefixed by the letter Z. The chemical composition ranges are not specified and therefore two electrodes with the same Z classification may not be interchangeable.

### Standardisation example DIN EN ISO 3581-A

Covered electrodes for manual metal arc welding of stainless and heat-resisting steels

## DIN EN ISO 3581-A-E 18 8 Mn R 12



#### Advise 1

The components of the alloy are given in the order Cr, Ni and Mo, respectively, without the chemical code. Alloy components such as niobium, manganese and nitrogen are included as chemical codes with no number for the alloy component. The additional L stands for a very low carbon content. The mechanical properties specified in the standard must be met.

**Table 2**

Ratio	Metal recovery (%)	Current type
1	<105	Direct current, alternating current
2	<105	Direct current
3	>105 - 125	Direct current, alternating current
4	>105 - 125	Direct current
5	>125 - 160	Direct current, alternating current
6	>125 - 160	Direct current
7	>160	Direct current, alternating current
8	>160	Direct current

Proof of suitability for alternating current with open circuit voltage of max. 65 V

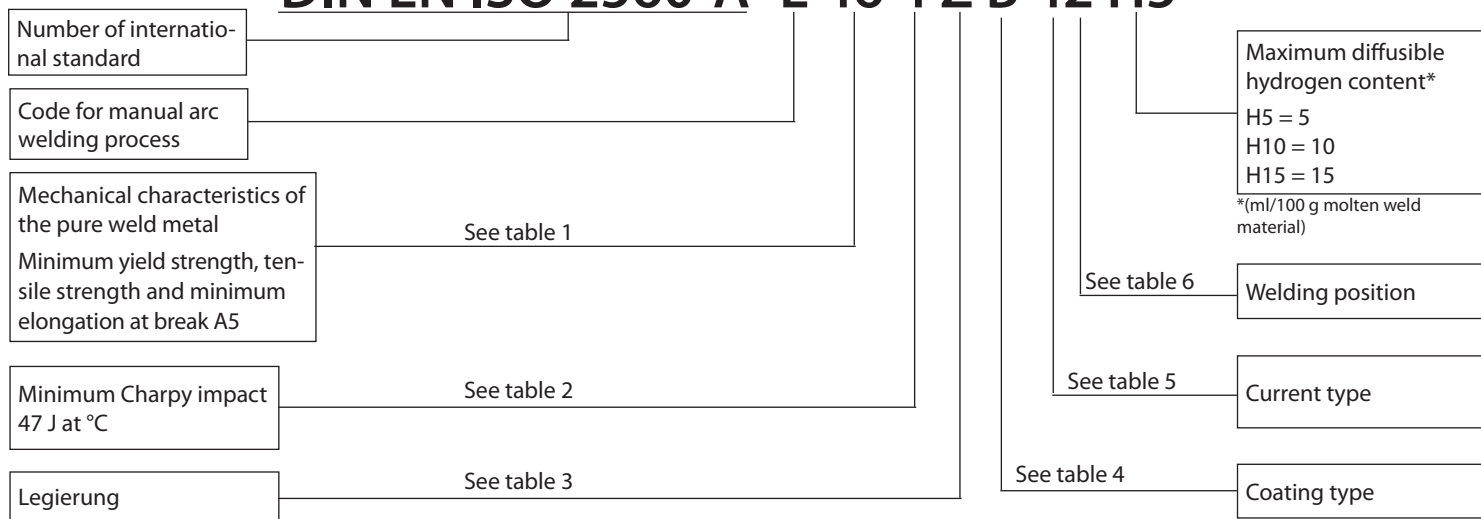
**Table 3**

Ratio	Welding position
1	All positions
2	All positions except vertical-down weld
3	Butt weld in flat position
	Fillet weld in flat and horizontal position
4	Butt weld in horizontal position
	Fillet weld in flat position
5	For fillet welds and as per figure 3

### Standardisation example DIN EN ISO 2560-A

Covered electrodes for manual metal arc welding of non-alloy and fine grain steels

## DIN EN ISO 2560-A-E 46 4 Z B 42 H5



**Table 1**

Code for mechanical characteristics of the pure weld metal			
Code	Minimum yield strength*1 Re (N/mm <sup>2</sup> )	Tensile strength: Rm (N/mm <sup>2</sup> )	Minimum elongation at break A5 (%)
35	355	440 - 570	22
38	380	470 - 600	20
42	420	500 - 640	20
46	460	530 - 680	20
50	500	560 - 720	18

\*1 The yield strength is lower yield strength R. If it is not specified, the 0.2 % elongation limit R should be chosen

**Table 2**

Symbol/number	Minimum Charpy impact 47 J at °C
Z	no requirements
A	+20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60

**Table 3**

Code	Chemical composition		
	Mn	Mo	Ni
No code	2	-	-
Mo	1,4	0,3 - 0,6	-
Mn Mo	> 1,4 - 2,0	0,3 - 0,6	-
1 Ni	1,4	-	0,6 - 1,2
2 Ni	1,4	-	1,8 - 2,6
3 Ni	1,4	-	2,6 - 3,8
Mn 1 Ni	> 1,4 - 2,0	-	0,6 - 1,2
1 Ni Mo	1,4	0,3 - 0,6	0,6 - 1,2
Z	Any otherwise agreed composition		

\*\*2 if not specified: Mo<0.2, Ni<0.3, Cr<0.2, V<0.08, Nb<0.05, Cu<0.3, are each maximum values

**Table 4**

Code	Coating type
A	Acid
C	Cellulose
R	Rutile
RR	Thick rutile
RC	Rutile/cellulose
RA	Rutile/acid
RB	Rutile/basic
B	Basic

\*3 ratio of coating to rod diameter 1.6

**Table 5**

Ratio	Metal recovery (%)	Current type
1	<105	Direct current, alternating current
2	<105	Direct current
3	>105 - 125	Direct current, alternating current
4	>105 - 125	Direct current
5	>125 - 160	Direct current, alternating current
6	>125 - 160	Direct current
7	>160	Direct current, alternating current
8	>160	Direct current

\*3 ratio of coating to rod diameter 1.6

**Table 6**

Ratio	Welding position
1	All positions
2	All positions except vertical-down weld
3	Butt weld in flat position Fillet weld in flat and horizontal position
4	Butt and fillet welds in flat position
5	For fillet welds and as per figure 3

### Standardisation example DIN EN 14700 Welding consumables for hardfacing

## DIN EN 14700–E Fe 15

Number of international standard	
The product type	See table 1
The alloy code	See table 2

**Table 1**

Product type code (consumables)	
E	Coated electrode
S	Solid wire and solid rod
T	Flux cored wire and flux cored rod
R	Cast rod
B	Solid strip
C	Sintered rod, flux cored strip and sintered strip
P	Metal flux

**Table 2**

Code <sup>a)</sup>	Suitability	Chemical analysis in % (m/m)									
		C	Cr	Ni	Mn	Mo	W	V	Nb	Other	Rest
Fe1	p	≤ 0,4	≤ 3,5	-	0,5 - 3	≤ 1	≤ 1	≤ 1	-	-	Fe
Fe2	p	0,4 - 1,2	≤ 7	≤ 1	0,5 - 3	≤ 1	≤ 1	≤ 1	-	-	Fe
Fe3	st	0,2 - 0,5	1 - 8	≤ 5	≤ 3	≤ 4,5	≤ 10	≤ 1,5	-	Co, Si	Fe
Fe4	st (p)	0,2 - 1,5	2 - 6	≤ 4	≤ 3	≤ 10	≤ 19	≤ 4	-	Co, Ti	Fe
Fe5	cpstw	≤ 0,5	≤ 0,1	17 - 22	≤ 1	3 - 5	-	-	-	Co, Al	Fe
Fe6	gps	≤ 2,5	≤ 10	-	≤ 3	≤ 3	-	-	≤ 10	Ti	Fe
Fe7	cpt	≤ 0,2	4 - 30	≤ 6	≤ 3	≤ 2	-	≤ 1	≤ 1	Si	Fe
Fe8	gpt	0,2 - 2	5 - 18	-	0,3 - 3	≤ 4,5	≤ 2	≤ 2	≤ 10	Si, Ti	Fe
Fe9	k(n)p	0,3 - 1,2	≤ 19	≤ 3	11 - 18	≤ 2	-	≤ 1	-	Ti	Fe
Fe10	ck(n)pz	≤ 0,25	17 - 22	7 - 11	3 - 8	≤ 1,5	-	-	≤ 1,5	Si	Fe
Fe11	cnz	≤ 0,3	18 - 31	8 - 20	≤ 3	≤ 4	-	-	≤ 1,5	Cu	Fe
Fe12	c(n)z	≤ 0,08	17 - 26	9 - 26	0,5 - 3	≤ 4	-	-	≤ 1,5		Fe
Fe13	g	≤ 1,5	≤ 6,5	≤ 4	0,5 - 3	≤ 4	-	-	-	B, Ti	Fe
Fe14	g	1,5 - 4,5	25 - 40	≤ 4	0,5 - 3	≤ 4	-	-	-		Fe
Fe15	g	4,5 - 5,5	20 - 40	≤ 4	0,5 - 3	≤ 2	-	-	≤ 10	B	Fe
Fe16	gz	4,5 - 7,5	10 - 40	-	≤ 3	≤ 9	≤ 8	≤ 10	≤ 10	B, Co	Fe
Fe20	cgztz	Hard materials <sup>b)</sup>	-	-	-	-	-	-	-	-	Fe
Ni1	cpt	≤ 1	15 - 30	Rest	0,3 - 1	≤ 6	≤ 2	≤ 1	-	Si, Fe, B	Ni
Ni2	ckptz	≤ 0,1	15 - 30	Rest	≤ 1,5	≤ 28	≤ 8	≤ 1	≤ 4	Co, Si, Ti	Ni
Ni3	cpt	≤ 1	1 - 15	Rest	0,3 - 1	≤ 6	≤ 2	≤ 1	-	Si, Fe, B	Ni
Ni4	ckptz	≤ 0,1	1 - 15	Rest	≤ 1,5	≤ 28	≤ 8	≤ 1	≤ 4	Co, Si, Ti	Ni
Ni20	cgztz	Hard materials <sup>b)</sup>	-	-	-	-	-	-	-	-	Ni
Co1	cktz	≤ 0,6	20 - 35	≤ 10	0,1 - 2	≤ 10	≤ 15		≤ 1	Fe	Co
Co2	tz(cs)	0,6 - 3	20 - 35	≤ 4	0,1 - 2		4 - 10	-	-	Fe	Co
Co3	tz(cs)	1 - 3	20 - 35	≤ 4	≤ 2	≤ 1	6 - 14	-	-	Fe	Co
Cu1	c(n)	-	-	≤ 6	≤ 15	-	-	-	-	Al, Fe, Sn	Cu
Al1	cn	-	-	10 - 35	≤ 0,5	-	-	-	-	Cu, Si	Al
Cr	gn	1 - 5	Rest	-	≤ 1	-	-	15 - 30	-	Fe, B, Si, Zr	Cr

c: non-corroding  
k: strain-hardening ability  
p: impact-resistant  
t: heat-resistant  
w: precipitation-hardening

g: sanding-resistant  
n: not magnetisable  
s: edge-holding  
z: scale-resistant  
( ): May not apply to all alloys of this classification.

<sup>a)</sup> Alloys not specified in the table are to be marked in a similar way, prefixing the letter „Z“.

<sup>b)</sup> Tungsten melt carbides or tungsten sintered carbides broken or spherical

### Running lengths of welding wire

#### Steel wire in meters

Weight in kg	Ø-Wire							
	4,0	3,0	2,4	2,0	1,6	1,2	1,0	0,8
1000	10137,3	18021,8	28159,0	40549,0	63357,9	112636,2	162196,1	253431,4
400	4054,9	7208,7	11263,6	16219,6	25343,1	45054,5	64878,4	101372,6
330	3345,3	5947,2	9292,5	13381,2	20908,1	37169,9	53524,7	83632,4
300	3041,2	5406,5	8447,7	12164,7	19007,4	33790,9	48658,8	76029,4
150	1520,6	2703,3	4223,9	6082,4	9503,7	16895,4	24329,4	38014,7
100	1013,7	1802,2	2815,9	4054,9	6335,8	11263,6	16219,6	25343,1
75	760,3	1351,6	2111,9	3041,2	4751,8	8447,7	12164,7	19007,4
50	506,9	901,1	1408,0	2027,5	3167,9	5631,8	8109,8	12671,6
30	304,1	540,7	844,8	1216,5	1900,7	3379,1	4865,9	7602,9
25	253,4	450,5	704,0	1013,7	1583,9	2815,9	4054,9	6335,8
20	202,7	360,4	563,2	811,0	1267,2	2252,7	3243,9	5068,6
19	192,6	342,4	535,0	770,4	1203,8	2140,1	3081,7	4815,2
18	182,5	324,4	506,9	729,9	1140,4	2027,5	2919,5	4561,8
17	172,3	306,4	478,7	689,3	1077,1	1914,8	2757,3	4308,3
16	162,2	288,3	450,5	648,8	1013,7	1802,2	2595,1	4054,9
15	152,1	270,3	422,4	608,2	950,4	1689,5	2432,9	3801,5
14	141,9	252,3	394,2	567,7	887,0	1576,9	2270,7	3548,0
13	131,8	234,3	366,1	527,1	823,7	1464,3	2108,5	3294,6
12	121,6	216,3	337,9	486,6	760,3	1351,6	1946,4	3041,2
11	111,5	198,2	309,7	446,0	696,9	1239,0	1784,2	2787,7
10	101,4	180,2	281,6	405,5	633,6	1126,4	1622,0	2534,3
9	91,2	162,2	253,4	364,9	570,2	1013,7	1459,8	2280,9
8	81,1	144,2	225,3	324,4	506,9	901,1	1297,6	2027,5
7	71,0	126,2	197,1	283,8	443,5	788,5	1135,4	1774,0
6	60,8	108,1	169,0	243,3	380,1	675,8	973,2	1520,6
5	50,7	90,1	140,8	202,7	316,8	563,2	811,0	1267,2
4	40,5	72,1	112,6	162,2	253,4	450,5	648,8	1013,7
3	30,4	54,1	84,5	121,6	190,1	337,9	486,6	760,3
2,7	27,4	48,7	76,0	109,5	171,1	304,1	437,9	684,3
2	20,3	36,0	56,3	81,1	126,7	225,3	324,4	506,9
1	10,1	18,0	28,2	40,5	63,4	112,6	162,2	253,4
0,5	5,1	9,0	14,1	20,3	31,7	56,3	81,1	126,7

#### Running lengths per spool in metres

Wire diameter	CrNi steels 15 kg spool	Aluminium 7.0 Kg spool	Copper 15 kg spool	Nickel 15 kg spool	Medium-alloy and unalloyed 15 kg
0,8 mm	3826	5158	3353	3511	3801
1,0 mm	2449	3301	2146	2247	2433
1,2 mm	1700	2292	1490	1560	1698
1,6 mm	956	1289	838	878	952
2 mm	612	825	536	562	608
2,4 mm	425	573	373	390	422
3 mm	272	367	238	250	270
3,2 mm	239	322	210	219	ka
4 mm	153	206	134	140	152

### Number of TIG rods per 1 kg

Number of TIG rods 1,000 mm long	CrNi steels 1 kg	Aluminium 1 kg	Copper 1 kg	Nickel 1 kg	Medium-alloy and unalloyed 1 kg
1,0 mm	163	471	143	150	162
1,2 mm	113	327	99	104	113
1,6 mm	63	184	55	59	64
2 mm	41	117	38	38	41
2,4 mm	28	82	25	26	29
3 mm	18	52	16	17	18
3,2 mm	16	46	14	15	ka
4 mm	11	30	9	10	11

### Notes on working Steel

#### Unalloyed and low-alloy steels

##### General information:

The suitability for welding of unalloyed and low-alloy steels depends largely on their carbon content. Steels with a C-content up to 0.22% can be worked using all welding procedures without limitation.

With increased carbon content and thus increased cooling rates, the suitability for welding is reduced as a result of hardening. A coarse-grained structure forms in the heat-affected zone, and the Charpy impact strength decreases considerably.

The hardening tendency of low-alloy structural steels can be estimated from the carbon equivalent value. In the International Institute of Welding carbon equivalent value (CEV), the influence of the key alloy elements is calculated using an empirically determined formula:

$$IIIW C_{ev} = C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Cu+Ni}{15}$$

The general limit for the welding suitability of low-alloy steels is CEV = 0.45. The welding suitability can be increased up to a CEV ≈ 0.60 through the suitable choice of an EWM filler material and correct application of heat.

However, the CEV is only an estimation of the expected increase in hardness because other process and material dimensions are not taken into account in the calculation.

The welding time, temperature and transformation details (welding ZTU) provide a more accurate idea of the welding suitability of low-alloy steels. This allows the structural transformations in the HAZ to be predicted for each material. speziell für jeden Werkstoff.

##### Welding recommendation:

Welding consumables should match the mechanical properties and chemical composition of the parent metal. Basic coated stick electrodes should be used for unalloyed steels and preheated according to the CEV. In the case of rimmed cast steels, basic electrodes should be used for the segregation zones and rutile electrodes for root and final passes..

#### Fine-grained steels

##### General information:

Fine-grained steels are generally suitable for welding. These steels are characterised by a maximum carbon content of 0.22% and use of the main strength-enhancing alloying elements manganese, silicon, chromium, molybdenum, copper and nitrogen.

Other micro-alloying elements such as aluminium, niobium, vanadium and boron are also added. In addition to enhancing strength, these also significantly increase the toughness of the steel by reducing the granularity of the structure. The type of hot forming during steel manufacture also influences its quality and properties.

Fine-grained steels are currently standardised up to a yield strength of 960 MPa and can be welded using all procedures. However components should be preheated before and after welding using the t8/5 method in order to prevent faults.

SEW sheet 088 provides relevant recommendations here. Preheating should generally be used above certain thickness limits. The following recommendations apply, depending on the yield strength:

Yield strength (N/mm <sup>2</sup> )	Thickness limit (mm)
<355	30
>355 bis 420	20
>420 bis 590	12
>590	8

##### Welding recommendation:

Welding consumables should match the mechanical properties and chemical composition of the parent metal. EWM can supply solid wire electrodes and flux cored wires for all fine-grained steels.

#### Pressure vessel and tubular steels, creep-resistant steels

##### General information:

Creep-resistant steels are generally well suited to welding. This is mainly a result of their high purity and low carbon content. Creep-resistant steels are used for boiler, tube, container and reactor construction at operating temperatures between 500 °C and 600 °C. Aside from having creep-resistant properties, these steels are very-scale resistant and creep-resistant at high temperatures. The temperature resistance is due mainly to the alloy elements manganese and molybdenum.

##### Welding recommendation:

Creep-resistant steels should be preheated to suit their sheet thickness because of the risk of hardening crack formation. The steel manufacturer will make recommendations here. Similar kinds of welding consumables are mainly used in order to guarantee the creep strength of the parent and weld metals.

### Notes on working Stainless Steel

#### Austenitic steels

**General information:**

Chromium and nickel are among the main alloying elements of austenitic materials. If the correct ratio is achieved (approx. 18% chromium and 8% nickel) the austenitic range is increased so that a stable structure results even at ambient temperature.

Unlike ferritic chromium steel, austenitic material cannot be further hardened and is also non-magnetic. We differentiate between stable and metastable austenites. Whereas stable austenites have no ferritic structure at ambient temperature, metastable austenites can have a ferrite component of up to 10% at ambient temperature.

**Welding recommendation:**

Austenitic steels can be welded without problems using similar welding consumables. It should however be noted that stable austenites are prone to developing heat cracks. In such cases, the heat input should be monitored during the welding process. Welding consumables containing manganese reduce this risk.

#### Austenitic/ferritic steels (duplex steels)

**General information:**

Austenitic steels can be welded without problems using similar welding consumables. It should however be noted that stable austenites are prone to developing heat cracks. In such cases, the heat input should be monitored during the welding process. Welding consumables containing manganese reduce this risk.

#### Ferritic chromium steels (chromium/ferrite)

**General information:**

The ferritic chromium steels include materials with carbon contents below 0.1% and chromium contents between 13% and 30%. Unlike fully austenitic steels, they contain no nickel. Stabilised ferrites should be used for welding purposes. This group is alloyed with strong carbide-forming elements such as titanium and niobium which combine with the carbon during welding. The carbon cannot combine with chromium to form chromium carbide which prevents intercrystalline corrosion.

**Welding recommendation:**

Fully ferritic welding consumables with a slightly increased content of chromium, niobium and titanium should generally be used for welding, because alloying elements can be lost in the welding zone. Austenitic consumables with a slightly increased chromium and molybdenum content can be used with multi-layer welds. Only pure argon or a mixture of argon and helium should be used as a shielding gas, because the steels are very given to oxidation when molten due to their high chromium content.

The argon/hydrogen mixes normally used with austenitic materials are not recommended. The hydrogen makes the material very brittle.



<b>Solid wire electrodes</b>	<b>18</b>
<b>Flux cored wire electrodes</b>	<b>60</b>
<b>TIG</b>	<b>74</b>
<b>Gas welding rods</b>	<b>112</b>
<b>MMA</b>	<b>114</b>
<b>Submerged-arc welding</b>	<b>136</b>

EWM description	Material number	DIN EN ISO	AWS	Approvals	Page
<b>unalloyed</b>					
SW 70S G3 XQ	1.5125	G 42 4 C1 3Si1 / G 42 5 M21 3Si1	ER 70S-6	CE / TÜV / DB / DNV-GL	19
SW 70S G3 XQ Brilliance	1.5125	G 42 2 C1 3Si1 / G 42 4 M21 3Si1	ER 70S-6	CE / TÜV / DB	20
SW 70S G3 Ti	1.5125	G 42 2 C1/M21 3Si1 Ti	ER 70S-6	CE / TÜV	21
SW 70S G3 Bronze	1.5125	G 42 2 C1 3Si1 / G 42 4 M21 3Si1	ER 70S-6		22
SW 70S G4 XQ	1.5130	G 46 4 C1 / G 46 5 M21 4Si1	ER 70S-6	CE / TÜV / DB / DNV-GL	23
SW 70S G4 XQ Brilliance	1.5130	G 42 3 C1 4Si1 / G 46 4 M21 4Si1	ER 70S-6	CE / TÜV	24
SW 70S G4 Bronze	1.5130	G 42 3 C G4Si1 / G 46 4M21 4Si1	ER 70S-6		25
<b>low-alloy</b>					
SW 100S NiMo		G 62 6 M21 Mn3Ni1Mo	ER 100S-G	CE / TÜV / DB	26
SW 100S NiMoCr		G 62 6 M21 Mn3Ni1Mo	ER 110S-G	CE / TÜV / DB	27
SW 120S NiMoCr		G 89 6 M21 Mn4Ni2CrMo	ER 120S-G	CE / TÜV / DB	28
SW 80S Mo	1.5424	G46 6 M21 2 Mo	ER 80S-G	CE / TÜV / DB	29
SW 80S CrMo1	1.7339	G CrMo1Si	ER 80S-G	CE / TÜV / DB	30
SW 90S CrMo2	1.7384	G CrMo2Si	ER 90S-G	CE / TÜV / DB	31
SW 80S NiCu		G 42 2 M21 Z2NiCu	ER 80S-G	CE / DB	32
SW 80S Ni1		G 50 6 M21 3Ni1	ER 80S-Ni1	CE / TÜV	33
SW 80S Ni2		G 46 7 M21 2Ni2	ER 80S-Ni2	CE	34
<b>High-alloy</b>					
SW 307 Si XQ	1.4370	G 18 8 Mn	ER 307 Si	CE / TÜV / DB	35
SW 308 LSi XQ	1.4316	G 19 9 L Si	ER 308 L Si	CE / TÜV / DB	36
SW 309 LSi XQ	1.4332	G 23 12 L Si	ER 309 L Si	CE / TÜV	37
SW 309 H	1.4829	G 22 12 H	ER 309 Si		38
SW 310 XQ	1.4842	G 25 20	ER 310		39
SW 312 XQ	1.4337	G 29 9	ER 312		40
SW 316 LSi XQ	1.4430	G 19 12 3 L Si	ER 316LSi	CE / TÜV / DB	41
SW 318 Si	1.4576	W 19 12 3 Nb Si	ER 318	CE / TÜV / DB	42
SW 347 Si XQ	1.4551	G 19 9 Nb Si	ER 347 Si		43
SW 2209 Duplex XQ	1.4462	G 22 9 3 LN	ER 2209	CE / TÜV / More on request	44
SW 2594 Super Duplex XQ		G 25 9 4 N L	ER 2594	On request	45
<b>Hardfacing</b>					
SW Hard 60	1.4718				46
<b>Nickel-based</b>					
SW 625	2.4831	Ni 6625 – NiCr22Mo9Nb	ER NiCrMo3	TÜV	47
SW NiCr82	2.4806	Ni 6082 – NiCr20Mn3Nb	ER NiCr 3		48
<b>Aluminium</b>					
SW ML 1450 Al99,5Ti	3.0805	S AL 1450 (Al99,5Ti)	ER 1450	On request	49
SW ML 3103 AlMn1	3.0516	S AL 3103 (AlMn1)	ER 3103	On request	50
SW ML 5087 AlMg4,5MnZr	3.3546	S AL 5087 (AlMg4,5MnZr)		CE / DNV-GL / ABS / DB / TÜV / Bureau Veritas	51
SW ML 5183 AlMg4,5Mn0,7	3.3548	S AL 5183 (AlMg4,5Mn0,7)	ER 5183	CE / DNV-GL / ABS / LR / DB / TÜV / KR (Korean Register) / BWB / Bureau Veritas	52
SW ML 5754 AlMg3	3.3536	S Al 5754 (AlMg53)	ER 5754	On request	53
SW ML4047 AlSi12	3.2585	S Al 4047 (AlSi12 (A))	ER 4047	CE / DB	54
SW ML 4043 AlSi5	3.2245	S Al 4043 (AlSi5(A))	ER 4043	CE / DB / TÜV	55
SW ML 5356 AlMg5Cr	3.3556	S AL 5356 (AlMg5Cr)	ER 5356	CE / DNV-GL / ABS / DB / TÜV / Bureau Veritas	56
<b>Copper-based</b>					
SW CuSi3		CuSi3Mn (Cu 6560)	ER CuSi-A		57
SW CuAl8		CuAl7 (Cu 6100)	ER CuAl-A1		58
SW CuSn1		CuSn1 (Cu 1898)	ER Cu		59

# Welding filler metals

## Solid wire electrodes

### SW 70S G3 XQ

<b>Standards</b>	DIN EN ISO 14341-A - G 42 4 C1 3Si1 / G 42 5 M21 3Si1 AWS A-5.18 - ER 70S-6
<b>Material number</b>	1.5125
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M2 M3 C1
<b>Yield strength</b>	≥420 MPa
<b>Tensile strength, Rm</b>	≥500 MPa
<b>Expansion, A5</b>	≥22 %
<b>Impact energy, Av</b>	-50 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB / DNV-GL
<b>Base materials</b>	S235JR - S355JR   S235JO - S355JO   S235J2 - S355J2   S275N - S420N   S275M - S420M   P235GH - P355GH   P275NL1 - P355NL1   P215NL   P265NL   P355N   P285NH - P420NH   P195TR1 - P265TR1   P195TR2 - P265TR2   P195GH - P265GH   L245NB - L415NB   L245MB - L415MB   GE200 - GE240 ASTM: A 106 Gr. A, B, C   A 181 Gr. 60, 70   A 283 Gr. A, C   A 285 Gr. A, B, C   A 350 Gr. LF1   A 414 Gr. A, B, C, D, E, F, G   A 501 Gr. B   A 513 Gr. 1018   A 516 Gr. 55, 60, 65, 70   A 573 Gr. 58, 65, 70   A 588 Gr. A, B   A 633 Gr. C   A 662 Gr. B   A 711 Gr. 1013   A 841 Gr. A   API 5 L Gr. B, X42, X52, X56, X60

Shipbuilding steels: A, B, D, E, A 32-E 36



unalloyed

- Unalloyed solid wire electrode
- Copper-plated, layer wound
- EWM premium quality
- High arc stability, low spatter
- Low impurity of the feed system
- Very good mechanical properties
- Operating temperature ranges from -50°C to 450°C

#### • Fields of application:

- Industry, trade and repair shops and shipbuilding

#### Chemical analysis (in %)

C	Mn	Si	P	S
0.06 - 0.14	1.3 - 1.6	0.7 - 1	<0.025	<0.025

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	0.8 mm	-	<a href="#">097-005374-20008</a>
Plastic spool	S200	5 kg	1 mm	-	<a href="#">097-005374-20010</a>
Plastic spool	S200	5 kg	1.2 mm	-	<a href="#">097-005374-20012</a>
Plastic spool	S280	15 kg	0.8 mm	-	<a href="#">097-005374-28008</a>
Plastic spool	S280	15 kg	1 mm	-	<a href="#">097-005374-28010</a>
Plastic spool	S280	15 kg	1.2 mm	-	<a href="#">097-005374-28012</a>
Plastic spool	S280	15 kg	1.6 mm	-	<a href="#">097-005374-28016</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-005374-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-005374-30012</a>
Basket spool	B300	15 kg	1.6 mm	-	<a href="#">097-005374-30016</a>
Drum	F250	250 kg	1 mm	-	<a href="#">097-005374-25010</a>
Drum	F250	250 kg	1.2 mm	-	<a href="#">097-005374-25012</a>

### SW 70S G3 XQ Brilliance

<b>Standards</b>	DIN EN ISO 14341-A - G 42 2 C1 3Si1 / G 42 4 M21 3Si1 AWS A-5.18 - ER 70S-6
<b>Material number</b>	1.5125
<b>Welding positions</b>	PA / PB / PC / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	C1 M21
<b>Yield strength</b>	≥470 MPa
<b>Tensile strength, Rm</b>	560 MPa
<b>Expansion, A5</b>	≥26 %
<b>Impact energy, Av</b>	20 °C: ≥ 70 J -40 °C: 90 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	10113-2 S275, S355, S420   10113-3 S275M, S275ML, S355M, S355ML   10113-3 S420M, S420ML   10025 S185, S235, S275, S355   10208-1 L210, L240, L290, L360 ASTM: A 139   A 210 Gr A1, C   A 36   A 234 Gr WPB   A 334 Gr 1   A 106 Gr A B, C   A 131 Gr A B, D   API 5LX42   API 5LX46   AP1 5LX52   API 5LX60   API 5LX65



- Unalloyed solid wire electrode
- Non-copper coated wire
- EWM premium quality
- High arc stability, low spatter
- Low impurity of the feed system
- Very good mechanical properties
- High current load
- Operating temperature ranges from -50°C to 450°C

• **Fields of application:**

- Industry, trade and repair shops and shipbuilding

**Chemical analysis (in %)**

C	Mn	Si	P	S
0.06 - 0.14	1.3 - 1.6	0.7 - 1	0.025	0.025
Ni	Cr	Mo	Cu	
0.15	0.15	0.15	0.3	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	0.8 mm	-	<a href="#">097-005299-30008</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-005299-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-005299-30012</a>
Basket spool	B300	15 kg	1.6 mm	-	<a href="#">097-005299-30016</a>
Drum	F250	250 kg	1 mm	-	<a href="#">097-005299-25010</a>
Drum	F250	250 kg	1.2 mm	-	<a href="#">097-005299-25012</a>
Drum	F250	250 kg	1.6 mm	-	<a href="#">097-005299-25016</a>

### SW 70S G3 Ti

<b>Standards</b>	DIN EN ISO 14341-A - G 42 2 C1/M21 3Si1 Ti AWS A-5.18 - ER 70S-6
<b>Material number</b>	1.5125
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	C1 M21
<b>Yield strength</b>	534 MPa
<b>Tensile strength, Rm</b>	600 MPa
<b>Expansion, A5</b>	28.6 %
<b>Impact energy, Av</b>	-29 °C: ≥ 102 J
<b>Approvals</b>	CE / TÜV
<b>Base materials</b>	S185 - S355J0   S255N - S355N



- Unalloyed solid wire electrode
- Layer-wound
- Low-spatter thanks to high chemical purity
- Excellent for rusty, primed, contaminated and galvanised surfaces

- **Fields of application:**

- Shipbuilding, steel construction and automotive industry

#### Chemical analysis (in %)

C	Si	Mn	P	S	Ti
0.05	0.82	1.5	0.011	0.01	0.18

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	0.8 mm	-	<a href="#">097-005432-20008</a>
Plastic spool	S200	5 kg	1 mm	-	<a href="#">097-005432-20010</a>
Plastic spool	S280	15 kg	0.8 mm	-	<a href="#">097-005432-28008</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-005432-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-005432-30012</a>
Basket spool	B300	15 kg	1.6 mm	-	<a href="#">097-005432-30016</a>



### SW 70S G3 Bronze

<b>Standards</b>	DIN EN ISO 14341-A - G 42 2 C1 3Si1 / G 42 4 M21 3Si1 AWS A-5.18 - ER 70S-6
<b>Material number</b>	1.5125
<b>Welding positions</b>	PA / PB / PC / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	C1 M21
<b>Yield strength</b>	470 MPa
<b>Tensile strength, Rm</b>	560 MPa
<b>Expansion, A5</b>	26 %
<b>Impact energy, Av</b>	20 °C: 70 J -40 °C: 90 J
<b>Base materials</b>	10113-2 S275, S355, S420   10113-3 S275M, S275ML, S355M, S355ML   10113-3 S420M, S420ML   10025 S185, S235, S275, S355   10208-1 L210, L240, L290, L360 ASTM: A 139   A 210 Gr A1, C   A 36   A 234 Gr WPB   A 334 Gr 1   A 106 Gr A B, C   A 131 Gr A B, D   API 5LX42   API 5LX46   AP1 5LX52   API 5LX60   API 5LX65

- Unalloyed solid wire electrode
- Bronze plated, layer wound
- Low-spatter thanks to high chemical purity
- For welding unalloyed steels with a yield strength of less than 540 N/mm<sup>2</sup>

**Fields of application:**

- Industry, trade and repair shops and shipbuilding

**Chemical analysis (in %)**

C	Mn	Si	P	S
0.06 - 0.14	1.3 - 1.6	0.7 - 1	0.025	0.025
Ni	Cr	Mo	Cu	
0.15	0.15	0.15	0.3	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	0.6 mm	-	<a href="#">097-005396-30006</a>
Basket spool	B300	15 kg	0.8 mm	-	<a href="#">097-005396-30008</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-005396-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-005396-30012</a>
Basket spool	B300	15 kg	1.6 mm	-	<a href="#">097-005396-30016</a>
Drum	F250	250 kg	0.8 mm	-	<a href="#">097-005396-25008</a>
Drum	F250	250 kg	1 mm	-	<a href="#">097-005396-25010</a>
Drum	F250	250 kg	1.2 mm	-	<a href="#">097-005396-25012</a>

# Welding filler metals

## Solid wire electrodes

### SW 70S G4 XQ

<b>Standards</b>	DIN EN ISO 14341-A - G 46 4 C1 / G 46 5 M21 4S11 AWS A-5.18 - ER 70S-6
<b>Material number</b>	1.5130
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	C1 M21 M20 - M33
<b>Yield strength</b>	≥460 MPa
<b>Tensile strength, Rm</b>	≥530 MPa
<b>Expansion, A5</b>	≥20 %
<b>Impact energy, Av</b>	-50 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB / DNV-GL
<b>Base materials</b>	S185 - S355G1   S255N - S355N   P255NH - P355NH   P235GH - P285NH   P235 - P355T2   20MnNb6   L210 - L360N Shipbuilding steels A, B, D, E



- Unalloyed solid wire electrode
- Copper-plated, layer wound
- EWM premium quality
- High arc stability, low spatter
- Low impurity of the feed system
- Very good mechanical properties
- Operating temperature ranges from -50°C to 450°C

#### • Fields of application:

- Industry, trade and repair shops and shipbuilding

#### Chemical analysis (in %)

C	Mn	Si	P	S
0.06 - 0.14	1.6 - 1.9	0.8 - 1.2	max. 0.025	max. 0.025

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	0.8 mm	-	<a href="#">097-005375-20008</a>
Plastic spool	S200	5 kg	1 mm	-	<a href="#">097-005375-20010</a>
Plastic spool	S200	5 kg	1.2 mm	-	<a href="#">097-005375-20012</a>
Plastic spool	S280	15 kg	0.8 mm	-	<a href="#">097-005375-28008</a>
Plastic spool	S280	15 kg	1 mm	-	<a href="#">097-005375-28010</a>
Plastic spool	S280	15 kg	1.2 mm	-	<a href="#">097-005375-28012</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-005375-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-005375-30012</a>
Basket spool	B300	15 kg	1.6 mm	-	<a href="#">097-005375-30016</a>
Drum	F250	250 kg	1 mm	-	<a href="#">097-005375-25010</a>
Drum	F250	250 kg	1.2 mm	-	<a href="#">097-005375-25012</a>

### SW 70S G4 XQ Brilliance

<b>Standards</b>	DIN EN ISO 14341-A - G 42 3 C1 4Si1 / G 46 4 M21 4Si1 AWS A-5.18 - ER 70S-6
<b>Material number</b>	1.5130
<b>Welding positions</b>	PA / PB / PC / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	C1 M21
<b>Yield strength</b>	≥510 MPa
<b>Tensile strength, Rm</b>	580 MPa
<b>Expansion, A5</b>	≥26 %
<b>Impact energy, Av</b>	20 °C: ≥ 140 J -40 °C: 70 J
<b>Approvals</b>	CE / TÜV
<b>Base materials</b>	Construction steels: S275, S355   P235TR2 - P355T2   E295, E335, E360   C10 - C35, fine-grained steels: S255N - S420N   P255NH - P355NH Pressure vessel and tubular steels, creep-resistant steels: P235GH, P265GH   P295GH, P355GH   P235G1TH - P255G1TH Cast steel: GE200, GE240, GE260 Pipeline steels: L210 - L415NB Shipbuilding steels: A, B, C, D, E



- Unalloyed solid wire electrode
- Non-copper coated wire
- EWM premium quality
- High arc stability, low spatter
- Low impurity of the feed system
- Very good mechanical properties
- Operating temperature ranges from -50°C to 450°C

• **Fields of application:**

- Industry, trade and repair shops and shipbuilding

**Chemical analysis (in %)**

C	Mn	Si	P	S
0.06 - 0.14	1.6 - 1.9	0.8 - 1.2	0.025	0.025
Ni	Cr	Mo	Cu	
0.15	0.15	0.15	0.3	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	0.8 mm	-	<a href="#">097-005300-30008</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-005300-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-005300-30012</a>
Basket spool	B300	15 kg	1.6 mm	-	<a href="#">097-005300-30016</a>
Drum	F250	250 kg	1 mm	-	<a href="#">097-005300-25010</a>
Drum	F250	250 kg	1.2 mm	-	<a href="#">097-005300-25012</a>
Drum	F250	250 kg	1.6 mm	-	<a href="#">097-005300-25016</a>



# Welding filler metals

## Solid wire electrodes

### SW 70S G4 Bronze

<b>Standards</b>	DIN EN ISO 14341-A - G 42 3 C G4Si1 / G 46 4M21 4Si1 AWS A-5.18 - ER 70S-6
<b>Material number</b>	1.5130
<b>Welding positions</b>	PA / PB / PC / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	C1 M21
<b>Yield strength</b>	≥510 MPa
<b>Tensile strength, Rm</b>	580 MPa
<b>Expansion, A5</b>	≥26 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -40 °C: 70 J
<b>Base materials</b>	Construction steels: S275, S355   P235TR2 - P355T2   E295, E335, E360   C10 - C35, fine-grained steels: S255N - S420N   P255NH - P355NH Pressure vessel and tubular steels, creep-resistant steels: P235GH, P265GH   P295GH, P355GH   P235G1TH - P255G1TH Cast steel: GE200, GE240, GE260 Pipeline steels: L210 - L415NB Shipbuilding steels: A, B, C, D, E   AH32 - EH36



unalloyed

- Unalloyed solid wire electrode
- Bronze plated, layer wound
- Low-spatter thanks to high chemical purity
- Low impurity of the feed system
- **Fields of application:**
  - Industry, trade and repair shops and shipbuilding

#### Chemical analysis (in %)

C	Mn	Si	P	S
0.06 - 0.14	1.6 - 1.9	0.8 - 1.2	0.025	0.025
Ni	Cr	Mo	Cu	
0.15	0.15	0.15	0.3	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	0.8 mm	-	<a href="#">097-005402-30008</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-005402-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-005402-30012</a>
Drum	F250	250 kg	1 mm	-	<a href="#">097-005402-25010</a>
Drum	F250	250 kg	1.2 mm	-	<a href="#">097-005402-25012</a>

# Welding filler metals

## Solid wire electrodes

### SW 100S NiMo

<b>Standards</b>	DIN EN ISO 16834-A - G 62 6 M21 Mn3Ni1Mo AWS A-5.28 - ER 100S-G
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	≥620 MPa
<b>Tensile strength, Rm</b>	≥760 MPa
<b>Expansion, A5</b>	≥18 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -60 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	High tensile, thermomechanically rolled and tempered, fine-grain construction steels with a yield strength of up to 620 MPa
	S500Q - S620Q   S500QL - S620QL   P500Q - P620Q   P500QL1 - P620QL1
	Alform Plate 620 M   NAXTRA 620   Strenx 600



- Low-alloy solid wire electrode
- Copper-plated, layer wound
- For welding high tensile and fine-grain construction steels

#### Chemical analysis (in %)

	C	Si	Mn	Ni	Mo	Ti
	0.08	0.6	1.7	0.95	0.38	0.08

#### • Fields of application:

- For steel, machine, crane and mining construction, as well as pipeline and container construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-003525-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003525-30012</a>

# Welding filler metals

## Solid wire electrodes

### SW 100S NiMoCr

<b>Standards</b>	DIN EN ISO 16834-A - G 62 6 M21 Mn3Ni1Mo AWS A-5.28 - ER 110S-G
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	≥620 MPa
<b>Tensile strength, Rm</b>	≥760 MPa
<b>Expansion, A5</b>	≥18 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -60 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	High tensile, thermomechanically rolled and tempered, fine-grain construction steels with a yield strength of up to 620 MPa S500Q-S620Q, S500QL-S620QL, P500Q-P620Q, P500QL1-P620QL1 Alform Plate 620 M   NAXTRA 620   Strenx 600



low-alloy

#### Chemical analysis (in %)

	C	Si	Mn	Ni	Mo	Ti
	0.08	0.6	1.7	0.95	0.38	0.08

- Low-alloy solid wire electrode
- Copper-plated, layer wound
- Low-spatter thanks to high chemical purity
- For welding high-tensile fine-grain structural steels up to 690 MPa yield strength

#### • Fields of application:

- For steel, machine, crane, pipeline and mining construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-003548-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003548-30012</a>
Basket spool	B300	15 kg	1.6 mm	-	<a href="#">097-003548-30016</a>

### SW 120S NiMoCr



<b>Standards</b>	DIN EN ISO 16834-A - G 89 6 M21 Mn4Ni2CrMo AWS A-5.28 - ER 120S-G
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	≥890 MPa
<b>Tensile strength, Rm</b>	≥940 MPa
<b>Expansion, A5</b>	≥15 %
<b>Impact energy, Av</b>	20 °C: ≥ 70 J -60 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	High tensile fine-grain construction steels with a yield strength above 890 MPa S690Q - S890Q   S690QL - S890QL   S690QLN - S890QLN   S960QL   S1100QL   S1300QL



#### Chemical analysis (in %)

- Low-alloy solid wire electrode
- Copper-plated, layer wound
- Low-spatter thanks to high chemical purity
- For welding high tensile, medium-alloy steels
- Excellent toughness characteristics down to -60°C

	C	Si	Mn	Cr	Ni	Mo
	0.09	0.8	1.8	0.3	2.25	0.55

- **Fields of application:**
  - For structures under high load, mobile crane construction, lattice masts, shipbuilding, the automotive industry and pressure vessel construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-003558-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003558-30012</a>

# Welding filler metals

## Solid wire electrodes

### SW 80S Mo

<b>Standards</b>	DIN EN ISO 14341-A - G46 6 M21 2 Mo AWS A-5.28 - ER 80S-G
<b>Material number</b>	1.5424
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	≥460 MPa
<b>Tensile strength, Rm</b>	≥560 MPa
<b>Expansion, A5</b>	≥22 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -40 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	Similarly alloyed creep-resistant steels and cast steel S355   P235G1TH - P255G1TH   P310GH   L320   L360NB - L415NB   16Mo3 ASTM: A182/A336 grade F1   A204 grades A/B/C   A209/A250 grade T1   A217 grade WC1   A335 grade P1   A352 grade LC



- Low-alloy solid wire electrode, creep-resistant
- Copper-plated, layer wound
- Low-spatter thanks to high chemical purity
- Mainly for welding creep-resistant 0.5% Mo steels
- Maximum operating temperature 500 °C

#### • Fields of application:

- Boiler, container, pressure vessel and pipeline construction

#### Chemical analysis (in %)

C	Si	Mn	Mo
0.1	0.6	1.15	0.52

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	0.8 mm	-	<a href="#">097-003547-30008</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-003547-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003547-30012</a>

### SW 80S CrMo1

<b>Standards</b>	DIN EN ISO 21952-A - G CrMo1Si AWS A-5.28 - ER 80S-G
<b>Material number</b>	1.7339
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	≥355 MPa
<b>Tensile strength, Rm</b>	≥510 MPa
<b>Expansion, A5</b>	≥20 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -10 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	13CrMo 4-4   13CrMo 4-5   16CrMo 4-4   G-17CrMo 5-5 ASTM: A182 grades F11/F12   A199/A200 grade T11   A217 grades WC6/WC11   A234 grades WP11/WP12   A335 grades P11/P12   A387 grades 11/12



- Low-alloy solid wire electrode, creep-resistant
- Copper-plated, layer wound
- Low-spatter thanks to high chemical purity
- For welding creep-resistant, ferritic 1.25 % Cr - 0.5 % Mo steels
- For operating temperatures up to max. 550°C
- Low Bruscato factor (X<10ppm) = insensitive to temper embrittlement or 500°C embrittlement

• **Fields of application:**

- Pressure pipe, turbine and boiler construction, as well as for the chemical and petrochemical industry

**Chemical analysis (in %)**

C	Si	Mn	Cr	Mo
0.1	0.6	1	1.2	0.52

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1 mm	-	097-003546-30010
Basket spool	B300	15 kg	1.2 mm	-	097-003546-30012

# Welding filler metals

## Solid wire electrodes

### SW 90S CrMo2

<b>Standards</b>	DIN EN ISO 21952-A - G CrMo2Si AWS A-5.28 - ER 90S-G
<b>Material number</b>	1.7384
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	≥400 MPa
<b>Tensile strength, Rm</b>	≥520 MPa
<b>Expansion, A5</b>	≥20 %
<b>Impact energy, Av</b>	20 °C: ≥ 80 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	10CrMo 9-10   G-17CrMo 9-10 ASTM: A182 grade F22   A199/A200 grades T21/T22   A213 grade T22   A217 grade WC9   A234 grade WP22   A335 grade P22   A387 grades 21/22



- Low-alloy solid wire electrode, creep-resistant
- Copper-plated, layer wound
- Low-spatter thanks to high chemical purity
- For operating temperatures up to max. 600°C
- Low Bruscato factor (X<10ppm) = insensitive to temper embrittlement or 500°C embrittlement
- For welding creep-resistant, ferritic 2.25% Cr - 1% Mo steels

#### • Fields of application:

- Power plant, turbine, boiler and pressure line construction, as well as for chemicals and petrochemicals

#### Chemical analysis (in %)

C	Si	Mn	Cr	Mo
0.08	0.6	0.92	2.45	1

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1 mm	-	097-003526-30010
Basket spool	B300	15 kg	1.2 mm	-	097-003526-30012
Basket spool	B300	15 kg	1.6 mm	-	097-003526-30016

# Welding filler metals

## Solid wire electrodes

### SW 80S NiCu

<b>Standards</b>	DIN EN ISO 14341-A - G 42 2 M21 Z2NiCu AWS A-5.28 - ER 80S-G
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	C1 M2 M3
<b>Yield strength</b>	≥450 MPa
<b>Tensile strength, Rm</b>	≥550 MPa
<b>Expansion, A5</b>	≥22 %
<b>Impact energy, Av</b>	20 °C: ≥ 80 J -20 °C: ≥ 47 J
<b>Approvals</b>	CE / DB
<b>Base materials</b>	S235J0W - S355J0W   S235J2W - S355J2W   S355J0WP   S355J2WP   S355K2W ASTM: A242 grades 1/2   A588 grades A/B/C/K   A606   A709 grade 50W   Corten   Patinax



- Low-alloy solid wire electrode, weather-resistant
- Copper-plated, layer wound
- Low-spatter thanks to high chemical purity
- Increased corrosion resistance compared to construction steels
- For joining and surfacing weather-resistant steels (Corten, Patinax)

#### • Fields of application:

- For building construction (facades), sea containers and bridge construction

#### Chemical analysis (in %)

C	Si	Mn	Ni	Cu
0.08	0.8	1.4	0.8	0.4

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	0.8 mm	-	097-003524-30008
Basket spool	B300	15 kg	1 mm	-	097-003524-30010
Basket spool	B300	15 kg	1.2 mm	-	097-003524-30012





### SW 80S Ni1

<b>Standards</b>	DIN EN ISO 14341-A - G 50 6 M21 3Ni1 AWS A-5.28 - ER 80S-Ni1
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	≥500 MPa
<b>Tensile strength, Rm</b>	≥560 MPa
<b>Expansion, A5</b>	≥18 %
<b>Impact energy, Av</b>	20 °C: ≥ 80 J -60 °C: 47 J
<b>Approvals</b>	CE / TÜV
<b>Base materials</b>	Nickel-alloyed, low-temperature tough steels 11MnNi5-3   13MnNi6-3   S275NL - S460NL   S275ML - S460ML   P275NL2 - P460NL2   P355ML2 - P460ML2 ASTM: A333/A334 grades 1/6   A350 grades LF2/LF6   A352 grades LCB API: 5L X65

#### Chemical analysis (in %)

- Low-alloy solid wire electrode, low-temperature tough
- Copper-plated, layer wound
- Low-spatter thanks to high chemical purity
- For welding low-temperature tough steels
- Low temperature requirements down to -60°C

C	Si	Mn	Ni
0.09	0.5	1.05	0.9

#### • Fields of application:

- Oil and gas industry, offshore sector and steel construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-003622-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003622-30012</a>

# Welding filler metals

## Solid wire electrodes

### SW 80S Ni2

<b>Standards</b>	DIN EN ISO 14341-A - G 46 7 M21 2Ni2 AWS A-5.28 - ER 80S-Ni2
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	≥470 MPa
<b>Tensile strength, Rm</b>	≥570 MPa
<b>Expansion, A5</b>	≥20 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -70 °C: ≥ 47 J
<b>Approvals</b>	CE
<b>Base materials</b>	Nickel-alloyed, low-temperature tough steels 11MnNi5-3   13MnNi6-3   12Ni14   S275NL - S460NL   S275ML - S460ML   P275NL2 - P460NL2   P355ML2 - P460ML2 ASTM: A203 grade A/B   A333/A334 grades 1/6/7   A350 grade LF2/LF5/LF6   A352 grade LC1/LC2



- Low-alloy solid wire electrode, low-temperature tough
- Copper-plated, layer wound
- Low-spatter thanks to high chemical purity
- For welding low-temperature tough steels
- For low temperature requirements down to -90°C

**Fields of application:**

- Oil and gas industry, offshore sector and steel construction

**Chemical analysis (in %)**

C	Si	Mn	Ni
0.09	0.52	1.1	2.45

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1 mm	-	097-003640-30010
Basket spool	B300	15 kg	1.2 mm	-	097-003640-30012



### SW 307 Si XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 18 8 Mn AWS A-5.9 - ER 307 Si
<b>Material number</b>	1.4370
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M13 M12
<b>Tensile strength, Rm</b>	≥600 MPa
<b>Expansion, A5</b>	≥35 %
<b>Impact energy, Av</b>	20 °C: ≥ 120 J
<b>Approvals</b>	CE / TÜV / DB
<b>Hardness</b>	190 BHN
<b>Base materials</b>	Dissimilar steels (black-and-white joints)

Claddings, buffer layers for hardfacing, high carbon and difficult-to-weld steels, manganese high carbon steel (e.g. 1.3401)

#### Chemical analysis (in %)

- High-alloy solid wire electrode, non-corroding
- Layer-wound
- Suitable for dissimilar joints and buffer layers
- For welding heat-resistant Cr and CrNi steels, as well as austenitic stainless steels containing Mn
- Scale resistant up to approx. 850°C
- Strain-hardening

C	Si	Mn	Cr	Ni	P	S	Mo
max. 0.12	0.65 - 1	5 - 8	17 - 20	7.5 - 9	max. 0.03	max. 0.03	max. 0.3

#### • Fields of application:

- Exhaust system construction (e.g. exhaust systems), spring technology, repair of shafts

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	0.8 mm	-	<a href="#">097-005370-20008</a>
Wire basket	BS300	15 kg	0.8 mm	-	<a href="#">097-005370-30008</a>
Wire basket	BS300	15 kg	1 mm	-	<a href="#">097-005370-30010</a>
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-005370-30012</a>
Wire basket	BS300	15 kg	1.6 mm	-	<a href="#">097-005370-30016</a>
Drum	F250	250 kg	1 mm	-	<a href="#">097-005370-25010</a>
Drum	F250	250 kg	1.2 mm	-	<a href="#">097-005370-25012</a>

# Welding filler metals

## Solid wire electrodes

### SW 308 LSi XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 19 9 L Si AWS A-5.9 - ER 308 L Si
<b>Material number</b>	1.4316
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Tensile strength, Rm</b>	≥600 MPa
<b>Expansion, A5</b>	≥35 %
<b>Impact energy, Av</b>	20 °C: ≥ 110 J -196 °C: ≥ 40 J
<b>Approvals</b>	CE / TÜV / DB
<b>Hardness</b>	190 BHN
<b>Base materials</b>	1.4301   1.4306 304   304L



High-alloy

#### Chemical analysis (in %)

- High-alloy solid wire electrode, non-corroding
- Layer-wound
- Good resistance to intergranular and atmospheric corrosion
- Excellent welding properties (better seam appearance) due to higher Si content
- For welding stabilised and non-stabilised CrNi steels
- For operating temperatures up to approx. +350°C, low-temperature tough down to -196°C

	C	Si	Mn	P	S	Cr	Ni	Mo
	max. 0.03	0.65 - 1	1 - 2.5	max. 0.03	max. 0.02	19.5 - 21	9 - 11	max. 0.3

#### • Fields of application:

- Chemical and food industry, as well as pipeline and boiler construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	0.8 mm	-	097-005391-20008
Plastic spool	S200	5 kg	1 mm	-	097-005391-20010
Wire basket	BS300	15 kg	0.8 mm	-	097-005391-30008
Wire basket	BS300	15 kg	1 mm	-	097-005391-30010
Wire basket	BS300	15 kg	1.2 mm	-	097-005391-30012
Wire basket	BS300	15 kg	1.6 mm	-	097-005391-30016
Drum	F250	250 kg	1 mm	-	097-005391-25010
Drum	F250	250 kg	1.2 mm	-	097-005391-25012
Drum	F250	250 kg	1.6 mm	-	097-005391-25016

### SW 309 LSi XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 23 12 L Si AWS A-5.9 - ER 309 L Si
<b>Material number</b>	1.4332
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Tensile strength, Rm</b>	≥650 MPa
<b>Expansion, A5</b>	≥35 %
<b>Impact energy, Av</b>	20 °C: ≥ 120 J -196 °C: 55 J
<b>Approvals</b>	CE / TÜV
<b>Base materials</b>	Austenite-ferrite joints (dissimilar), cladding, corrosion-resistant layers on non-alloyed construction steels, buffer layers



- High-alloy solid wire electrode, non-corroding
- Layer-wound
- Very good corrosion and scale resistance
- Excellent welding properties (better seam appearance) due to higher Si content
- Suitable for dissimilar joints and buffer layers
- Heat and scale resistant up to approx. +950°C
- For operating temperatures up to approx. +300°C

• **Fields of application:**

- Industrial furnaces and boiler parts, annealing chambers, heat exchangers, processing plants

**Chemical analysis (in %)**

C	Mn	Si	P	S	Cr	Ni	Mo
max. 0.03	1 - 2.5	0.65 - 1	max. 0.03	max. 0.02	23 - 25	12 - 14	max. 0.3

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	1 mm	-	097-005393-30010
Wire basket	BS300	15 kg	1.2 mm	-	097-005393-30012
Wire basket	BS300	15 kg	1.6 mm	-	097-005393-30016

# Welding filler metals

## Solid wire electrodes

### SW 309 H

<b>Standards</b>	DIN EN ISO 14343-A - G 22 12 H AWS A-5.9 - ER 309 Si
<b>Material number</b>	1.4829
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Yield strength</b>	≥400 MPa
<b>Tensile strength, Rm</b>	≥600 MPa
<b>Expansion, A5</b>	≥25 %
<b>Impact energy, Av</b>	20 °C: 130 J
<b>Base materials</b>	1.4828   1.4826   1.4833   1.4713   1.4724   1.4742   1.4710   1.4740   1.4829   1.4832   1.4878   1.4713



High-alloy

#### Chemical analysis (in %)

- High-alloy solid wire electrode
- Not prone to hot crack formation due to high delta-ferrite content
- Joint welding and surfacing of heat-resisting CrSi, CrAl and CrNiSi steels
- For similar heat- and scale-resistant steels
- Scale-resistant up to 950 °C

C	Si	Mn	Ni	Cr	Mo	Cu
0.08 - 0.12	0.65 - 1.2	1 - 2.5	12 - 14	22 - 24	≤0.5	≤0.5

#### • Fields of application:

- Industrial furnaces and boiler parts

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	0.8 mm	-	<a href="#">097-004878-30008</a>
Wire basket	BS300	15 kg	1 mm	-	<a href="#">097-004878-30010</a>
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-004878-30012</a>
Wire basket	BS300	15 kg	1.6 mm	-	<a href="#">097-004878-30016</a>

# Welding filler metals

## Solid wire electrodes

### SW 310 XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 25 20 AWS A-5.9 - ER 310
<b>Material number</b>	1.4842
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Tensile strength, Rm</b>	≥590 MPa
<b>Expansion, A5</b>	≥35 %
<b>Impact energy, Av</b>	20 °C: ≥ 140 J
<b>Hardness</b>	9 HRC
<b>Base materials</b>	1.4710   1.4713   1.4726   1.4745   1.4823   1.4832   1.4837   1.4840   1.4841   1.4845   1.4846   1.4848   1.4849



High-alloy

#### Chemical analysis (in %)

- High-alloy solid wire electrode
- Weld metal made of fully austenitic chrome nickel steel
- Moderate corrosion resistance in wet environments
- For welding heat-resistant steels
- Scale resistant up to 1150°C
- Not resistant to hot cracking

C	Mn	Si	Cr	Ni	S	P	Mo
0.08 - 0.15	1 - 2.5	0.3 - 0.65	25 - 27	20 - 22	max. 0.03	max. 0.02	max. 0.75

#### • Fields of application:

- Industrial furnaces, boiler construction, heat exchangers

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	1 mm	-	<a href="#">097-005394-30010</a>
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-005394-30012</a>
Wire basket	BS300	15 kg	1.6 mm	-	<a href="#">097-005394-30016</a>

# Welding filler metals

## Solid wire electrodes

### SW 312 XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 29 9 AWS A-5.9 - ER 312
<b>Material number</b>	1.4337
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Tensile strength, Rm</b>	≥760 MPa
<b>Expansion, A5</b>	≥25 %
<b>Impact energy, Av</b>	20 °C: ≥ 45 J
<b>Base materials</b>	Corrosion-resistant analogue steel and cast steel (e.g. 1.4762, 1.4085) Difficult-to-weld steel, manganese high carbon steel, spring steel, tool steel



High-alloy

- High-alloy solid wire electrode, creep-resistant
- The weld metal has a ferritic-austenitic structure
- Suitable for dissimilar joints and buffer layers
- Good scale resistance
- High hot crack resistance

- **Fields of application:**
  - Offshore industry

#### Chemical analysis (in %)

C	Mn	Si	Cr	Ni	S	P	Mo
max. 0.15	1 - 2.5	0.3 - 0.65	28 - 32	8 - 11	max. 0.02	max. 0.03	max. 0.3

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	0.8 mm	-	<a href="#">097-005403-30008</a>
Wire basket	BS300	15 kg	1 mm	-	<a href="#">097-005403-30010</a>
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-005403-30012</a>
Wire basket	BS300	15 kg	1.6 mm	-	<a href="#">097-005403-30016</a>



# Welding filler metals

## Solid wire electrodes

### SW 316 LSi XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 19 12 3 L Si AWS A-5.9 - ER 316LSi
<b>Material number</b>	1.4430
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Tensile strength, Rm</b>	≥600 MPa
<b>Expansion, A5</b>	≥40 %
<b>Impact energy, Av</b>	20 °C: 110 J -196 °C: 40 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	1.4401   1.4404   1.4406   1.4408   1.4429   1.4435   1.4436   1.4541   1.4550   1.4571   1.4580   1.4581   1.4583



High-alloy

#### Chemical analysis (in %)

- High-alloy solid wire electrode, creep-resistant
- Layer-wound
- Excellent corrosion resistance in acidic media and chlorinated solutions
- Excellent welding properties (better seam appearance) due to higher Si content
- For welding stabilised and non-stabilised austenites of similar types
- For operating temperatures up to + 400°C, low-temperature tough down to - 196°C

C	Mn	Si	Cr	Ni	S	P	Mo
max. 0.03	1 - 2.5	0.65 - 1	18 - 20	11 - 14	max. 0.02	max. 0.03	2 - 3

#### • Fields of application:

- Chemical and food industry (containers, pipes, pumps)

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	0.8 mm	-	<a href="#">097-005372-20008</a>
Plastic spool	S200	5 kg	1 mm	-	<a href="#">097-005372-20010</a>
Wire basket	BS300	15 kg	0.8 mm	-	<a href="#">097-005372-30008</a>
Wire basket	BS300	15 kg	1 mm	-	<a href="#">097-005372-30010</a>
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-005372-30012</a>
Wire basket	BS300	15 kg	1.6 mm	-	<a href="#">097-005372-30016</a>
Drum	F250	250 kg	0.8 mm	-	<a href="#">097-005372-25008</a>
Drum	F250	250 kg	1 mm	-	<a href="#">097-005372-25010</a>
Drum	F250	250 kg	1.2 mm	-	<a href="#">097-005372-25012</a>

### SW 318 Si

<b>Standards</b>	DIN EN ISO 14343-A - W 19 12 3 Nb Si AWS A-5.9 - ER 318
<b>Material number</b>	1.4576
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Tensile strength, Rm</b>	≥600 MPa
<b>Expansion, A5</b>	≥32 %
<b>Impact energy, Av</b>	20 °C: 120 J -196 °C: 30 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	1.4401   1.4404   1.4408   1.4420   1.4435   1.4436   1.4571   1.4573   1.4580   1.4581   1.4583



- High-alloy solid wire electrode, creep-resistant
- Layer-wound
- Good resistance to intergranular and pitting corrosion
- Excellent welding properties (better seam appearance) due to higher Si content
- For welding stabilised austenites of similar types
- For operating temperatures up to + 400°C, low-temperature tough down to - 196°C

• **Fields of application:**

- For chemical apparatus and container construction

**Chemical analysis (in %)**

C	Mn	Si	Cr	Ni
max. 0.08	1 - 2.5	0.65 - 1	18 - 20	11 - 14
S	P	Mo	Nb	
max. 0.03	max. 0.02	2.5 - 3.5	≥10 xC	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	0.8 mm	-	097-003476-20008
Plastic spool	S200	5 kg	1 mm	-	097-003476-20010
Wire basket	BS300	15 kg	0.8 mm	-	097-003476-30008
Wire basket	BS300	15 kg	1 mm	-	097-003476-30010
Wire basket	BS300	15 kg	1.2 mm	-	097-003476-30012
Wire basket	BS300	15 kg	1.6 mm	-	097-003476-30016
Drum	F250	250 kg	1 mm	-	097-003476-25010

# Welding filler metals

## Solid wire electrodes

### SW 347 Si XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 19 9 Nb Si AWS A-5.9 - ER 347 Si
<b>Material number</b>	1.4551
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Tensile strength, Rm</b>	≥610 MPa
<b>Expansion, A5</b>	≥35 %
<b>Impact energy, Av</b>	20 °C: ≥ 110 J -196 °C: 30 J
<b>Hardness</b>	190 BHN
<b>Base materials</b>	1.4541   1.4550   1.4552   1.4301   1.4312   1.4546   1.4311   1.4306



High-alloy

#### Chemical analysis (in %)

- High-alloy solid wire electrode, creep-resistant
- Layer-wound
- Good resistance to intergranular and pitting corrosion
- For welding stabilised austenites of similar types
- Heat and scale resistant up to approx. 700°C
- For operating temperatures up to + 400°C, low-temperature tough down to - 196°C

C	Si	Cr	Ni	Mn	P	Mo	S
max. 0.08	0.65 - 1	19 - 21	9 - 11	1 - 2.5	max. 0.03	max. 0.3	max. 0.02

#### • Fields of application:

- Chemical plant engineering

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	0.8 mm	-	<a href="#">097-005378-30008</a>
Wire basket	BS300	15 kg	1 mm	-	<a href="#">097-005378-30010</a>
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-005378-30012</a>

### SW 2209 Duplex XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 22 9 3 LN AWS A-5.9 - ER 2209
<b>Material number</b>	1.4462
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Tensile strength, Rm</b>	≥790 MPa
<b>Expansion, A5</b>	≥25 %
<b>Impact energy, Av</b>	20 °C: ≥ 120 J -80 °C: ≥ 40 J
<b>Approvals</b>	CE / TÜV / Weitere auf Anfrage
<b>Base materials</b>	1.4462   1.4417   1.4460   1.4362 Dissimilar joints



#### Chemical analysis (in %)

C	Mn	Mo	Cr	Ni	S	P	N
max. 0.03	0.5 - 2	2.5 - 3.5	21.5 - 23.5	7.5 - 9.5	max. 0.02	max. 0.03	0.08 - 0.2

- High-alloy solid wire electrode
- Good resistance to pitting and stress corrosion cracking, even in media containing chloride
- For joining austenitic-ferritic stainless steels and all other lean duplex steels
- Suitable for black/white joints
- To be used in the temperature range from -80°C to approx. 250°C

#### • Fields of application:

- Offshore (e.g. pipeline construction), pulp and paper industry

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	0.8 mm	-	<a href="#">097-005380-30008</a>
Wire basket	BS300	15 kg	1 mm	-	<a href="#">097-005380-30010</a>
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-005380-30012</a>
Wire basket	BS300	15 kg	1.6 mm	-	<a href="#">097-005380-30016</a>

### SW 2594 Super Duplex XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 25 9 4 N L AWS A-5.9 - ER 2594
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13
<b>Tensile strength, Rm</b>	≥830 MPa
<b>Expansion, A5</b>	≥22 %
<b>Impact energy, Av</b>	-196 °C: ≥ 80 J
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	Austenitic-ferritic super duplex steels such as 1.4410 Dissimilar joints



- High-alloy solid wire electrode
- Excellent resistance to pitting, air gap and stress corrosion cracking in chloride-containing environments
- Suitable for surfacing on steels in particularly aggressive environments
- For welding duplex and super-duplex steels

• **Fields of application:**

- Chemical and petrochemical industry (chloride environment)

**Chemical analysis (in %)**

C	Mn	Mo	Cr	Ni	S
max. 0.03	2.5	2.5 - 4.5	24 - 27	8 - 10.5	max. 0.02
P	N	Si	W	Cu	
max. 0.03	0.2 - 0.3	max. 1	max. 1	max. 1.5	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	0.8 mm	-	<a href="#">097-005422-30008</a>
Wire basket	BS300	15 kg	1 mm	-	<a href="#">097-005422-30010</a>
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-005422-30012</a>

# Welding filler metals

## Solid wire electrodes

### SW Hard 60

<b>Standards</b>	DIN EN 14700 - S Fe8
<b>Material number</b>	1.4718
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
	I1
<b>Hardness</b>	55 - 60 HRC
<b>Base materials</b>	X45CrSi9-3   4Xr9Si2   X45CrSi8   HNV1   HNV2   SUH11   X45CrSi 9-3   401 S45   SUH 1   STR 1   40Ch9S2



- High-alloy solid wire electrode
- Copper-plated, layer wound
- Good wear and impact resistance
- Up to 60 HRC

• **Fields of application:**

- Impact drill bits, cutting tools, screw conveyors, etc.

#### Chemical analysis (in %)

C	Si	Cr	Mn	P	S
0.45	3	9.3	0.4	<0.025	<0.02
Cu	Ni	Mo	Al	V	W
<0.25	<0.15	<0.15	<0.03	<0.03	<0.1

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-003549-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003549-30012</a>
Basket spool	B300	15 kg	1.6 mm	-	<a href="#">097-003549-30016</a>

# Welding filler metals

## Solid wire electrodes

### SW 625

<b>Standards</b>	DIN EN ISO 18274 - Ni 6625 – NiCr22Mo9Nb AWS A-5.14 - ER NiCrMo3
<b>Material number</b>	2.4831
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Shielding gas</b>	I3 M12
<b>Tensile strength, Rm</b>	≥720 J
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 200 J -17 °C: 180 J -40 °C: 160 J
<b>Approvals</b>	TÜV
<b>Base materials</b>	1.4529   1.4539   1.4558   1.4876   1.5680   1.5681   1.5662   2.4605   2.4618   2.4856   2.4858   2.4951   2.4952 Alloy 625, alloy 800 and similar Ni-Cr alloys



Nickel-based

- High-alloy solid wire electrode made of nickel-based alloy
- Very good corrosion resistance to hydrochloric, sulphuric and nitric acid
- Very good resistance to pitting, air gap and intergranular corrosion
- Suitable for nickel-based alloys, dissimilar joints up to 300°C and surfacing
- Can be used in temperature range from -196°C to 550°C

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni
≤0.03	≤0.5	≤1	21 - 23	≥60
Mo	Cu	Fe	(Nb + Ta)	
8.5 - 9.5	≤0.5	≤1	3.2 - 4	

#### • Fields of application:

- High-temperature applications, marine and offshore environments, pipework systems, reactor components

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	1 mm	-	097-003515-30010
Wire basket	BS300	15 kg	1.2 mm	-	097-003515-30012

# Welding filler metals

## Solid wire electrodes

### SW NiCr82

<b>Standards</b>	DIN EN ISO 18274 - Ni 6082 – NiCr20Mn3Nb AWS-SFA-5.14 - ER NiCr 3
<b>Material number</b>	2.4806
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Shielding gas</b>	M12 M13
	I3
<b>Tensile strength, Rm</b>	660 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 150 J -50 °C: 60 J
<b>Base materials</b>	1.4558   1.4859   1.4861   1.4876   1.4877   1.4885   1.4958   1.4968   2.4669   2.4694   2.4816   2.4817   2.4867   2.4867   2.4869   2.4951   2.4952
	Nickel-based alloys, dissimilar joints (also at temperatures >300 °C), cladding, surfacing



Nickel-based

- High-alloy solid wire electrode made of nickel-based alloy
- Good resistance to stress and intergranular corrosion
- Suitable for nickel-based alloys, dissimilar joints up to 300°C and surfacing
- Scale-resistant up to 1,200 °C
- Cold tough up to -196 °C

#### • Fields of application:

- Petrochemicals and offshore technology (e.g. furnace systems)

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni
≤0.05	≤0.1	2.5 - 3.5	18 - 22	≥67
Cu	Ti	Fe	(Nb + Ta)	
≤0.5	≤0.7	≤3	2 - 3	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	0.8 mm	-	<a href="#">097-003586-30008</a>
Wire basket	BS300	15 kg	1 mm	-	<a href="#">097-003586-30010</a>
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-003586-30012</a>
Wire basket	BS300	15 kg	1.6 mm	-	<a href="#">097-003586-30016</a>



### SW ML 1450 Al99,5Ti

<b>Standards</b>	DIN EN ISO 18273 - S AL 1450 (Al99,5Ti) AWS A-5.10 - ER 1450
<b>Material number</b>	3.0805
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥65 MPa
<b>Expansion, A5</b>	35 %
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	Al99,0   Al99,5   Al99,7   E-Al



- MIG solid wire electrode, aluminium
- High strength due to titanium content
- High corrosion resistance
- Resistant to hot cracks
- Well suited to welding
- For welding pure aluminium alloys

• **Fields of application:**

- Chemical and food industry (containers, pipes, pumps)

**Chemical analysis (in %)**

Si	Fe	Cu	Mn	Zn	Mg	Ti	Al
<0.25	<0.4	<0.05	<0.05	<0.07	0.05	0.1 - 0.2	≥99.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	7 kg	0.8 mm	-	<a href="#">097-580017-30008</a>
Wire basket	BS300	7 kg	1 mm	-	<a href="#">097-580017-30010</a>
Wire basket	BS300	7 kg	1.2 mm	-	<a href="#">097-580017-30012</a>
Wire basket	BS300	7 kg	1.6 mm	-	<a href="#">097-580017-30016</a>
Wire basket	BS300	7 kg	2 mm	-	<a href="#">097-580017-30020</a>
Wire basket	BS300	7 kg	2.4 mm	-	<a href="#">097-580017-30024</a>

### SW ML 3103 AlMn1

<b>Standards</b>	DIN EN ISO 18273 - S AL 3103 (AlMn1) AWS A-5.10 - ER 3103
<b>Material number</b>	3.0516
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥105 MPa
<b>Expansion, A5</b>	≥29 %
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	Similar materials



- MIG solid wire electrode, aluminium
- Shaved several times
- Seawater resistant
- Resistant to hot cracks
- Well suited to welding

• **Fields of application:**

- Shipbuilding, chemical plant construction, pipeline construction, vehicle construction (coolers)

**Chemical analysis (in %)**

Si	Fe	Cu	Mn	Mg
<0.5	<0.3	<0.1	0.9 - 1.5	<0.3
Cr	Zn	Ti+Zr	Al	
<0.1	<0.2	<0.1	Remainder	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	7 kg	0.8 mm	-	<a href="#">097-580019-30008</a>
Wire basket	BS300	7 kg	1 mm	-	<a href="#">097-580019-30010</a>
Wire basket	BS300	7 kg	1.2 mm	-	<a href="#">097-580019-30012</a>
Wire basket	BS300	7 kg	1.6 mm	-	<a href="#">097-580019-30016</a>
Wire basket	BS300	7 kg	2 mm	-	<a href="#">097-580019-30020</a>
Wire basket	BS300	7 kg	2.4 mm	-	<a href="#">097-580019-30024</a>

# Welding filler metals

## Solid wire electrodes

### SW ML 5087 AlMg4,5MnZr



<b>Standards</b>	DIN EN ISO 18273 - S AL 5087 (AlMg4,5MnZr)
<b>Material number</b>	3.3546
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1
	I2
	I3
<b>Tensile strength, Rm</b>	275 MPa
<b>Expansion, A5</b>	17 %
<b>Approvals</b>	CE / DNV-GL / ABS / DB / TÜV / Bureau Veritas
<b>Base materials</b>	AlMg4,5Mn   AlZnMgCu1,5   AlMg5Mn   AlMg3   AlMg5   AlMgMn   AlZn   Mg1   G-AlMg3Si   G-AlMg10   AlMgSi0,7

- MIG solid wire electrode, aluminium
- Improved seawater and corrosion resistance as well as tensile strength due to Zr content
- Insensitive to hot cracking (with low dilution)
- Mainly for welding Al-Mg alloys with max. 5% Mg
- Not suitable for anodising

**Fields of application:**

- Shipbuilding, offshore, automotive industry, rail transport

**Chemical analysis (in %)**

Si	Fe	Cu	Mn	Mg	Cr
<0.25	<0.4	<0.05	0.7 - 1.1	4.5 - 5.2	0.05 - <0.25
Zn	Ti	Zr	Al	Others	
<0.25	<0.15	0.1 - 0.2	Remainder	<0.15	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	7 kg	0.8 mm	-	<a href="#">097-580010-30008</a>
Wire basket	BS300	7 kg	1 mm	-	<a href="#">097-580010-30010</a>
Wire basket	BS300	7 kg	1.2 mm	-	<a href="#">097-580010-30012</a>
Wire basket	BS300	7 kg	1.6 mm	-	<a href="#">097-580010-30016</a>
Wire basket	BS300	7 kg	2 mm	-	<a href="#">097-580010-30020</a>
Wire basket	BS300	7 kg	2.4 mm	-	<a href="#">097-580010-30024</a>

# Welding filler metals

## Solid wire electrodes

### SW ML 5183 AlMg4,5Mn0,7



<b>Standards</b>	DIN EN ISO 18273 - S AL 5183 (AlMg4,5Mn0,7) AWS A-5.10 - ER 5183
<b>Material number</b>	3.3548
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥275 MPa
<b>Expansion, A5</b>	17 %
<b>Approvals</b>	CE / DNV-GL / ABS / LR / DB / TÜV / KR (Korean Register) / BWB / Bureau Veritas
<b>Base materials</b>	AlMg4,5Mn   AlMg5   AlMg2Mn0,8   AlZnMg1   AlZnMgCu0,5   AlMgSi0,5   AlMgSi1   G-AlMg10   G-AlMg5   G-AlMg3Si   G- AlMg5Si

#### Chemical analysis (in %)

- MIG solid wire electrode, aluminium
- Very high resistance to seawater and corrosion
- Higher tensile strength
- For welding high tensile Al alloys
- Mainly for welding Al-Mg alloys with max. 5% Mg
- Suitable for anodising

Si	Fe	Cu	Mn	Mg
<0.4	<0.4	<0.1	<0.5 - 1	<4.3 - 5.2
Cr	Zn	Ti	Al	Others
<0.05 - <0.25	<0.25	<0.15	Remainder	<0.15

- **Fields of application:**
  - Shipbuilding, offshore, automotive industry, rail transport

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	2 kg	0.8 mm	-	097-580012-20008
Plastic spool	S200	2 kg	1 mm	-	097-580012-20010
Plastic spool	S200	2 kg	1.2 mm	-	097-580012-20012
Wire basket	BS300	7 kg	0.8 mm	-	097-580012-30008
Wire basket	BS300	7 kg	1 mm	-	097-580012-30010
Wire basket	BS300	7 kg	1.2 mm	-	097-580012-30012
Wire basket	BS300	7 kg	1.6 mm	-	097-580012-30016
Wire basket	BS300	7 kg	2 mm	-	097-580012-30020
Wire basket	BS300	7 kg	2.4 mm	-	097-580012-30024

# Welding filler metals

## Solid wire electrodes

### SW ML 5754 AlMg3

<b>Standards</b>	DIN EN ISO 18273 - S AI 5754 (AlMg53) AWS A-5.10 - ER 5754
<b>Material number</b>	3.3536
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥190 MPa
<b>Expansion, A5</b>	20 %
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	AlMgMn   AlMg1   AlMg2,7Mn   AlMg3   AlMg3,5   AlMgSi0,5   AlMgSi0,8   G-AlMg3Si



- MIG solid wire electrode, aluminium
- High corrosion resistance (against seawater) and strength
- Mainly for welding Al-Mg alloys with max. 3% Mg
- Suitable for anodising

**Fields of application:**

- Shipbuilding, plant engineering, construction

**Chemical analysis (in %)**

Si	Fe	Cu	Mn	Mg
<0.4	<0.4	<0.1	<0.5	2.6 - 3.6
Cr	Ti	Zn	Al	Others
<0.3	<0.15	<0.2	Remainder	<0.15

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	2 kg	0.8 mm	-	<a href="#">097-580013-20008</a>
Plastic spool	S200	2 kg	1 mm	-	<a href="#">097-580013-20010</a>
Plastic spool	S200	2 kg	1.2 mm	-	<a href="#">097-580013-20012</a>
Wire basket	BS300	7 kg	0.8 mm	-	<a href="#">097-580013-30008</a>
Wire basket	BS300	7 kg	1 mm	-	<a href="#">097-580013-30010</a>
Wire basket	BS300	7 kg	1.2 mm	-	<a href="#">097-580013-30012</a>
Wire basket	BS300	7 kg	1.6 mm	-	<a href="#">097-580013-30016</a>
Wire basket	BS300	7 kg	2 mm	-	<a href="#">097-580013-30020</a>
Wire basket	BS300	7 kg	2.4 mm	-	<a href="#">097-580013-30024</a>

# Welding filler metals

## Solid wire electrodes

### SW ML4047 AISi12

<b>Standards</b>	DIN EN ISO 18273 - S Al 4047 (AISi12 (A)) AWS A-5.10 - ER 4047
<b>Material number</b>	3.2585
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥130 N/mm <sup>2</sup>
<b>Expansion, A5</b>	5 %
<b>Approvals</b>	CE / DB
<b>Base materials</b>	G-AISi10Mg   G-AISi11   G-AISi12(Cu)   G-AISi7Mg   G-AISi6Cu4   AlMgSi0,8   AlMgSi1



#### Chemical analysis (in %)

Si	Fe	Cu	Mn	Mg	Zn	Al	Others
11 - 13	<0.8	<0.3	<0.15	<0.1	<0.2	<Remainder	0.15

- MIG solid wire electrode, aluminium
- Shaved several times
- High corrosion resistance, low distortion
- Resistant to hot cracks
- Very good flow and wetting properties
- Bright and virtually dirt-free weld seams
- Suitable for welding and brazing aluminium alloys and cast aluminium alloys with up to 12% Si content
- Not suitable for anodising
- **Fields of application:**
  - Brazing of sheet metal and extruded profiles from cast workpieces

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	7 kg	0.8 mm	-	<a href="#">097-580016-30008</a>
Wire basket	BS300	7 kg	1 mm	-	<a href="#">097-580016-30010</a>
Wire basket	BS300	7 kg	1.2 mm	-	<a href="#">097-580016-30012</a>
Wire basket	BS300	7 kg	1.6 mm	-	<a href="#">097-580016-30016</a>
Wire basket	BS300	7 kg	2 mm	-	<a href="#">097-580016-30020</a>
Wire basket	BS300	7 kg	2.4 mm	-	<a href="#">097-580016-30024</a>

### SW ML 4043 AISi5

<b>Standards</b>	DIN EN ISO 18273 - S AI 4043 (AISi5(A)) AWS A-5.10 - ER 4043
<b>Material number</b>	3.2245
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥130 MPa
<b>Expansion, A5</b>	≥5 %
<b>Approvals</b>	CE / DB / TÜV
<b>Base materials</b>	AlMgSi0,5   AlMgSi0,8   AlMgSi1   AlZnMg   AlCuMg



- MIG solid wire electrode, aluminium
- High corrosion resistance
- Resistant to hot cracks
- Very good flow and wetting properties
- Bright and virtually dirt-free weld seams
- Not suitable for anodising

- **Fields of application:**
  - Bicycles, trucks, trailers and aluminium constructions

#### Chemical analysis (in %)

Si	Fe	Cu	Mn	Mg
<4.5 - 6	<0.8	<0.3	<0.05	<0.05
Zn	Ti	Al	Others	
<0.1	<0.2	Remainder	<0.15	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	2 kg	0.8 mm	-	<a href="#">097-580015-20008</a>
Plastic spool	S200	2 kg	1 mm	-	<a href="#">097-580015-20010</a>
Plastic spool	S200	2 kg	1.2 mm	-	<a href="#">097-580015-20012</a>
Wire basket	BS300	7 kg	0.8 mm	-	<a href="#">097-580015-30008</a>
Wire basket	BS300	7 kg	1 mm	-	<a href="#">097-580015-30010</a>
Wire basket	BS300	7 kg	1.2 mm	-	<a href="#">097-580015-30012</a>
Wire basket	BS300	7 kg	1.6 mm	-	<a href="#">097-580015-30016</a>
Wire basket	BS300	7 kg	2 mm	-	<a href="#">097-580015-30020</a>
Wire basket	BS300	7 kg	2.4 mm	-	<a href="#">097-580015-30024</a>
Drum	F100	100 kg	1.2 mm	-	<a href="#">097-580015-10012</a>

### SW ML 5356 AlMg5Cr

<b>Standards</b>	DIN EN ISO 18273 - S AL 5356 (AlMg5Cr) AWS A-5.10 - ER 5356
<b>Material number</b>	3.3556
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥240 MPa
<b>Expansion, A5</b>	17 %
<b>Approvals</b>	CE / DNV-GL / ABS / DB / TÜV / Bureau Veritas
<b>Base materials</b>	AlMg5   AlMg3   AlZnMg1   AlZnMgCu0,5   AlMgSi0,7   AlMg1SiCu   G-AlMg10   G-AlMg3Si   G-AlMg5Si



- MIG solid wire electrode, aluminium
- Shaved several times
- High strength and significantly improved seawater resistance
- Mainly for welding Al-Mg alloys with max. 5% Mg
- Suitable for anodising
- Not resistant to stress corrosion cracking at >65°C

#### Chemical analysis (in %)

Si	Fe	Cu	Mn	Mg
<0.25	<0.4	<0.1	<0.05 - 0.2	<4.5 - 5.5
Cr	Zn	Ti	Al	Others
<0.05 - 0.2	<0.1	0.06 - 0.2	Remainder	<0.015

#### • Fields of application:

- Shipbuilding, offshore, automotive industry, rail transport

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	2 kg	0.8 mm	-	<a href="#">097-580011-20008</a>
Plastic spool	S200	2 kg	1 mm	-	<a href="#">097-580011-20010</a>
Plastic spool	S200	2 kg	1.2 mm	-	<a href="#">097-580011-20012</a>
Wire basket	BS300	7 kg	0.8 mm	-	<a href="#">097-580011-30008</a>
Wire basket	BS300	7 kg	1 mm	-	<a href="#">097-580011-30010</a>
Wire basket	BS300	7 kg	1.2 mm	-	<a href="#">097-580011-30012</a>
Wire basket	BS300	7 kg	1.6 mm	-	<a href="#">097-580011-30016</a>
Wire basket	BS300	7 kg	2 mm	-	<a href="#">097-580011-30020</a>
Wire basket	BS300	7 kg	2.4 mm	-	<a href="#">097-580011-30024</a>



### SW CuSi3

<b>Standards</b>	DIN EN ISO 24373 - CuSi3Mn (Cu 6560) AWS A-5.7 - ER CuSi-A
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	350 MPa
<b>Expansion, A5</b>	40 %
<b>Impact energy, Av</b>	20 °C: 60 J
<b>Hardness</b>	80 HB
<b>Base materials</b>	CuSi2Mn   CuSi3Mn   CuZn5   CuZn10   CuZn15



- Solid wire electrode made of Cu-Si alloy
- Layer-wound
- Excellent flow characteristics
- Suitable for joint welding, brazing and surfacing
- Ideal for MIG brazing of galvanised, thin sheets

• **Fields of application:**

- Galvanised body panels, heating construction, ventilation construction
- Applications on unalloyed and low-alloy steels and cast iron

#### Chemical analysis (in %)

Si	Mn	Cu	Others
2.8 - 2.95	0.75 - 0.95	Remainder	max. 0.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	0.8 mm	-	<a href="#">097-003485-20008</a>
Plastic spool	S200	5 kg	1 mm	-	<a href="#">097-003485-20010</a>
Basket spool	B300	15 kg	0.8 mm	-	<a href="#">097-003485-30008</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-003485-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003485-30012</a>
Drum	F200	200 kg	1 mm	-	<a href="#">097-003485-20110</a>

# Welding filler metals

## Solid wire electrodes

### SW CuAl8

<b>Standards</b>	DIN EN ISO 24373 - CuAl7 (Cu 6100) AWS A-5.7 - ER CuAl-A1
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	430 MPa
<b>Expansion, A5</b>	40 %
<b>Impact energy, Av</b>	20 °C: 100 J
<b>Hardness</b>	100 HB
<b>Base materials</b>	CuAl5   CuAl8   CuAl9   CuZn20Al



- Solid wire electrode made of Cu-Al alloy
- The weld metal is corrosion-resistant, seawater-resistant and wear-resistant
- Suitable for joint welding, brazing and surfacing
- Excellent for GMAW brazing of galvanised and aluminised thin sheets
- Surfacing on unalloyed and low-alloy steels and cast iron
- Joint welding of Cu materials and various steel sheets
- **Fields of application:**
  - Vehicle/vehicle body construction, air conditioning and ventilation system construction and container construction

#### Chemical analysis (in %)

Al	Mn	Ni	Cu	Others
7.5 - 8	0.1 - 0.3	0.1 - 0.5	Remainder	max. 0.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	0.8 mm	-	<a href="#">097-003486-30008</a>
Basket spool	B300	15 kg	1 mm	-	<a href="#">097-003486-30010</a>
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003486-30012</a>

# Welding filler metals

## Solid wire electrodes

### SW CuSn1

<b>Standards</b>	DIN EN ISO 24373 - CuSn1 (Cu 1898) AWS A-5.7 - ER Cu
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	220 MPa
<b>Expansion, A5</b>	30 %
<b>Impact energy, Av</b>	20 °C: 75 J
<b>Hardness</b>	60 HB
<b>Base materials</b>	OF-Cu   SE-Cu   SW-Cu   SF-Cu   CuZn0,5



- Solid wire electrode made of copper-tin alloy
- The weld metal is corrosion-resistant, seawater-resistant and wear-resistant
- Non-porous weld seams
- Very good welding properties
- Suitable for highly stressed welded joints on oxygen-free copper / Cu materials
- For joint welding and surfacing on pure copper and copper alloys

- **Fields of application:**

- Vehicle/vehicle body construction, air conditioning and ventilation system construction and container construction

#### Chemical analysis (in %)

Sn	Mn	Si	P	Cu	Others
0.75 - 0.9	0.15 - 0.3	0.15 - 0.25	0.005 - 0.02	Remainder	max. 0.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003559-30012</a>
Basket spool	B300	15 kg	1.6 mm	-	<a href="#">097-003559-30016</a>

EWM description	Material number	DIN EN ISO	AWS	Approvals	Page
<b>unalloyed</b>					
SC-70 Zn		T3T Z M M21 1	E70C-GS		61
FCW 71T Selfshield			E 71T-11		62
FCW 71T Rutil Black		T 46 3 P C1/M21 1 H5	E71T-9C/9M H4(H8)	CE / TÜV / DB / DNV-GL / LR	63
FCW 70-M		T 46 3 M M21 1 H5 / T 42 3 M C1 1 H5	E70C-3C / E70C-6M	CE / TÜV / DB / DNV-GL / LR	64
<b>Low-alloy</b>					
FCW MEGAFIL 825 R			E81T1-A1M H4	On request	65
FCW 111T NiMoCr			E111T1-M21A4-G-H4	On request	66
FCW MEGAFIL 742M			E110C-K4 H4	On request	67
<b>High-alloy</b>					
FCW 308 Rutile	1.4316	T 19 9 L R C1/M21 3	E 308LT0-1/4	On request	68
FCW 316 Rutile	1.4430	T 19 12 3 L R C1/M21 3	E 316LT0-1/4	On request	69
FCW 316 METAL	1.4430	T 19 12 3 L M M12 1	EC 316L	On request	70
<b>Hardfacing</b>					
FCW Hard 52 G					71
FCW DURMAT FD 665					72
FCW STELLOY 21-G			ERCCoCr-E		73

# Welding filler metals

## Flux cored wire electrodes

### SC-70 Zn

<b>Standards</b>	DIN EN ISO 17632-A - T3T Z M M21 1 AWS A-5.18 - E70C-GS
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	M20-M21
<b>Yield strength</b>	>355 MPa
<b>Tensile strength, Rm</b>	>490 MPa



#### Chemical analysis (in %)

- Specially developed metal cored wire for welding galvanised sheet metal (approx. 0.8–4.0 mm)
- Suitable for single pass welding on galvanised steel sheets
- Low reworking effort due to very low spatter tendency and easy cleaning of the weld seam
- Stable arc in the lower current range
- Low spatter tendency even in the short arc range
- Wide arc compensates for inaccuracies during seam preparation
- Suitable for pulse welding procedures

C	Si	Mn	P	S	Al
0.45	0.37	1.15	0.008	0.003	2.05

#### • Fields of application:

- General metal and sheet metal construction
- Automotive and vehicle industry
- Air conditioning and ventilation construction
- Shipbuilding

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	BS 300	15 kg	1.2 mm	-	<a href="#">097-145495-30012</a>

### FCW 71T Selfshield

<b>Standards</b>	EN ISO 17632-A - T 42 Z Z Z N 1 AWS A-5.20 - E 71T-11
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	--
<b>Yield strength</b>	510 MPa
<b>Tensile strength, Rm</b>	580 MPa
<b>Expansion, A5</b>	21 %
<b>Base materials</b>	S185 - P275JR   S355J0 - S335   P255N - P355N   P235GH   P265GH   P310GH   P295Gh   S460N   S460M



- Unalloyed self-shielding flux cored wire electrode
- No shielding gas required
- Bright, layer wound
- Very high arc stability, easy handling
- Can be welded in any position, including vertically down
- Single-pass and multi-pass welding
- Slag is removed very easily
- Low spatter formation

• **Fields of application:**

- Galvanised and non-galvanised structural steels

#### Chemical analysis (in %)

	C	Si	Mn	P	S	Al
	0.18	0.34	0.5	0.012	0.006	1.35

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	2 kg	0.9 mm	-	<a href="#">097-003455-20209</a>
Plastic spool	S200	5 kg	0.9 mm	-	<a href="#">097-003455-20009</a>
Plastic spool	S200	5 kg	1.2 mm	-	<a href="#">097-003455-20012</a>
Plastic spool	S300	15 kg	1.2 mm	-	<a href="#">097-003455-30012</a>
Plastic spool	S300	15 kg	1.6 mm	-	<a href="#">097-003455-30016</a>

### FCW 71T Rutil Black

<b>Standards</b>	DIN EN ISO 17632-A - T 46 3 P C1/M21 1 H5 AWS A 5.36 - E71T-9C/9M H4(H8)
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21 C1
<b>Yield strength</b>	575 MPa
<b>Tensile strength, Rm</b>	630 MPa
<b>Expansion, A5</b>	28 %
<b>Impact energy, Av</b>	-20 °C: ≥ 105 J
<b>Approvals</b>	CE / TÜV / DB / DNV-GL / LR
<b>Base materials</b>	Material groups 1.1, 1.2, 1.3, 2.1, 3.1



- Unalloyed, rutile flux-cored wire electrode
- Bright, layer wound
- Stable arc
- Can be welded in any position, including vertically down
- Quick solidifying slag
- Easily removable slag
- Low smoke development and spatter formation
- Low H<sub>2</sub> content and good crack resistance
- Insensitive to non-optimised surfaces

• **Fields of application:**

- Ship, steel, bridge and vehicle construction

**Chemical analysis (in %)**

C	Si	Mn	P	S
0.04	0.6	1.35	0.01	0.006

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	1.2 mm	-	<a href="#">097-005265-20012</a>
Plastic spool	S200	5 kg	1.6 mm	-	<a href="#">097-005265-20016</a>
Plastic spool	S300	15 kg	1.2 mm	-	<a href="#">097-005265-30012</a>
Plastic spool	S300	15 kg	1.6 mm	-	<a href="#">097-005265-30016</a>

# Welding filler metals

## Flux cored wire electrodes

### FCW 70-M

<b>Standards</b>	DIN EN ISO 17632-A - T 46 3 M M21 1 H5 / T 42 3 M C1 1 H5 AWS A-5.18 - E70C-3C / E70C-6M
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21 C1
<b>Yield strength</b>	540 MPa
<b>Tensile strength, Rm</b>	610 MPa
<b>Expansion, A5</b>	26.4 %
<b>Impact energy, Av</b>	-30 °C: 70 J
<b>Approvals</b>	CE / TÜV / DB / DNV-GL / LR
<b>Base materials</b>	Material groups 1.1, 1.2, 1.3, 2.1, 3.1



#### Chemical analysis (in %)

	C	Si	Mn	P	S
	0.06	0.55	1.55	0.01	0.009

- Unalloyed, flux-cored wire electrode
- Bright, layer wound
- Stable arc
- Can be welded in any position, including vertically down
- Suitable for multi-pass welding without slag removal
- Excellent gap bridging and sidewall fusion
- Low smoke development and spatter formation
- Notch-free seam transitions
- Increased productivity thanks to high metal recovery and deposition rate
- **Fields of application:**
  - Ship, machine, bridge and steel construction as well as automated robot welding

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Plastic spool	S200	5 kg	1.2 mm	-	<a href="#">097-005267-20012</a>
Plastic spool	S200	5 kg	1.6 mm	-	<a href="#">097-005267-20016</a>
Plastic spool	S300	15 kg	1.2 mm	-	<a href="#">097-005267-30012</a>
Plastic spool	S300	15 kg	1.6 mm	-	<a href="#">097-005267-30016</a>



# Welding filler metals

## Flux cored wire electrodes

### FCW MEGAFIL 825 R

<b>Standards</b>	EN ISO 17634-A - T MoI P M21 1 H5 AWS A-5.29 - E81T1-A1M H4 AWS A5.36 - E81T1-M21PY-A1-H4
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	520 MPa
<b>Tensile strength, Rm</b>	600 MPa
<b>Expansion, A5</b>	23 %
<b>Impact energy, Av</b>	20 °C: 80 J
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	P235GH - P355GH   16Mo3   P235T1/P235T2 - P460NL2   L210 - L445MB   S255 - S460



#### Chemical analysis (in %)

- Low-alloy, rutile flux-cored wire electrode with rapidly solidifying slag
- Stable, low-spatter arc
- Can be welded in any position, including vertically down
- Single-pass and multi-pass welding
- Easy modelling capabilities and slag detachability
- Very crack-resistant weld metal
- Toughness down to -60°C
- Extremely low, diffusible H2 content in weld metal

C	Si	Mn	Mo	S	P
0.07	0.5	1.1	0.5	0.015	0.015

#### • Fields of application:

- Steel and container construction, as well as pipeline, ship and mechanical engineering

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	16 kg	1.2 mm	-	097-103603-30012

# Welding filler metals

## Flux cored wire electrodes

### FCW 111T NiMoCr

<b>Standards</b>	EN ISO 18276-A - T 69 6 Z P M21 1 H5 AWS A5.36 - E111T1-M21A4-G-H4
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	750 MPa
<b>Tensile strength, Rm</b>	820 MPa
<b>Expansion, A5</b>	18 %
<b>Impact energy, Av</b>	-20 °C: 110 J -40 °C: 80 J -60 °C: 55 J
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	S620 – S690   A106   A600   P620GH – P690GH bis A517   A537   A625   P620T1/T2 - P690NL2 bis A625   S620 – S629QL1 bis A625   X70 – X100 / HY100



- Low-alloy, rutile flux-cored wire electrode
- Copper-plated, layer wound
- Stable arc
- Can be welded in any position, including vertically down
- Easy modelling capabilities and slag detachability
- Crack-resistant weld metal – also for positional welding
- Excellent gap bridging and sidewall fusion
- Low smoke development and spatter formation
- For joining fine-grained construction steels up to 690 MPa yield strength
- Toughness down to -60°C
- Extremely low, diffusible H2 content in weld metal

• **Fields of application:**

- Steel construction, pipeline construction, shipbuilding, offshore

#### Chemical analysis (in %)

C	Si	Mn	Mo	Ni	P	S
0.08	0.5	1.7	0.15	2	0.015	0.015

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	16 kg	1.2 mm	-	<a href="#">097-003630-30012</a>

# Welding filler metals

## Flux cored wire electrodes

### FCW MEGAFIL 742M



<b>Standards</b>	EN ISO 18276-A - T 69 6 Mn2NiCrMo M M21 1 H5 AWS A-5.28 - E110C-K4 H4 AWS A5.36 - E111T15-M21A8-K4-H4
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Yield strength</b>	750 MPa
<b>Tensile strength, Rm</b>	820 MPa
<b>Expansion, A5</b>	20 %
<b>Impact energy, Av</b>	-40 °C: 120 J -60 °C: 90 J
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	S620 - S690   A 106   A 600   P620GH - P690GH bis A517   A537   A625   P620T1/T2 - P690NL2 bis A 625   S620 - S690QL1 bis A 625   X70 - X100 / HY100

#### Chemical analysis (in %)

- Low-alloy, flux-cored wire electrode
- Quiet, stable, low-spatter arc
- Can be welded in any position, including vertically down
- Single-pass and multi-pass welding
- Crack-resistant weld metal
- Good re-ignition properties
- Excellent gap bridging
- No slag formation
- Toughness down to -60°C
- Extremely low, diffusible H2 content in weld metal

	C	Si	Mn	Mo	Ni	P	S	Cr
	0.05	0.4	1.6	0.5	2.2	0.015	0.015	0.5

- **Fields of application:**
  - Steel construction, pipeline construction, shipbuilding, offshore

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS 300	16 kg	1.2 mm	-	097-004914-30012

### FCW 308 Rutile

<b>Standards</b>	DIN EN ISO 17633-A - T 19 9 L R C1/M21 3 AWS A-5.22 - E 308LT0-1/4
<b>Material number</b>	1.4316
<b>Welding positions</b>	PA / PB / PC
<b>Polarity</b>	DC+
<b>Shielding gas</b>	C1 M21
<b>Yield strength</b>	410 MPa
<b>Tensile strength, Rm</b>	570 MPa
<b>Expansion, A5</b>	40 %
<b>Impact energy, Av</b>	-20 °C: 45 J
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	18%-Cr-10%-Ni steels such as 304L or EN 1.4307



- High-alloy, rutile flux-cored wire electrode with slowly solidifying slag
- Stable, low-spatter arc
- High resistance to intergranular corrosion
- Mainly for PA, PB and PC welding positions
- Shiny, smooth weld surfaces
- Self-dissolving slag
- For welding stainless Cr-Ni steels with a low carbon content

#### Chemical analysis (in %)

C	Si	Mn	P	S
0.02	0.6	1.6	0.02	0.005
Ni	Cr	FS	FN	FNW
10.1	19.7	8.9	12.4	10.8

#### • Fields of application:

- Chemical, textile and pharmaceutical industry

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	1.2 mm	-	097-063561-30012

### FCW 316 Rutile

<b>Standards</b>	DIN EN ISO 17633-A - T 19 12 3 L R C1/M21 3 AWS A-5.22 - E 316LT0-1/4
<b>Material number</b>	1.4430
<b>Welding positions</b>	PA / PB / PC
<b>Polarity</b>	DC+
<b>Shielding gas</b>	C1 M21
<b>Tensile strength, Rm</b>	570 MPa
<b>Expansion, A5</b>	39 %
<b>Impact energy, Av</b>	-20 °C: 44 J
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	18%Cr-12%Ni-2.5%Mo steels such as 316L or EN 1.4435



- High-alloy, rutile flux-cored wire electrode with slowly solidifying slag
- Stable, low-spatter arc
- High resistance to intergranular corrosion
- Molybdenum improves pitting corrosion and creep resistance
- Mainly for PA, PB and PC welding positions
- Shiny, smooth weld surfaces
- Self-dissolving slag
- For non-rusting Cr-Ni-Mo steels with low carbon content

#### Chemical analysis (in %)

C	Si	Mn	P	S	Ni
0.03	0.6	1.6	0.02	0.006	12.2
Cr	Mo	FS	FN	FNW	
18.7	2.8	7.7	12.8	9.7	

#### • Fields of application:

- Chemical, textile and pharmaceutical industry

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-003457-30012</a>

# Welding filler metals

## Flux cored wire electrodes

### FCW 316 METAL

<b>Standards</b>	DIN EN ISO 17633-A - T 19 12 3 L M M12 1 AWS A-5.9 - EC 316L
<b>Material number</b>	1.4430
<b>Welding positions</b>	PA / PB / Positional welding with pulsed arc possible
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M12 M13 I1 Z
<b>Tensile strength, Rm</b>	610 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	-60 °C: 40 J
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	1.4401   1.4404   1.4406   1.4571   1.4583



High-alloy

#### Chemical analysis (in %)

- High-alloy, flux-cored wire electrode
- Stable, low-spatter arc
- Particularly suitable for welding in trough lengths; positional welding (except PG) also possible by using a pulsed arc
- Very good sidewall wetting, good X-ray resistance
- Shiny, smooth weld surfaces
- For welding stabilised and non-stabilised Cr-Ni steels

C	Si	Mn	Cr	Mo	Ni	S	P
0.02	0.6	1.4	19.5	2.8	12	0.008	0.02

#### • Fields of application:

- Chemical, textile and pharmaceutical industry

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	B300	15 kg	1.2 mm	-	<a href="#">097-003631-30012</a>

### FCW Hard 52 G

<b>Standards</b>	DIN EN 14700 - T Z Fe 16 DIN 8555 - MF10-GF-50-G
<b>Welding positions</b>	PA / PB
<b>Polarity</b>	DC+
<b>Shielding gas</b>	M21
<b>Hardness</b>	52 HRC



- C-, Cr-, Si-, Mn-alloyed flux-cored wire
- Low spatter and smoke formation
- For armour-plating that is subject to heavy abrasive wear with medium impact stress
- The weld metal is rust-resistant and can be machined by grinding

• **Fields of application:**

- Waste and recycling industry, screw conveyors, crusher rollers

#### Chemical analysis (in %)

C	Si	Mn	Cr
3	1.8	1.8	15

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS 300	15 kg	1.6 mm	-	<a href="#">097-003732-30016</a>
Wire basket	BS 300	15 kg	2 mm	-	<a href="#">097-003732-30020</a>

### FCW DURMAT FD 665

<b>Standards</b>	DIN EN 14700 - -
<b>Welding positions</b>	PA / slightly vertical up, slightly vertical down
<b>Polarity</b>	DC+
<b>Hardness</b>	56 - 61 HRC



- Iron-based flux-cored wire
- Good toughness and insensitivity to impact loads
- Good crack resistance with customised welding parameters
- Suitable for semi-automatic and fully automatic applications

- **Fields of application:**

- Applications on tools that are exposed to abrasion and impact loads

#### Chemical analysis (in %)

C	Mn	Si	Cr	Mo	Ti	Fe
<5	<3	<3	<10	<5	<10	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	1.6 mm	-	<a href="#">097-325049-30016</a>



### FCW STELLOY 21-G

<b>Standards</b>	DIN EN 14700 - T Co1 AWS A-5.21 - ERCCoCr-E
<b>Welding positions</b>	PA / slightly vertical up, slightly vertical down
<b>Polarity</b>	DC+
<b>Shielding gas</b>	I1 M13
<b>Hardness</b>	33 - 47 HRC



- Cobalt-based flux-cored wire
- Can be welded using shielding gas
- Very good resistance to corrosion, frictional wear and impact stress
- Good toughness and insensitivity to thermal shocks and alternating stresses
- Less susceptible to cracking than other co-alloys

#### Chemical analysis (in %)

C	Mn	Si	Cr	Ni	Mo	Fe	Co
0.25	1	1	28.5	3	5.5	4	Remainder

#### • Fields of application:

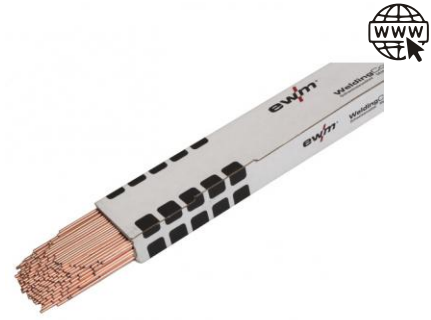
- Applications on components that are exposed to a combination of impact stress, abrasion, high pressure and corrosion at temperatures of up to 900°C, such as valve seats and guides for large water or high-pressure fittings, forging hammers, pump shafts, etc.

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Wire basket	BS300	15 kg	1.2 mm	-	<a href="#">097-004943-30012</a>

EWM description	Material number	DIN EN ISO	AWS	Approvals	Page
<b>unalloyed</b>					
TR 70S G2	1.5112	W 42 4 2Si	ER 70S-3	CE	75
TR 70S G3	1.5125	W 46 5 3Si1	ER 70S-6	CE / TÜV / DB	76
TR 70S G4	1.5130	W 50 5 4Si1	ER 70S-6	CE	77
<b>low-alloy</b>					
TR 80S Mo	1.5424	W MoSi	ER 70S-A1 (ER 80S-G)	CE / TÜV / DB	78
TR 80S CrMo1	1.7339	W CrMo1Si	ER 80S-G	CE / TÜV / DB	79
TR 90S CrMo2	1.7384	W CrMo2Si	ER 90S-G		80
TR CrMo5	1.7373	W CrMo5 Si	ER 80S-B6		81
TR 80S Ni1		W 46 6 3Ni1	ER 80S-Ni1		82
<b>High-alloy</b>					
TR 307 Si XQ	1.4370	W 18 8 Mn	ER 307 Si	CE	83
TR 308 LSi XQ	1.4316	W 19 9 L Si	ER 308 L Si	CE / TÜV / DB	84
TR 309 L Si XQ	1.4332	W 23 12 L Si	ER 309 L Si	CE / TÜV	85
TR 309 H	1.4829	W 22 12 H	ER 309 Si		86
TR 310 XQ	1.4842	G 25 20	ER 310		87
TR 312 XQ	1.4337	W 29 9	ER 312		88
TR 316 LSi XQ	1.4430	W 19 12 3 LSi	ER 316 LSi	CE / TÜV / DB	89
TR 318 Si	1.4576	W 19 12 3 Nb Si	ER 318 Si	CE / TÜV / DB	90
TR 347 XQ	1.4551	W 19 9 Nb	ER 347		91
TR 2209 Duplex XQ		W22 9 3 NL	ER 2209	CE / TÜV	92
TR 2594 Super Duplex XQ		W 25 9 4 N L	ER 2594	On request	93
<b>Tool steels</b>					
TR Tool 45 T	1.2567				94
TR Tool 55 T					95
<b>Hardfacing</b>					
TR Stelloy 21			ERCCoCr-E		96
TR Corolit T 21			ER CoCr E		97
<b>Nickel-based</b>					
TR NiCr82	2.4806	Ni 6082 – NiCr20Mn3Nb	ER NiCr 3		98
TR 625	2.4831	Ni 6625 – NiCr22Mo9Nb	ER NiCrMo3	TÜV	99
<b>Aluminium</b>					
TR ML 1450 Al99,5Ti	3.0805	S AL 1450 (Al99,5Ti)	ER 1450	On request	100
TR ML 3103 AlMn1	3.0516	S AL 3103 (AlMn1)	ER 3103	On request	101
TR ML 4043 AlSi5	3.2245	S Al 4043 (AlSi5(A))	ER 4043	CE / DB / TÜV	102
TR ML 4047 AlSi12	3.2585	S AL 4047A (AlSi12(A))	ER 4047	CE / DB	103
TR ML 5087	3.3546	S AL 5087 (AlMg4,5MnZr)	ER 5087	CE / DNV-GL / ABS / DB / TÜV / Bureau Veritas	104
TR ML 5183 AlMg4,5Mn0,7	3.3548	S AL 5183 (AlMg4,5Mn0,7)	ER 5183	CE / DNV-GL / ABS / LR / DB / TÜV / KR (Korean Register) / BWB / Bureau Veritas	105
TR ML 5356 AlMg5Cr	3.3556	S AL 5356 (AlMg5Cr)	ER 5356	CE / DNV-GL / ABS / DB / TÜV / Bureau Veritas	106
TR ML 5754 AlMg3	3.3536	S Al 5754 (AlMg3)	ER 5754	On request	107
<b>Copper-based</b>					
TR CuSi3		CuSi3Mn (Cu 6560)	ER CuSi-A		108
TR CuSn1		CuSn1 (Cu 1898)	ER Cu		109
TR CuSn6		S Cu 5180A (CuSn6P)	ER CuSn-A		110
TR CuAl8		CuAl7 (Cu 6100)	ER CuAl-A1		111

### TR 70S G2

<b>Standards</b>	DIN EN ISO 636-A - W 42 4 2Si AWS A-5.18 - ER 70S-3
<b>Material number</b>	1.5112
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	DC-
<b>Yield strength</b>	≥420 MPa
<b>Tensile strength, Rm</b>	≥510 MPa
<b>Expansion, A5</b>	≥22 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -46 °C: ≥ 200 J
<b>Approvals</b>	CE
<b>Base materials</b>	S185 - E360   S235JR - S355JR   S235J0 - S355J0   S235J2 - S355J2   S275N - S420N   S275M - S420M   P235GH - P355GH   P275N - P355N   P355M - P420M   P355Q ASTM: A36   A106 grades A/B/C   A139   A210 grades A1/C   A214   A216 grades WCA/WCB/WCC   A234 grade WPB   A334 API: 5L grades X42-X60



- Unalloyed TIG welding rod
- Copper-plated and stamped
- High chemical purity
- For single-pass and multi-pass welding
- Semi-fluid weld pool, good controllability
- Welding of steels with a yield strength of 420 MPa

• **Fields of application:**

- Shipbuilding, pressure vessel and boiler construction

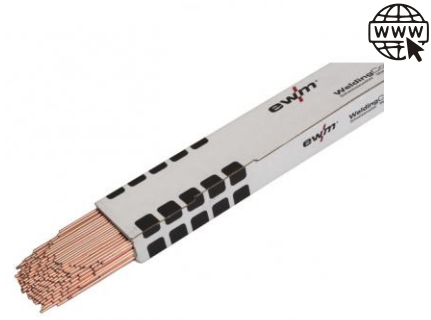
**Chemical analysis (in %)**

C	Si	Mn
0.09	0.6	1.15

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-003580-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003580-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003580-10024</a>
Package	Package	5 kg	3 mm	1000 mm	<a href="#">097-003580-10030</a>

### TR 70S G3

<b>Standards</b>	DIN EN ISO 636-A - W 46 5 3Si1 AWS A-5.18 - ER 70S-6
<b>Material number</b>	1.5125
<b>Welding positions</b>	PA / PB / PC / PE
<b>Polarity</b>	DC-
<b>Yield strength</b>	≥460 MPa
<b>Tensile strength, Rm</b>	≥560 MPa
<b>Expansion, A5</b>	≥22 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	S185 - E360   S235JR - S355JR   S235J0 - S355J0   S235J2 - S355J2   S275N - S420N   S275NL - S420NL   S275M - S420M   S275ML - S420ML   P275N - P355N   P275NL1 - P355NL1   P275NL2 - P355NL2   P355M - P420M   P355ML2 - P420ML2   P355Q   P355QL1 ASTM: A36   A106 grades A/B/C   A139   A210 grades A1/C   A214   A216 grades WCA/WCB/WCC   A234 grade WPB   A334 API: 5L grades X42-X60



#### Chemical analysis (in %)

	C	Si	Mn
	0.09	0.87	1.47

- Unalloyed TIG welding rod
- Copper-plated and stamped
- High chemical purity
- For single-pass and multi-pass welding
- Semi-fluid weld pool, good controllability
- Good wetting properties, flat weld surface
- Very stable arc at high welding currents
- Welding of steels with a yield strength of 460 MPa
- **Fields of application:**
  - Shipbuilding, pressure vessel and boiler construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-003489-10010</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-003489-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003489-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003489-10024</a>
Package	Package	5 kg	3 mm	1000 mm	<a href="#">097-003489-10030</a>
Package	Package	5 kg	5 mm	1000 mm	<a href="#">097-003489-10050</a>

### TR 70S G4

<b>Standards</b>	DIN EN ISO 636-A - W 50 5 4Si1 AWS A-5.18 - ER 70S-6
<b>Material number</b>	1.5130
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	DC-
<b>Yield strength</b>	≥500 MPa
<b>Tensile strength, Rm</b>	≥560 MPa
<b>Expansion, A5</b>	≥18 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -50 °C: ≥ 80 J



<b>Approvals</b>	CE
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<b>Base materials</b>	S185 - E360   S235JR - S355JR   S235J0 - S450J0   S235J2 - S355J2   S275N - S460N   S275M - S460M   S460Q   S460QL   P275N - P460N   P275NL1 - P460NL1   P355M - P460M   P355ML1 - P460ML1   P355Q - P460Q   P355QL1 - P460QL1
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#### Chemical analysis (in %)

	C	Si	Mn
	0.09	0.95	1.67

- Unalloyed TIG welding rod
- Copper-plated and stamped
- High chemical purity
- For single-pass and multi-pass welding
- Suitable for welding rolling scale and slightly rusty metal surfaces thanks to multiple deoxidisation
- Semi-fluid weld pool, good controllability
- Good wetting properties, flat weld surface
- Very stable arc at high welding currents
- Welding of steels with a yield strength of 460 MPa

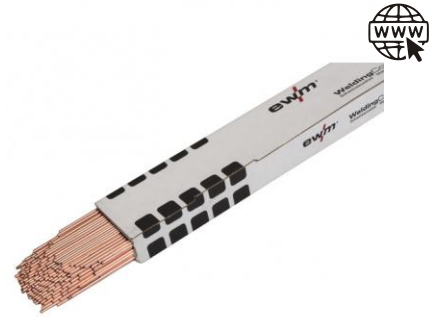
#### • Fields of application:

- Shipbuilding, pressure vessel and boiler construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-003574-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003574-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003574-10024</a>
Package	Package	5 kg	3 mm	1000 mm	<a href="#">097-003574-10030</a>

### TR 80S Mo

<b>Standards</b>	DIN EN ISO 21952-A - W MoSi DIN EN ISO 636-A - W 46 4 2Mo AWS A-5.28 - ER 70S-A1 (ER 80S-G)
<b>Material number</b>	1.5424
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Yield strength</b>	≥460 MPa
<b>Tensile strength, Rm</b>	≥560 MPa
<b>Expansion, A5</b>	>22 %
<b>Impact energy, Av</b>	20 °C: ≥ 60 J -40 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	Similarly alloyed creep-resistant steels and cast steel S355   P235G1TH - P255G1TH   P310GH   L320   L360NB - L415NB   16Mo3 ASTM: A182/A336 grade F1   A204 grades A/B/C   A209/A250 grade T1   A217 grade WC1   A335 grade P1   A352 grade LC



#### Chemical analysis (in %)

- Low-alloy TIG welding rod
- Copper-plated and stamped
- Low-spatter thanks to high chemical purity
- Mainly for welding creep-resistant 0.5% Mo steels
- Maximum operating temperature 500 °C

	C	Si	Mn	Mo
	0.1	0.6	1.15	0.52

- **Fields of application:**
  - Boiler, container, pressure vessel and pipeline construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-003487-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003487-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003487-10024</a>
Package	Package	5 kg	3 mm	1000 mm	<a href="#">097-003487-10030</a>

### TR 80S CrMo1

<b>Standards</b>	DIN EN ISO 21952-A - W CrMo1Si AWS A-5.28 - ER 80S-G
<b>Material number</b>	1.7339
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Yield strength</b>	≥355 MPa
<b>Tensile strength, Rm</b>	≥510 MPa
<b>Expansion, A5</b>	≥20 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -40 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	13CrMo 4-4   13CrMo 4-5   16CrMo 4-4   G-17CrMo 5-5 ASTM: A182 grades F11/F12   A199/A200 grade T11   A217 grades WC6/WC11   A234 grades WP11/WP12   A335 grades P11/P12   A387 grades 11/12



#### Chemical analysis (in %)

C	Si	Mn	Cr	Mo
0.1	0.6	1	1.2	0.52

- Low-alloy TIG welding rod
- Copper-plated and stamped
- High chemical purity
- For welding creep-resistant, ferritic 1.25 % Cr - 0.5 % Mo steels
- For operating temperatures up to max. 550°C
- Low Bruscato factor (X<10ppm) = insensitive to temper embrittlement or 500°C embrittlement

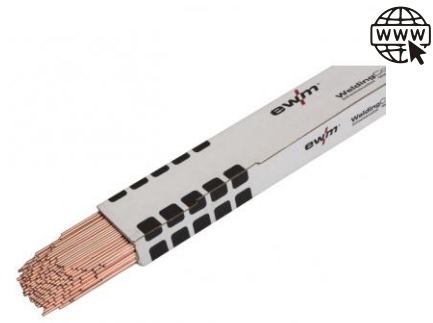
#### • Fields of application:

- Pressure pipe, turbine and boiler construction, as well as for the chemical and petrochemical industry

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-003500-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003500-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003500-10024</a>
Package	Package	5 kg	3 mm	1000 mm	<a href="#">097-003500-10030</a>

### TR 90S CrMo2

<b>Standards</b>	DIN EN ISO 21952-A - W CrMo2Si AWS A-5.28 - ER 90S-G
<b>Material number</b>	1.7384
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Yield strength</b>	≥400 MPa
<b>Tensile strength, Rm</b>	≥520 MPa
<b>Expansion, A5</b>	≥18 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -40 °C: ≥ 47 J
<b>Base materials</b>	10CrMo 9-10   G-17CrMo 9-10 ASTM: A182 grade F22   A199/A200 grades T21/T22   A213 grade T22   A217 grade WC9   A234 grade WP22   A335 grade P22   A387 grades 21/22



- Low-alloy TIG welding rod, creep-resistant
- Copper-plated and stamped
- Low-spatter thanks to high chemical purity
- For operating temperatures up to max. 600°C
- Low Bruscato factor (X<10ppm) = insensitive to temper embrittlement or 500°C embrittlement
- For welding creep-resistant, ferritic 2.25% Cr - 1% Mo steels

• **Fields of application:**

- Power plant, turbine, boiler and pressure line construction, as well as for chemicals and petrochemicals

**Chemical analysis (in %)**

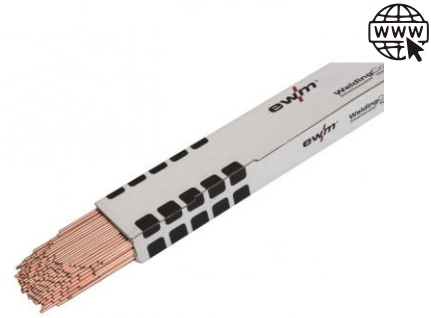
C	Si	Mn	Cr	Mo
0.08	0.6	0.92	2.45	1

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003541-10024</a>



### TR CrMo5

<b>Standards</b>	DIN EN ISO 21952-A - W CrMo5 Si AWS A-5.28 - ER 80S-B6
<b>Material number</b>	1.7373
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Yield strength</b>	≥450 MPa
<b>Tensile strength, Rm</b>	≥550 MPa
<b>Expansion, A5</b>	≥18 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J
<b>Base materials</b>	ASTM: A182/A336 F5   A199/A213 T5   A217 C5   A234 WP5   A335 P5   A387 5 X12CrMo5   GX12CrMo5



- Low-alloy TIG welding rod, creep-resistant
- Copper-plated and stamped
- For 5% Cr - 0.5% Mo alloyed, creep-resistant, ferritic steels of the same type
- For operating temperatures up to max. 600°C

• **Fields of application:**

- Chemical and petrochemical industry and heat exchanger, boiler, pipeline and pressure vessel construction

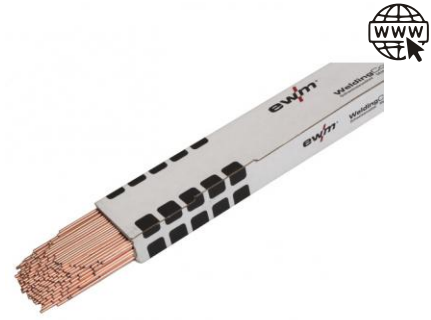
#### Chemical analysis (in %)

C	Si	Mn	Mo	Cr
0.08	0.35	0.55	0.65	6

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003585-10024</a>
Package	Package	5 kg	3 mm	1000 mm	<a href="#">097-003585-10032</a>

### TR 80S Ni1

<b>Standards</b>	DIN EN ISO 636-A - W 46 6 3Ni1 AWS A-5.28 - ER 80S-Ni1
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Yield strength</b>	≥470 MPa
<b>Tensile strength, Rm</b>	≥550 MPa
<b>Expansion, A5</b>	≥20 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J -60 °C: 47 J
<b>Base materials</b>	Nickel-alloyed, low-temperature tough steels 11MnNi5-3   13MnNi6-3   S275NL - S460NL   S275ML - S460ML   P275NL2 - P460NL2   P355ML2 - P460ML2 ASTM: A333/A334 grades 1/6   A350 grades LF2/LF6   A352 grades LCB API: 5L X65



#### Chemical analysis (in %)

- Low-alloy TIG welding rod, low-temperature tough
- Copper-plated and stamped
- Low-spatter thanks to high chemical purity
- Semi-fluid weld pool, good controllability
- For welding low-temperature tough steels
- Low temperature requirements down to -60°C

	C	Si	Mn	Ni
	0.09	0.5	1.05	0.9

- **Fields of application:**

- Oil and gas industry, offshore sector and steel construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-003618-10016</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003618-10024</a>
Package	Package	5 kg	3 mm	1000 mm	<a href="#">097-003618-10030</a>

### TR 307 Si XQ

<b>Standards</b>	DIN EN ISO 14343-A - W 18 8 Mn AWS A-5.9 - ER 307 Si
<b>Material number</b>	1.4370
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	600 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 120 J
<b>Approvals</b>	CE
<b>Hardness</b>	190 BHN
<b>Base materials</b>	Claddings, buffer layers for hardfacing, high carbon and difficult-to-weld steels, manganese high carbon steel (e.g. 1.3401) Dissimilar steels (black-and-white joints)



- High-alloy TIG welding rod, creep-resistant
- Stamped
- Suitable for dissimilar joints and buffer layers
- For welding heat-resistant Cr and CrNi steels, as well as austenitic stainless steels containing Mn
- Scale resistant up to approx. 850°C
- Strain-hardening

• **Fields of application:**

- Exhaust system construction (e.g. exhaust systems), spring technology, repair of shafts

**Chemical analysis (in %)**

C	Mn	Si	Cr	Ni	S	P	Mo
max. 0.12	5 - 8	0.65 - 1	17 - 20	7.5 - 9	max. 0.03	max. 0.03	max. 0.3

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-005371-10010</a>
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-005371-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-005371-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-005371-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-005371-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-005371-10032</a>

### TR 308 LSi XQ

<b>Standards</b>	DIN EN ISO 14343-A - W 19 9 L Si AWS A-5.9 - ER 308 L Si
<b>Material number</b>	1.4316
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1 M13
<b>Tensile strength, Rm</b>	600 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 120 J -196 °C: 50 J
<b>Approvals</b>	CE / TÜV / DB
<b>Hardness</b>	190 BHN
<b>Base materials</b>	304   304L 1.4301   1.4306



#### Chemical analysis (in %)

	C	Si	Mn	P	S	Cr	Ni	Mo
	max. 0.03	0.65 - 1	1 - 2.5	max. 0.03	max. 0.02	19.5 - 21	9 - 11	max. 0.3

- High-alloy TIG welding rod, stainless
- Stamped
- Good resistance to intergranular and atmospheric corrosion
- Excellent welding properties (better seam appearance) due to higher Si content
- For welding stabilised and non-stabilised CrNi steels
- For operating temperatures up to approx. +350°C, low-temperature tough down to -196°C
- **Fields of application:**
  - Chemical and food industry, as well as pipeline and boiler construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-005392-10010</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-005392-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-005392-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-005392-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-005392-10032</a>

### TR 309 L Si XQ

<b>Standards</b>	DIN EN ISO 14343-A - W 23 12 L Si AWS A-5.9 - ER 309 L Si
<b>Material number</b>	1.4332
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1 M13
<b>Tensile strength, Rm</b>	590 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 120 J -196 °C: 48 J
<b>Approvals</b>	CE / TÜV
<b>Hardness</b>	178 BHN
<b>Base materials</b>	Austenite-ferrite joints (dissimilar), cladding, corrosion-resistant layers on non-alloyed construction steels, buffer layers



- High-alloy TIG welding rod, stainless
- Stamped
- Very good corrosion and scale resistance
- Excellent welding properties (better seam appearance) due to higher Si content
- The weld metal is resistant to hot cracking
- Suitable for dissimilar joints and buffer layers
- Heat and scale resistant up to approx. +950°C
- For operating temperatures up to approx. +300°C

• **Fields of application:**

- Industrial furnaces and boiler parts, annealing chambers, heat exchangers, processing plants

**Chemical analysis (in %)**

C	Mn	Si	P	S	Cr	Ni	Mo
max. 0.03	1 - 2.5	0.65 - 1	max. 0.03	max. 0.02	23 - 25	12 - 14	max. 0.3

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-005420-10010</a>
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-005420-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-005420-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-005420-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-005420-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-005420-10032</a>

### TR 309 H

<b>Standards</b>	DIN EN ISO 14343-A - W 22 12 H AWS A-5.9 - ER 309 Si
<b>Material number</b>	1.4829
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Tensile strength, Rm</b>	≥600 MPa
<b>Expansion, A5</b>	≥25 %
<b>Impact energy, Av</b>	20 °C: 130 J
<b>Base materials</b>	1.4828   1.4826   1.4833   1.4713   1.4724   1.4742   1.4710   1.4740   1.4829   1.4832   1.4878   1.4713



- High-alloy TIG welding rod
- Not prone to hot crack formation due to high delta-ferrite content
- Joint welding and surfacing of heat-resisting CrSi, CrAl and CrNiSi steels
- For similar heat- and scale-resistant steels
- Scale-resistant up to 950 °C

- **Fields of application:**

- Industrial furnaces and boiler parts

#### Chemical analysis (in %)

C	Si	Mn	Ni	Cr	Mo	Cu
0.08 - 0.12	0.65 - 1.2	1 - 2.5	12 - 14	22 - 24	≤0.5	≤0.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-004879-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-004879-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-004879-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-004879-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-004879-10032</a>

### TR 310 XQ

<b>Standards</b>	DIN EN ISO 14343-A - G 25 20 AWS A-5.9 - ER 310
<b>Material number</b>	1.4842
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1 M13
<b>Tensile strength, Rm</b>	590 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 150 J
<b>Hardness</b>	175 BHN
<b>Base materials</b>	1.4710   1.4713   1.4726   1.4745   1.4823   1.4832   1.4837   1.4840   1.4841   1.4845   1.4846   1.4848   1.4849



- High-alloy TIG welding rod, heat-resistant
- Excellent corrosion resistance
- For welding heat-resistant steels
- Scale resistant up to 1150°C
- Not resistant to hot cracking

#### Chemical analysis (in %)

C	Mn	Si	Cr	Ni	S	P	Mo
0.08 - 0.15	1 - 2.5	0.3 - 0.65	25 - 27	20 - 22	max. 0.02	max. 0.03	max. 0.75

#### • Fields of application:

- Industrial furnaces, boiler construction, heat exchangers

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-005395-10010</a>
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-005395-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-005395-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-005395-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-005395-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-005395-10032</a>

### TR 312 XQ

<b>Standards</b>	DIN EN ISO 14343-A - W 29 9 AWS A-5.9 - ER 312
<b>Material number</b>	1.4337
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1 M13
<b>Tensile strength, Rm</b>	720 MPa
<b>Expansion, A5</b>	25 %
<b>Impact energy, Av</b>	20 °C: 45 J
<b>Hardness</b>	210 BHN
<b>Base materials</b>	Difficult-to-weld steel, manganese high carbon steel, spring steel, tool steel Corrosion-resistant analogue steel and cast steel (e.g. 1.4762, 1.4085)



- High-alloy TIG welding rod, creep-resistant
- The weld metal has a ferritic-austenitic structure
- Suitable for dissimilar joints and buffer layers
- Good scale resistance
- High hot crack resistance

- **Fields of application:**
  - Offshore industry

#### Chemical analysis (in %)

C	Mn	Si	Cr	Ni	S	P	Mo
max. 0.15	1 - 2.5	0.3 - 0.65	28 - 32	8 - 11	max. 0.03	max. 0.03	max. 0.3

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-005403-10010</a>
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-005403-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-005403-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-005403-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-005403-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-005403-10032</a>



### TR 316 LSi XQ

<b>Standards</b>	DIN EN ISO 14343-A - W 19 12 3 LSi AWS A-5.9 - ER 316 LSi
<b>Material number</b>	1.4430
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1 M13
<b>Tensile strength, Rm</b>	600 MPa
<b>Expansion, A5</b>	40 %
<b>Impact energy, Av</b>	20 °C: 110 J -196 °C: 40 J
<b>Approvals</b>	CE / TÜV / DB
<b>Hardness</b>	190 BHN
<b>Base materials</b>	1.4401   1.4404   1.4406   1.4408   1.4429   1.4435   1.4436   1.4541   1.4550   1.4571   1.4580   1.4581   1.4583



#### Chemical analysis (in %)

- High-alloy TIG welding rod, creep-resistant
- Stamped
- Excellent corrosion resistance in acidic media and chlorinated solutions
- Excellent welding properties (better seam appearance) due to higher Si content
- For welding stabilised and non-stabilised austenites of similar types
- For operating temperatures up to + 400°C, low-temperature tough down to - 196°C

	C	Mn	Si	Cr	Ni	S	P	Mo
	max. 0.03	1 - 2.5	0.65 - 1	18 - 20	11 - 14	max. 0.02	max. 0.03	2 - 3

#### • Fields of application:

- Chemical and food industry (containers, pipes, pumps)

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-005373-10010</a>
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-005373-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-005373-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-005373-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-005373-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-005373-10032</a>

### TR 318 Si

<b>Standards</b>	DIN EN ISO 14343-A - W 19 12 3 Nb Si AWS A-5.9 - ER 318 Si
<b>Material number</b>	1.4576
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Tensile strength, Rm</b>	620 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 135 J -196 °C: 40 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	1.4401   1.4404   1.4408   1.4420   1.4435   1.4436   1.4571   1.4573   1.4580   1.4581   1.4583



- High-alloy TIG welding rod, creep-resistant
- Stamped
- Good resistance to intergranular and pitting corrosion
- Excellent welding properties (better seam appearance) due to higher Si content
- For welding stabilised austenites of similar types
- For operating temperatures up to + 400°C, low-temperature tough down to - 196°C

- **Fields of application:**

- For chemical apparatus and container construction

#### Chemical analysis (in %)

C	Mn	Si	Cr	Ni	Mo	Cu	Nb
max. 0.08	1 - 2.5	0.65 - 1	18 - 20	11 - 14	2.5 - 3.5	>0.5	min.10 xC

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-003493-10010</a>
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-003493-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-003493-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003493-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003493-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-003493-10032</a>

### TR 347 XQ

<b>Standards</b>	DIN EN ISO 14343-A - W 19 9 Nb AWS A-5.9 - ER 347
<b>Material number</b>	1.4551
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	610 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 110 J -196 °C: 30 J
<b>Hardness</b>	190 BHN



- High-alloy TIG welding rod, creep-resistant
- Stamped
- Good resistance to intergranular corrosion
- For welding stabilised austenites of similar types
- Heat and scale resistant up to approx. 700°C
- For operating temperatures up to + 400°C, low-temperature tough down to - 196°C

- **Fields of application:**
  - Chemical plant engineering

#### Chemical analysis (in %)

C	Si	Cr	Ni	Mn	P	Mo	S
max. 0.08	0.65 - 1	19 - 21	9 - 11	1 - 2.5	max. 0.03	max. 0.3	max. 0.02

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-005379-10010</a>
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-005379-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-005379-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-005379-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-005379-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-005379-10032</a>

### TR 2209 Duplex XQ

<b>Standards</b>	DIN EN ISO 14343-A - W22 9 3 NL AWS A-5.9 - ER 2209
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1 M13
<b>Tensile strength, Rm</b>	800 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 120 J -80 °C: 40 J
<b>Approvals</b>	CE / TÜV
<b>Hardness</b>	220 BHN
<b>Base materials</b>	1.4462   1.4417   1.4460   1.4362



- High-alloy TIG welding rod
- Good resistance to pitting and stress corrosion cracking, even in media containing chloride
- For joining austenitic-ferritic stainless steels and all other lean duplex steels
- Suitable for black/white joints
- Use in the temperature range from -80°C to approx. 300°C

- **Fields of application:**

- Offshore (e.g. pipeline construction), pulp and paper industry

#### Chemical analysis (in %)

C	Mn	Mo	Cr	Ni	S	P	N
max. 0.03	0.5 - 2	2.5 - 3.5	21.5 - 23.5	7.5 - 9.5	max. 0.02	max. 0.03	0.08 - 0.2

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1 mm	1000 mm	<a href="#">097-005381-10010</a>
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-005381-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-005381-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-005381-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-005381-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-005381-10032</a>

### TR 2594 Super Duplex XQ

<b>Standards</b>	DIN EN ISO 14343-A - W 25 9 4 N L AWS A-5.9 - ER 2594
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	810 MPa
<b>Expansion, A5</b>	22 %
<b>Impact energy, Av</b>	-40 °C: 130 J
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	Austenitic-ferritic super duplex steels such as 1.4410



- High-alloy TIG welding rod
- Excellent resistance to pitting, air gap and stress corrosion cracking in chloride-containing environments
- Suitable for surfacing on steels in particularly aggressive environments
- For welding duplex and super-duplex steels

• **Fields of application:**

- Chemical and petrochemical industry (chloride environment)

**Chemical analysis (in %)**

C	Mn	Mo	Cr	Ni	S
max. 0.03	2.5	2.5 - 4.5	24 - 27	8 - 10.5	max. 0.02
P	N	Si	W	Cu	
max. 0.03	0.2 - 0.3	max. 1	max. 1	max. 1.5	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.2 mm	1000 mm	<a href="#">097-005422-10012</a>
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-005422-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-005422-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-005422-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-005422-10032</a>

### TR Tool 45 T

<b>Standards</b>	DIN EN 14700 - S Fe 3-45-st DIN 8555 - WSG 3-GZ-45 T
<b>Material number</b>	1.2567
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Hardness</b>	41 - 45 HRC
<b>Base materials</b>	Creep-resistant, tough TIG surfacing on hot-work steels of the same or a similar type, as well as low-alloy and unalloyed steels



- TIG welding rod for deposits on highly stressed moulds made of hot-work steel
- Hard and tough, creep-resistant deposits on similar or analogue hot-work steels and their welds for fabricating purposes
- Up to 45 HRC
- Very good resistance to thermal shock
- Operating temperatures up to 550 °C

#### Chemical analysis (in %)

C	Si	Mn	Cr	W	V	Fe
0.25 - 0.35	0.6	0.2 - 0.4	2.2 - 2.5	4 - 4.5	0.5 - 0.7	Remainder

#### • Fields of application:

- Repair and production welding on swaging tools, press punches and press dies

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-004876-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-004876-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-004876-10024</a>

### TR Tool 55 T

<b>Standards</b>	DIN EN 14700 - S Fe 3-55-st DIN 8555 - WSG 6-GZ-55 ST
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Hardness</b>	50 - 56 HRC
<b>Base materials</b>	Creep-resistant applications against pressure and abrasion on hot-work tool steels with high hardness



- TIG welding rod for deposits on hot-work steels
- For wear-resistant applications on hot-working tools that are subject to high abrasion and pressure and moderate impact loads
- Suitable for new fabrication of hot-work tools
- Up to 55 HRC
- Suitable for surface and edge application
- Operating temperatures up to 550 °C

• **Fields of application:**

- Applications on clamshell sprockets, rollers, punching knives

#### Chemical analysis (in %)

C	Si	Mn	Cr	Mo	Ti	Fe
0.4	0.6	0.9 - 1.5	6.5 - 7.5	2 - 2.5	0.4	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-004877-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-004877-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-004877-10024</a>

### TR Stelloy 21

<b>Standards</b>	DIN EN 14700 - R Co1 AWS A-5.21 - ERCCoCr-E
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Hardness</b>	33 - 47 HRC



- Cobalt-based TIG welding rod
- Good sliding properties, stamped
- Very good resistance to corrosion, frictional wear and impact stress
- Good toughness and insensitivity to thermal shocks and alternating stresses
- Particularly suitable for high operating temperatures in conjunction with impact or shock loads
- Temperature resistant up to max. 800°C

#### Chemical analysis (in %)

C	Mn	Si	Cr	Ni	Mo	Fe	Co
0.25	1	1	28.5	3	5.5	4	Remainder

#### • Fields of application:

- Applications on components that are exposed to a combination of impact stress, abrasion, high pressure and corrosion at temperatures of up to 900°C, such as valve seats and guides for large water or high-pressure fittings, forging hammers, pump shafts, etc.
- Hot work tools with alternating thermal loads, e.g. extruder screws, combustion engines, earth drills, etc.

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-123625-10032</a>



### TR Corolit T 21

<b>Standards</b>	DIN EN 14700 - R Co1 DIN 8555 - G 20-GO-300-CKTZ
	AWS A-5.21 - ER CoCr E
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Hardness</b>	30 - 32 HRC



- Cobalt-based TIG welding rod
- Good sliding properties, stamped
- Very good resistance to corrosion, abrasion, oxidation and impact stress
- Good toughness and insensitivity to thermal shocks and alternating stresses
- Temperature resistant up to max. 800°C

• **Fields of application:**

- Hot work tools, outlet valves and vapour and acid-proof fittings

**Chemical analysis (in %)**

C	Si	Mn	Cr	Ni	Mo	Fe	Co
0.15 - 0.45	max. 1.5	max. 1.5	25 - 30	1.5	4.5 - 7.5	<3	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-205182-10032</a>

### TR NiCr82

<b>Standards</b>	DIN EN ISO 18274 - Ni 6082 – NiCr20Mn3Nb AWS-SFA-5.14 - ER NiCr 3
<b>Material number</b>	2.4806
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	670 MPa
<b>Expansion, A5</b>	40 %
<b>Impact energy, Av</b>	20 °C: 160 J -196 °C: 80 J
<b>Base materials</b>	1.4558   1.4859   1.4861   1.4876   1.4877   1.4885   1.4958   1.4968   2.4669   2.4694   2.4816   2.4817   2.4867   2.4867   2.4869   2.4951   2.4952



- High-alloy TIG welding rod made from nickel-based alloy
- Good resistance to stress and intergranular corrosion
- Suitable for nickel-based alloys, dissimilar joints and surfacing
- Scale-resistant up to 1,000 °C
- Cold tough up to -196 °C

• **Fields of application:**

- Petrochemicals and offshore technology (e.g. furnace systems)

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni
≤0.05	≤0.1	2.5 - 3.5	18 - 22	≥67
Cu	Ti	Fe	(Nb + Ta)	
≤0.5	≤0.7	≤3	2 - 3	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-003608-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003608-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003608-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-003608-10032</a>

### TR 625

<b>Standards</b>	DIN EN ISO 18274 - Ni 6625 – NiCr22Mo9Nb AWS A-5.14 - ER NiCrMo3
<b>Material number</b>	2.4831
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I3
<b>Tensile strength, Rm</b>	670 MPa
<b>Expansion, A5</b>	40 %
<b>Impact energy, Av</b>	20 °C: 160 J -196 °C: 80 J
<b>Approvals</b>	TÜV
<b>Base materials</b>	1.4529   1.4539   1.4558   1.4876   1.5680   1.5681   1.5662   2.4605   2.4618   2.4856   2.4858   2.4951   2.4952 High-molybdenum, corrosion-resistant steels, low- temperature tough nickel steels, alloy 625, Alloy 800



- High-alloy TIG welding rod made from nickel-based alloy
- Very good corrosion resistance to hydrochloric, sulphuric and nitric acid
- Very good resistance to pitting, air gap and intergranular corrosion
- Suitable for nickel-based alloys, dissimilar joints up to 300°C and surfacing
- Can be used in temperature range from -196°C to 550°C

- **Fields of application:**

- High-temperature applications, marine and offshore environments, pipework systems, reactor components

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni
≤0.03	≤0.5	≤1	21 - 23	≥60
Mo	Cu	Fe	(Nb + Ta)	
8.5 - 9.5	≤0.5	≤1	3.2 - 4	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-003537-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003537-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003537-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-003537-10032</a>

### TR ML 1450 Al99,5Ti



<b>Standards</b>	DIN EN ISO 18273 - S AL 1450 (Al99,5Ti) AWS A-5.10 - ER 1450
<b>Material number</b>	3.0805
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	AC
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥65 MPa
<b>Expansion, A5</b>	35 %
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	Al99,0   Al99,5   Al99,7   E-Al

#### Chemical analysis (in %)

Si	Fe	Cu	Mn	Zn	Mg	Ti	Al
<0.25	<0.4	<0.05	<0.05	<0.07	0.05	0.1 - 0.2	≥99.5

- TIG welding rod, aluminium
- High strength due to titanium content
- High corrosion resistance
- Resistant to hot cracks
- Well suited to welding
- For welding pure aluminium alloys

#### • Fields of application:

- Chemical and food industry (containers, pipes, pumps)

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-580017-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-580017-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-580017-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-580017-10032</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-580017-10040</a>

### TR ML 3103 AlMn1



<b>Standards</b>	DIN EN ISO 18273 - S AL 3103 (AlMn1) AWS A-5.10 - ER 3103
<b>Material number</b>	3.0516
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	AC
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥105 N/mm <sup>2</sup>
<b>Expansion, A5</b>	29 %
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	Similar materials

- TIG welding rod, aluminium
- Seawater resistant
- Resistant to hot cracks
- Well suited to welding

**Fields of application:**

- Shipbuilding, chemical plant construction, pipeline construction, vehicle construction (coolers)

**Chemical analysis (in %)**

Si	Fe	Cu	Mn	Mg
<0.5	<0.3	<0.1	0.9 - 1.5	<0.3
Cr	Zn	Ti+Zr	Al	
<0.1	<0.1	<0.1	Remainder	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-580019-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-580019-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-580019-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-580019-10032</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-580019-10040</a>

### TR ML 4043 AISi5

<b>Standards</b>	DIN EN ISO 18273 - S AI 4043 (AISi5(A)) AWS A-5.10 - ER 4043
<b>Material number</b>	3.2245
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	AC
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥130 MPa
<b>Expansion, A5</b>	5 %
<b>Approvals</b>	CE / DB / TÜV
<b>Base materials</b>	AlMgSi0,5   AlMgSi0,8   AlMgSi1   AlZnMg   AlCuMg



- TIG welding rod, aluminium
- High corrosion resistance
- Resistant to hot cracks
- Very good flow and wetting properties
- Bright and virtually dirt-free weld seams
- Not suitable for anodising

- **Fields of application:**
  - Bicycles, trucks, trailers and aluminium constructions

#### Chemical analysis (in %)

Si	Fe	Cu	Mn	Mg
<4.5 - 6	<0.8	<0.3	<0.05	<0.05
Zn	Ti	Al	Others	
<0.1	<0.2	Remainder	<0.15 -	

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-580015-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-580015-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-580015-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-580015-10032</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-580015-10040</a>

### TR ML 4047 AlSi12



<b>Standards</b>	DIN EN ISO 18273 - S AL 4047A (AlSi12(A)) AWS A-5.10 - ER 4047
<b>Material number</b>	3.2585
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	AC
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥130 N/mm <sup>2</sup>
<b>Expansion, A5</b>	5 %
<b>Approvals</b>	CE / DB
<b>Base materials</b>	G-AlSi10Mg   G-AlSi11   G-AlSi12(Cu)   G-AlSi7Mg   G-AlSi6Cu4   AlMgSi0,8   AlMgSi1

#### Chemical analysis (in %)

- TIG welding rod, aluminium
- Shaved several times
- High corrosion resistance, low distortion
- Resistant to hot cracks
- Very good flow and wetting properties
- Bright and virtually dirt-free weld seams
- Suitable for welding and brazing aluminium alloys and cast aluminium alloys
- Not suitable for anodising

Si	Fe	Cu	Mn	Mg	Zn	Al	Others
11 - 13	<0.8	<0.3	<0.15	<0.1	<0.2	<Remainder	0.15

- **Fields of application:**
  - Brazing of sheet metal and extruded profiles from cast workpieces

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-580016-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-580016-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-580016-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-580016-10032</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-580016-10040</a>

### TR ML 5087

<b>Standards</b>	DIN EN ISO 18273 - S AL 5087 (AlMg4,5MnZr) AWS A-5.10 - ER 5087
<b>Material number</b>	3.3546
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	AC
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥275 MPa
<b>Expansion, A5</b>	17 %
<b>Approvals</b>	CE / DNV-GL / ABS / DB / TÜV / Bureau Veritas
<b>Base materials</b>	AlMg4,5Mn   AlZnMgCu1,5   AlMg5Mn   AlMg3   AlMg5   AlMgMn   AlZn   Mg1   G-AlMg3Si   G-AlMg10   AlMgSi0,7



- TIG welding rod, aluminium
- Improved seawater and corrosion resistance as well as tensile strength due to Zr content
- Insensitive to hot cracking (with low dilution)
- Mainly for welding Al-Mg alloys with max. 5% Mg
- Not suitable for anodising

#### Chemical analysis (in %)

Si	Fe	Cu	Mn	Mg	Cr
<0.25	<0.4	<0.05	0.7 - 1.1	4.5 - 5.2	0.05 - <0.25
Zn	Ti	Zr	Al	Others	
<0.25	<0.15	0.1 - 0.2	Remainder	<0.15	

#### Fields of application:

- Shipbuilding, offshore, automotive industry, rail transport

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-580010-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-580010-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-580010-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-580010-10032</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-580010-10040</a>



### TR ML 5183 AlMg4,5Mn0,7



<b>Standards</b>	DIN EN ISO 18273 - S AL 5183 (AlMg4,5Mn0,7) AWS A-5.10 - ER 5183
<b>Material number</b>	3.3548
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	AC
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥275 MPa
<b>Expansion, A5</b>	17 %
<b>Approvals</b>	CE / DNV-GL / ABS / LR / DB / TÜV / KR (Korean Register) / BWB / Bureau Veritas
<b>Base materials</b>	AlMg4,5Mn   AlMg5   AlMg2Mn0,8   AlZnMg1   AlZnMgCu0,5   AlMgSi0,5   AlMgSi1   G-AlMg10   G-AlMg5   G-AlMg3Si   G- AlMg5Si

- TIG welding rod, aluminium
- Very high resistance to seawater and corrosion
- Higher tensile strength
- For welding high tensile Al alloys
- Mainly for welding Al-Mg alloys with max. 5% Mg
- Suitable for anodising

#### Chemical analysis (in %)

Si	Fe	Cu	Mn	Mg
<0.4	<0.4	<0.1	<0.5 - 1	<4.3 - 5.2
Cr	Zn	Ti	Al	Others
<0.05 - <0.25	<0.25	<0.15	Remainder	<0.15

- **Fields of application:**
  - Shipbuilding, offshore, automotive industry, rail transport

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-580012-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-580012-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-580012-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-580012-10032</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-580012-10040</a>

### TR ML 5356 AlMg5Cr



<b>Standards</b>	DIN EN ISO 18273 - S AL 5356 (AlMg5Cr) AWS A-5.10 - ER 5356
<b>Material number</b>	3.3556
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	AC
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥240 MPa
<b>Expansion, A5</b>	17 %
<b>Approvals</b>	CE / DNV-GL / ABS / DB / TÜV / Bureau Veritas
<b>Base materials</b>	AlMg5   AlMg3   AlZnMg1   AlZnMgCu0,5   AlMgSi0,7   AlMg1SiCu   G-AlMg10   G-AlMg3Si   G-AlMg5Si

#### Chemical analysis (in %)

- TIG welding rod, aluminium
- Shaved several times
- High strength and significantly improved seawater resistance
- Mainly for welding Al-Mg alloys with max. 5% Mg
- Suitable for anodising
- Not resistant to stress corrosion cracking at >65°C

Si	Fe	Cu	Mn	Mg
<0.25	<0.4	<0.1	<0.05 - 0.2	<4.5 - 5.5
Cr	Zn	Ti	Al	Others
<0.05 - 0.2	<0.1	0.06 - 0.2	Remainder	<0.015

#### • Fields of application:

- Shipbuilding, offshore, automotive industry, rail transport

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-580011-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-580011-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-580011-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-580011-10032</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-580011-10040</a>

### TR ML 5754 AlMg3



<b>Standards</b>	DIN EN ISO 18273 - S Al 5754 (AlMg3) AWS A-5.10 - ER 5754
<b>Material number</b>	3.3536
<b>Welding positions</b>	PA / PB / PC / PF
<b>Polarity</b>	AC
<b>Shielding gas</b>	I1 I2 I3
<b>Tensile strength, Rm</b>	≥190 MPa
<b>Expansion, A5</b>	20 %
<b>Approvals</b>	auf Anfrage
<b>Base materials</b>	AlMgMn   AlMg1   AlMg2,7Mn   AlMg3   AlMg3,5   AlMgSi0,5   AlMgSi0,8   G-AlMg3Si

#### Chemical analysis (in %)

- TIG welding rod, aluminium
- High corrosion resistance (against seawater) and strength
- Mainly for welding Al-Mg alloys with max. 3% Mg
- Suitable for anodising

Si	Fe	Cu	Mn	Mg
<0.4	<0.4	<0.1	<0.5	2.6 - 3.6
Cr	Ti	Zn	Al	Others
<0.3	<0.15	<0.2	Remainder	<0.15

#### • Fields of application:

- Shipbuilding, plant engineering, construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	1.6 mm	1000 mm	<a href="#">097-580013-10016</a>
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-580013-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-580013-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-580013-10032</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-580013-10040</a>

### TR CuSi3

<b>Standards</b>	DIN EN ISO 24373 - CuSi3Mn (Cu 6560) AWS A-5.7 - ER CuSi-A
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	350 MPa
<b>Expansion, A5</b>	40 %
<b>Impact energy, Av</b>	20 °C: 60 J
<b>Hardness</b>	80 HB
<b>Base materials</b>	CuZn5   CuZn10   CuZn15   CuSi2Mn   CuSi3Mn



- TIG welding rod made of Cu-Si alloy
- Stamped
- Good resistance to wear and abrasion
- Excellent flow characteristics
- Suitable for joint welding, brazing and surfacing
- Ideal for MIG brazing of galvanised, thin sheets

• **Fields of application:**

- Galvanised body panels, heating construction, ventilation construction
- Applications on unalloyed and low-alloy steels and cast iron

#### Chemical analysis (in %)

Si	Mn	Cu	Others
2.8 - 2.95	0.75 - 0.95	Remainder	max. 0.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003540-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003540-10024</a>

### TR CuSn1

<b>Standards</b>	DIN EN ISO 24373 - CuSn1 (Cu 1898) AWS A-5.7 - ER Cu
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	220 MPa
<b>Expansion, A5</b>	30 %
<b>Impact energy, Av</b>	20 °C: 75 J
<b>Hardness</b>	60 HB
<b>Base materials</b>	OF-Cu   SE-Cu   SW-Cu   SF-Cu   CuZn0,5



- TIG welding rod made of copper-tin alloy
- Stamped
- The weld metal is corrosion-resistant and wear-resistant
- Non-porous weld seams
- Very good welding properties
- Suitable for highly stressed welded joints on oxygen-free copper / Cu materials
- For joint welding and surfacing on pure copper and copper alloys
- **Fields of application:**
  - Vehicle/vehicle body construction, air conditioning and ventilation system construction and container construction

#### Chemical analysis (in %)

Sn	Mn	Si	P	Cu	Others
0.75 - 0.9	0.15 - 0.3	0.15 - 0.25	0.005 - 0.02	Remainder	max. 0.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003609-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-003609-10032</a>

### TR CuSn6

<b>Standards</b>	DIN EN ISO 24373 - S Cu 5180A (CuSn6P) AWS A-5.7 - ER CuSn-A
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	DC-
<b>Tensile strength, Rm</b>	260 MPa
<b>Expansion, A5</b>	20 %
<b>Impact energy, Av</b>	20 °C: 32 J
<b>Hardness</b>	80 HB
<b>Base materials</b>	OF-Cu   SE-Cu   SW-Cu   SF-Cu   CuZn0,5



- TIG welding rod made of copper-tin alloy
- Stamped
- The weld metal is corrosion-resistant and wear-resistant
- Very good strength
- Very good welding properties
- For joint welding and surfacing on pure copper and CuSn alloys
- Suitable for welding copper materials
- Typical area of application: Furnace brazing

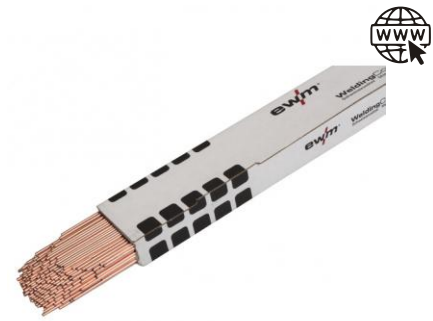
#### Chemical analysis (in %)

Sn	P	Cu	Others
6 - 6.6	0.2 - 0.25	Remainder	max. 0.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003613-10020</a>
Package	Package	5 kg	2.4 mm	1000 mm	<a href="#">097-003613-10024</a>
Package	Package	5 kg	3.2 mm	1000 mm	<a href="#">097-003613-10032</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-003613-10040</a>

### TR CuAl8

<b>Standards</b>	DIN EN ISO 24373 - CuAl7 (Cu 6100) AWS A-5.7 - ER CuAl-A1
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	DC-
<b>Shielding gas</b>	I1
<b>Tensile strength, Rm</b>	≥430 MPa
<b>Expansion, A5</b>	≥40 %
<b>Impact energy, Av</b>	20 °C: ≥ 100 J
<b>Hardness</b>	100 HB
<b>Base materials</b>	CuAl5   CuAl8   CuAl9   CuZn20Al



- TIG welding rod made of Cu-Al alloy
- Stamped
- The weld metal is corrosion-resistant, seawater-resistant and wear-resistant
- Suitable for joint welding, brazing and surfacing
- Excellent for GMAW brazing of galvanised and aluminised thin sheets
- Surfacing on unalloyed and low-alloy steels and cast iron
- Joint welding of Cu materials and various steel sheets

• **Fields of application:**

- Vehicle/vehicle body construction, air conditioning and ventilation system construction and container construction

#### Chemical analysis (in %)

Al	Mn	Ni	Cu	Others
7.5 - 8	0.1 - 0.3	0.1 - 0.5	Remainder	max. 0.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	10 kg	1.6 mm	1000 mm	<a href="#">097-003682-10016</a>
Package	Package	10 kg	2 mm	1000 mm	<a href="#">097-003682-10020</a>
Package	Package	10 kg	2.4 mm	1000 mm	<a href="#">097-003682-10024</a>
Package	Package	10 kg	3.2 mm	1000 mm	<a href="#">097-003682-10032</a>
Package	Package	10 kg	4 mm	1000 mm	<a href="#">097-003682-10040</a>

EWM description	Material number	DIN EN ISO	AWS	Approvals	Page
GFR R60	1.6215	unalloyed	R60	CE / TÜV / DB	113



### GFR R60

	AWS A-5.2 - R60
<b>Material number</b>	1.6215
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	DC-
<b>Yield strength</b>	≥310 MPa
<b>Tensile strength, Rm</b>	≥400 MPa
<b>Expansion, A5</b>	≥22 %
<b>Impact energy, Av</b>	20 °C: ≥ 47 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	Steels with a yield strength of up to 275 MPa
	S185-E295   S235JR-S275JR

ASTM: A36 | A106 grades A/B/C | A139 grade A | A210 grades A1/C | A216 grades WCA/WCB/WCC | A234 grade WPB



- Oxyacetylene welding rod
- Copper-plated and stamped
- Semi-fluid weld pool, good controllability
- Recommended for seal welds

#### Chemical analysis (in %)

	C	Si	Mn	Ni
	0.08	0.1	1.1	0.4

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Package	Package	5 kg	2 mm	1000 mm	<a href="#">097-003488-10020</a>
Package	Package	5 kg	2.5 mm	1000 mm	<a href="#">097-003488-10025</a>
Package	Package	5 kg	3 mm	1000 mm	<a href="#">097-003488-10030</a>
Package	Package	5 kg	4 mm	1000 mm	<a href="#">097-003488-10040</a>

EWM description	Material number	DIN EN ISO	AWS	Approvals	Page
<b>unalloyed</b>					
SE 6013 RC blue		Phoenix blue	E 6013	CE / TÜV / DB	115
SE 6013 RC		OVERCORD	E 6013	CE / TÜV / DB / DNV-GL	116
SE 6013 RR		E42 0 RR 12	E 6013	CE / TÜV / DB	117
SE 6013 RRB		E42 0 RB 12	E 6013	CE / TÜV / DB / LR / DNV-GL	118
SE 7016 BR		E 42 3 B 12 H10	E 7016	CE / TÜV / DB	119
SE 7018 BH5		E 46 4 Z B 42 H5	E 7018-1	CE / TÜV / DB / LR / DNV-GL	120
<b>Low-alloy</b>					
SE 7018 Mo		E Mo B 42	E 7018-A1	CE / TÜV	121
SE 8018 CrMo1		E CrMo1 B 42	E 8018-B2	CE / TÜV / DB	122
<b>High-alloy</b>					
SE 307	1.4370	E 18 8 Mn R 12	E 307-16		123
SE 308 L	1.4316	E 19 9 LR 12	E 308 L-16	CE / TÜV / DB	124
SE 309 L	1.4332	E 23 12 LR 32	E 309 L-16		125
SE 309 MoL	1.4459	E 23 12 2 LR 32	E 309 Mo-16	CE / TÜV / DB	126
SE 310	1.4842	E 25 20 R 12	E 310-16		127
SE 312	1.4337	E 29 9 R 12	E 312-16	CE / DB	128
SE 316-L		E 19 12 3 LR	ASME SFA5.4 E316L-16	CE / TÜV / DB	129
SE 318	1.4576	E 19 12 3 Nb R 32	E 318-16	CE / TÜV / DB	130
SE 347	1.4551	E 19 9 Nb R 12	E 347-16		131
<b>Hardfacing</b>					
SE Hard 300 P					132
SE Hard 60	1.4718				133
<b>Nickel-based</b>					
SE Ni		E C Ni-CI 1	E Ni-CI		134
SE NiFe		E C NiFe 1 1	E NiFeCI		135

### SE 6013 RC blue

<b>Standards</b>	DIN EN ISO 2560-A - Phoenix blue AWS A-5.1 - E 6013
<b>Coating type</b>	Rutile cellulose
<b>Welding positions</b>	PA / PB / PC / PE / PF / PG
<b>Polarity</b>	AC   DC-
<b>Yield strength</b>	≥430 MPa
<b>Tensile strength, Rm</b>	520 MPa - 600 MPa
<b>Expansion, A5</b>	>24 %
<b>Impact energy, Av</b>	-10 °C: > 70 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	S235 - S355   P195 - P355   L210 - L360   GE 200, GE240, GP240, GE21Mn5   BSt 420, BSt 500 Shipbuilding steels A, B, D, A32/36, D32/36



#### Chemical analysis (in %)

- Rutile/cellulose coated stick electrode
- Suitable for primed and rusted or galvanised sheet metal
- Very good ignition and reignition characteristics
- Can be welded in any position, including vertically down
- Perfect for roots
- Easy slag removal, medium spatter tendency
- High mechanical quality

	C	Si	Mn
	0.07	0.3	0.6

- **Fields of application:**

- Assembly, workshop and repair welding

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 packages/covering package	Package	1.6 kg	2 mm	250 mm	<a href="#">097-005507-20250</a>
3 packages/covering package	Package	4.8 kg	2.5 mm	350 mm	<a href="#">097-005507-25350</a>
3 packages/covering package	Package	4.8 kg	3.25 mm	350 mm	<a href="#">097-005507-32350</a>
3 packages/covering package	Package	4.8 kg	4 mm	350 mm	<a href="#">097-005507-40350</a>
3 packages/covering package	Package	6 kg	5 mm	450 mm	<a href="#">097-005507-50450</a>

### SE 6013 RC

<b>Standards</b>	DIN EN ISO 2560-A - OVERCORD AWS A-5.1 - E 6013
<b>Coating type</b>	Rutile cellulose
<b>Welding positions</b>	PA / PB / PC / PE / PF / PG
<b>Polarity</b>	AC   DC-
<b>Yield strength</b>	>380 MPa
<b>Tensile strength, Rm</b>	510 MPa - 560 MPa
<b>Expansion, A5</b>	>22 %
<b>Impact energy, Av</b>	0 °C: > 60 J
<b>Approvals</b>	CE / TÜV / DB / DNV-GL
<b>Base materials</b>	S235 - S355   P195 - P275   L210 - L245   GE200, GE240   BSt 420

Shipbuilding steels A, B, D, A32/36, D32/36



#### Chemical analysis (in %)

- Rutile/cellulose coated stick electrode
- Suitable for primed and rusted or galvanised sheet metal
- Very good ignition and reignition characteristics
- Can be welded in any position, including vertically down
- Good slag removal characteristics, medium spatter tendency
- Perfect for roots
- High mechanical quality

	C	Si	Mn
	0.08	0.3	0.6

- **Fields of application:**

- Machine, steel, ship and pipeline construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 packages/covering package	Package	1.6 kg	2 mm	250 mm	<a href="#">097-005502-20250</a>
3 packages/covering package	Package	4.8 kg	2.5 mm	350 mm	<a href="#">097-005502-25350</a>
3 packages/covering package	Package	5 kg	3.25 mm	350 mm	<a href="#">097-005502-32350</a>
3 packages/covering package	Package	5 kg	4 mm	350 mm	<a href="#">097-005502-40350</a>
3 packages/covering package	Package	6.5 kg	5 mm	450 mm	<a href="#">097-005502-50450</a>

### SE 6013 RR

<b>Standards</b>	DIN EN ISO 2560-A - E42 0 RR 12 AWS A-5.1 - E 6013
<b>Coating type</b>	Phoenix green
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	AC   DC-
<b>Yield strength</b>	>450 MPa
<b>Tensile strength, Rm</b>	510 MPa - 610 MPa
<b>Expansion, A5</b>	>22 %
<b>Impact energy, Av</b>	0 °C: > 60 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	S235 - S355, S275 - S355   P195, P355   L210, L360   GE200, GE240, GP240, G21Mn5   BSt 420, BSt 500 Shipbuilding steels A32/36, D32/36, A40, D40



- Thick rutile-coated stick electrode
- Self-removing slag, very low spatter tendency
- Excellent ignition and reignition characteristics
- Very good welding properties, easy handling
- Can be welded in any position except vertical down
- Excellent mechanical quality values

• **Fields of application:**

- Vehicle, container, boiler, pipeline, ship, steel and mechanical engineering

**Chemical analysis (in %)**

C	Si	Mn
0.08	0.4	0.6

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 packages/covering package	Package	1.7 kg	2 mm	250 mm	<a href="#">097-005500-20250</a>
3 packages/covering package	Package	4.6 kg	2.5 mm	350 mm	<a href="#">097-005500-25350</a>
3 packages/covering package	Package	4.6 kg	3.25 mm	350 mm	<a href="#">097-005500-32350</a>
3 packages/covering package	Package	6 kg	4 mm	450 mm	<a href="#">097-005500-40450</a>
3 packages/covering package	Package	6 kg	5 mm	450 mm	<a href="#">097-005500-50450</a>

### SE 6013 RRB

<b>Standards</b>	DIN EN ISO 2560-A - E42 0 RB 12 AWS A-5.1 - E 6013
<b>Coating type</b>	Rutile/basic
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	AC   DC-   DC+
<b>Yield strength</b>	≥440 MPa
<b>Tensile strength, Rm</b>	510 MPa - 560 MPa
<b>Expansion, A5</b>	>22 %
<b>Impact energy, Av</b>	0 °C: > 60 J
<b>Approvals</b>	CE / TÜV / DB / LR / DNV-GL
<b>Base materials</b>	S235 - S355   S275 - S355   P195 - P355   L210 - L360   GE200, GE240, GP240, G21Mn5   BSt 420, BSt 500 Shipbuilding steels A, B, D, A32/36, D32/36



#### Chemical analysis (in %)

- Thick rutile/basic coated stick electrode
- Very good ignition and reignition characteristics
- Fine-flaked and smooth seam appearance
- Good slag removal characteristics, medium spatter tendency
- Good controllability in positional welding
- Can be welded in any position except vertical down
- Excellent gap bridging
- Excellent mechanical quality values

	C	Si	Mn
	0.1	0.25	0.5

- **Fields of application:**

- Pipeline, boiler, container and ship construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 packages/covering package	Package	4.6 kg	2.5 mm	350 mm	<a href="#">097-005501-25350</a>
3 packages/covering package	Package	4.6 kg	3.25 mm	350 mm	<a href="#">097-005501-32350</a>
3 packages/covering package	Package	4.6 kg	4 mm	350 mm	<a href="#">097-005501-40450</a>

### SE 7016 BR

<b>Standards</b>	DIN EN ISO 2560-A - E 42 3 B 12 H10 AWS A-5.1 - E 7016
<b>Coating type</b>	Basic/rutile
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	AC   DC+
<b>Yield strength</b>	≥430 MPa
<b>Tensile strength, Rm</b>	>490 MPa
<b>Expansion, A5</b>	≥25 %
<b>Impact energy, Av</b>	-30 °C: ≥ 60 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	S235 - S355   S275 - S355   P195 - P355   L210 - L360   GE200, GE240, GP 240, G20Mo5, G21Mn5   BSt 420, BSt 500 Shipbuilding steels A32/36, D32/36, E32/36, A50, D40



#### Chemical analysis (in %)

- Basic rutile-coated stick electrode
- Very good weldability on alternating current
- Excellent for positional welding
- Can be welded in any position except vertical down
- Stable arc, low spatter formation

	C	Si	Mn
	0.08	0.5	1.1

- **Fields of application:**

- Universal electrode for assembly and repair welding of unalloyed and low-alloy steels

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 packages/covering package	Package	4.3 kg	2.5 mm	350 mm	<a href="#">097-005504-25350</a>
3 packages/covering package	Package	4.3 kg	3.25 mm	350 mm	<a href="#">097-005504-32350</a>
3 packages/covering package	Package	5.6 kg	4 mm	450 mm	<a href="#">097-005504-40450</a>

### SE 7018 BH5

<b>Standards</b>	DIN EN ISO 2560-A - E 46 4 Z B 42 H5 AWS A-5.1 - E 7018-1
<b>Coating type</b>	Basic
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	AC   DC-
<b>Yield strength</b>	>490 MPa
<b>Tensile strength, Rm</b>	570 MPa - 620 MPa
<b>Expansion, A5</b>	>24 %
<b>Impact energy, Av</b>	-40 °C: > 100 J
<b>Approvals</b>	CE / TÜV / DB / LR / DNV-GL
<b>Base materials</b>	S275 - S355   S275 - S460   P195 - P460   L210 - L450   GE200, GE240, GP240, G21Mn5   BSt 420, BSt 500 Schiffbaustähle A32/36, D32/36, E32/36, F32/36, A/D/E/F40



#### Chemical analysis (in %)

- Basic-coated moisture-resistant stick electrode
- Very good ignition characteristics
- Excellent for positional welding
- Can be welded in any position except vertical down
- Low H2 content and good crack resistance
- Suitable for low-temperature tough, fine-grained structural steels down to -60°C

	C	Si	Mn	Ni
	0.07	0.45	1.35	0.5

#### • Fields of application:

- Steel construction, pipeline construction, shipbuilding, offshore

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 packages/covering package	Package	4.6 kg	2.5 mm	350 mm	097-005503-25350
3 packages/covering package	Package	-	3.25 mm	350 mm	097-005503-32350
3 packages/covering package	Package	-	4 mm	450 mm	097-005503-40450
3 packages/covering package	Package	-	5 mm	450 mm	097-005503-50450



### SE 7018 Mo

<b>Standards</b>	DIN EN ISO 3580-A - E Mo B 42 AWS A-5.5 - E 7018-A1
<b>Coating type</b>	Basic
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	DC+
<b>Yield strength</b>	≥450 MPa
<b>Tensile strength, Rm</b>	540 MPa - 590 MPa
<b>Expansion, A5</b>	>24 %
<b>Impact energy, Av</b>	-10 °C: > 80 J
<b>Approvals</b>	CE / TÜV
<b>Base materials</b>	S275 - S355   S275 - S460   P195 - P460, 16Mo3   L210 - L450   GP 240, G20Mo5



#### Chemical analysis (in %)

- Basic-coated, moisture-resistant stick electrode
  - Particularly suitable for welding 16Mo3
  - Very good welding properties, easy handling
  - Can be welded in any position except vertical down
  - Low H2 weld metal (hydrogen content below 5%)
  - Operating temperature up to 520°C
  - Excellent mechanical quality values
- Fields of application:**
- Pipeline and boiler construction

	C	Si	Mn	Mo
	0.08	0.4	1	0.5

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 packages/covering package	Package	4.3 kg	2.5 mm	350 mm	<a href="#">097-005506-25350</a>
3 packages/covering package	Package	4.8 kg	3.25 mm	350 mm	<a href="#">097-005506-32350</a>
3 packages/covering package	Package	4.7 kg	4 mm	350 mm	<a href="#">097-005506-40350</a>

### SE 8018 CrMo1

<b>Standards</b>	DIN EN ISO 3580-A - E CrMo1 B 42 AWS A-5.5 - E 8018-B2
<b>Coating type</b>	Basic
<b>Welding positions</b>	PA / PB / PC / PE / PF
<b>Polarity</b>	DC+
<b>Yield strength</b>	>400 MPa
<b>Tensile strength, Rm</b>	510 MPa - 650 MPa
<b>Expansion, A5</b>	>20 %
<b>Impact energy, Av</b>	20 °C: > 80 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	1.7218   1.7218   1.7254   1.7258   1.7262   1.7335   1.7337   1.7350   1.7354 25 CrMo 4   G 25 CrMo 4   20 CrMo 4   24 CrMo5   15 CrMo 5   13 CrMo 4-5   16 CrMo 4-4   22 CrMo 4-4   G22 CrMo5-4



#### Chemical analysis (in %)

- Basic-coated, moisture-resistant stick electrode
- Very good welding properties, easy handling
- Can be welded in any position except vertical down
- Low H<sub>2</sub> weld metal (hydrogen content below 5%)
- Welding of creep-resistant and pressurised hydrogen-resistant steels
- Joint welding and surfacing of similar alloyed steels
- For operating temperatures up to max. 550°C

C	Si	Mn	Cr	Mo
0.08	0.4	1	1	0.5

- **Fields of application:**
  - Pipeline, boiler, steam plant and container construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 packages/covering package	Package	4.3 kg	2.5 mm	350 mm	<a href="#">097-005505-25350</a>
3 packages/covering package	Package	4.8 kg	3.25 mm	350 mm	<a href="#">097-005505-32350</a>
3 packages/covering package	Package	4.8 kg	4 mm	350 mm	<a href="#">097-005505-40350</a>

### SE 307

<b>Standards</b>	DIN EN ISO 3581-A - E 18 8 Mn R 12 AWS A-5.4 - E 307-16
<b>Material number</b>	1.4370
<b>Coating type</b>	Rutile/basic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	AC   DC+
<b>Tensile strength, Rm</b>	>600 MPa
<b>Expansion, A5</b>	>40 %
<b>Impact energy, Av</b>	20 °C: ≥ 70 J
<b>Base materials</b>	Dissimilar steels (dissimilar joints), high-carbon and difficult-to-weld steel, manganese high carbon steel e.g. X 120 Mn 12 (1.3401) Buffer layers for hardfacing



- Rutile basic coated, high-alloy stick electrode
- Self-removing slag, very low spatter tendency
- Excellent ignition and reignition characteristics
- Resistant to seawater and diluted acids
- Suitable for dissimilar joints and buffer layers
- For welding high-carbon and difficult-to-weld steels, as well as austenitic manganese steels
- Strain-hardening
- For operating temperatures up to approx. +300°C

- **Fields of application:**
  - Industrial furnaces, boiler construction, heat exchangers

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni	Fe
max. 0.2	max. 1.2	4.5 - 7.5	17 - 20	7 - 10	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	4 kg	2.5 mm	300 mm	<a href="#">097-005069-25300</a>
3 quivers/covering box	Quiver	5 kg	3.25 mm	350 mm	<a href="#">097-005069-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005069-40350</a>
3 quivers/covering box	Quiver	5 kg	5 mm	350 mm	<a href="#">097-005069-50350</a>

### SE 308 L

<b>Standards</b>	DIN EN ISO 3581-A - E 199 LR 12 AWS A-5.4 - E 308 L-16
<b>Material number</b>	1.4316
<b>Coating type</b>	Rutile/basic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	AC   DC+
<b>Tensile strength, Rm</b>	550 MPa
<b>Expansion, A5</b>	35 %
<b>Impact energy, Av</b>	20 °C: 70 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	1.4300   1.4301   1.4303   1.4306   1.4308   1.4311   1.4312   1.4371   1.4541   1.4543   1.4550   1.4552



- Rutile basic coated, high-alloy stick electrode
- Self-removing slag, very low spatter tendency
- Good ignition characteristics
- Good resistance to intergranular corrosion
- Can be welded in any position except vertical down
- Welding of non-stabilised Cr-Ni steels with a particularly low carbon content
- For operating temperatures up to approx. +350°C

• **Fields of application:**

- Chemical and food industry, as well as pipeline and boiler construction

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni	Fe
max. 0.04	max. 1.2	max. 2	18 - 21	9 - 11	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	4 kg	2 mm	300 mm	<a href="#">097-005062-20300</a>
3 quivers/covering box	Quiver	4 kg	2.5 mm	300 mm	<a href="#">097-005062-25300</a>
3 quivers/covering box	Quiver	5 kg	2.5 mm	350 mm	<a href="#">097-005062-25350</a>
3 quivers/covering box	Quiver	5 kg	3.2 mm	350 mm	<a href="#">097-005062-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005062-40350</a>
3 quivers/covering box	Quiver	6 kg	5 mm	450 mm	<a href="#">097-005062-50450</a>

### SE 309 L

<b>Standards</b>	DIN EN ISO 3581-A - E 23 12 LR 32 AWS A-5.4 - E 309 L-16
<b>Material number</b>	1.4332
<b>Coating type</b>	Rutile/basic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	AC   DC+
<b>Tensile strength, Rm</b>	550 MPa
<b>Expansion, A5</b>	30 %
<b>Impact energy, Av</b>	20 °C: 55 J
<b>Base materials</b>	1.4541   1.4550   1.4710   1.4712   1.4727   1.4729   1.4740   1.4742   1.4780   1.4825   1.4826   1.4828   1.4878



- Rutile basic coated, high-alloy stick electrode
- Self-removing slag, very low spatter tendency
- Good ignition characteristics
- Can be welded in any position except vertical down
- Good resistance to oxidation and intergranular corrosion
- Joint welds on heat-resistant, similar or lower alloyed Cr-Ni steels
- For dissimilar joints and buffer layers
- Surfacing on unalloyed steels if an 18/8 Cr-Ni alloy is to be achieved in the first layer
- Heat-resistant up to 1050°C

**Fields of application:**

- Chemical and food industry, as well as pipeline and boiler construction

**Chemical analysis (in %)**

C	Si	Mn	Cr	Ni	Fe
max. 0.04	max. 1.2	max. 2.5	22 - 25	11 - 14	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	4 kg	2 mm	300 mm	<a href="#">097-005063-20300</a>
3 quivers/covering box	Quiver	4 kg	2.5 mm	300 mm	<a href="#">097-005063-25300</a>
3 quivers/covering box	Quiver	5 kg	3.2 mm	350 mm	<a href="#">097-005063-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005063-40350</a>

### SE 309 MoL

<b>Standards</b>	DIN EN ISO 3581-A - E 23 12 2 LR 32 AWS A-5.4 - E 309 Mo-16
<b>Material number</b>	1.4459
<b>Coating type</b>	Rutile/basic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Tensile strength, Rm</b>	650 MPa
<b>Expansion, A5</b>	30 %
<b>Impact energy, Av</b>	20 °C: 55 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	1.4401   1.4404   1.4406   1.4410   1.4437   1.4571   1.4580



- Rutile basic coated, high-alloy stick electrode
- Self-removing slag, very low spatter tendency
- Good ignition characteristics
- Very good corrosion and scale resistance
- For dissimilar joints and buffer layers
- Surfacing on unalloyed steels if an 18/8/2 Cr-Ni-Mo alloy is to be achieved in the first layer
- Welding of unalloyed, low-alloy and difficult-to-weld steels with high-alloy steels
- Heat-resistant up to 1050°C
- For operating temperatures up to approx. +300°C

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni	Mo	Fe
max. 0.04	max. 1.2	max. 2.5	22 - 25	11 - 14	2 - 3	Remainder

#### • Fields of application:

- Chemical and food industry, as well as pipeline and boiler construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	4 kg	2 mm	300 mm	<a href="#">097-005064-20300</a>
3 quivers/covering box	Quiver	4 kg	2.5 mm	300 mm	<a href="#">097-005064-25300</a>
3 quivers/covering box	Quiver	5 kg	3.25 mm	350 mm	<a href="#">097-005064-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005064-40350</a>
3 quivers/covering box	Quiver	6 kg	5 mm	450 mm	<a href="#">097-005064-50450</a>

### SE 310

<b>Standards</b>	DIN EN ISO 3581-A - E 25 20 R 12 AWS A-5.4 - E 310-16
<b>Material number</b>	1.4842
<b>Coating type</b>	Rutile/basic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Tensile strength, Rm</b>	570 MPa
<b>Expansion, A5</b>	20 %
<b>Impact energy, Av</b>	20 °C: 40 J
<b>Base materials</b>	1.4832   1.4840   1.4841   1.4845   1.4846   1.4849   1.4713   1.4726   1.4710   1.4745   1.4823



- Rutile-basic coated, high-alloy stick electrode, heat-resistant
- Self-removing slag, very low spatter tendency
- Excellent ignition and reignition characteristics
- Weld metal made of fully austenitic chrome nickel steel
- For welding heat-resistant Cr and CrNi steels
- Heat and scale resistant up to 1000°C
- Not sufficiently resistant in sulphurous atmospheres

• **Fields of application:**

- Industrial furnaces, boiler construction, heat exchangers

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni	Fe
0.06 - 0.2	max. 1.2	1 - 5	23 - 27	18 - 22	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	4 kg	2.5 mm	300 mm	<a href="#">097-005065-25300</a>
3 quivers/covering box	Quiver	5 kg	3.25 mm	350 mm	<a href="#">097-005065-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005065-40350</a>
3 quivers/covering box	Quiver	5 kg	5 mm	350 mm	<a href="#">097-005065-50350</a>



### SE 312

<b>Standards</b>	DIN EN ISO 3581-A - E 29 9 R 12 AWS A-5.4 - E 312-16
<b>Material number</b>	1.4337
<b>Coating type</b>	Rutile/basic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	AC   DC+
<b>Tensile strength, Rm</b>	750 MPa
<b>Expansion, A5</b>	20 %
<b>Impact energy, Av</b>	20 °C: 40 J
<b>Approvals</b>	CE / DB
<b>Base materials</b>	Corrosion-resistant analogue steel and cast steel (e.g. 1.4762, 1.4085)

Difficult-to-weld steel, manganese high carbon steel, spring steel, tool steel

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni	Fe
max. 0.15	max. 1.2	max. 2.5	27 - 31	8 - 12	Remainder

- Rutile-basic coated, high-alloy stick electrode, creep-resistant
- Excellent ignition and reignition characteristics
- The weld metal has a ferritic-austenitic structure
- Fine-flaked and smooth seam appearance
- Good slag removal characteristics, low spatter tendency
- Can be welded in any position except vertical down
- Suitable for dissimilar joints, surfacing and buffer layers
- Can also be used for welding galvanised sheet metal
- Scale-resistant up to 1,000 °C
- High hot crack resistance
- **Fields of application:**
  - Construction, spring, tool and heat-treated steels. High manganese steels, galvanised sheet metal

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	4 kg	2 mm	300 mm	<a href="#">097-005070-20300</a>
3 quivers/covering box	Quiver	4 kg	2.5 mm	300 mm	<a href="#">097-005070-25300</a>
3 quivers/covering box	Quiver	5 kg	3.25 mm	350 mm	<a href="#">097-005070-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005070-40350</a>



### SE 316-L

<b>Standards</b>	DIN EN ISO 3581-A - E 19 12 3 LR AWS A-5.4 - ASME SFA5.4 E316L-16
<b>Coating type</b>	Phoenix green
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	AC   DC-   DC+
<b>Tensile strength, Rm</b>	557 MPa
<b>Expansion, A5</b>	45.2 %
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	1.4401   1.4404   1.4406   1.4408   1.4420   1.4435   1.4436   1.4571   1.4573   1.4580   1.4581   1.4583



#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni	Mo
0.02	0.75	0.95	18.5	12.7	2.7

- Rutile-coated, high-alloy stick electrode, creep-resistant
- Self-removing slag, very low spatter tendency
- Good resistance to intergranular corrosion
- Scale and moisture resistant
- Can be welded in any position except vertical down
- Welding of stabilised and non-stabilised austenites
- For CrNi and CrNiMo steels, as well as for dissimilar joints

#### • Fields of application:

- Textile, paper and chemical finishing industry

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
4 packages/covering package	Package	2.5 kg	2 mm	300 mm	<a href="#">097-005426-20300</a>
4 packages/covering package	Package	2.5 kg	2.6 mm	300 mm	<a href="#">097-005426-26300</a>
4 packages/covering package	Package	2.5 kg	3.2 mm	350 mm	<a href="#">097-005426-32350</a>
4 packages/covering package	Package	2.5 kg	4 mm	350 mm	<a href="#">097-005426-40350</a>
4 packages/covering package	Package	2.5 kg	5 mm	350 mm	<a href="#">097-005426-50350</a>

### SE 318

<b>Standards</b>	DIN EN ISO 3581-A - E 19 12 3 Nb R 32 AWS A-5.4 - E 318-16
<b>Material number</b>	1.4576
<b>Coating type</b>	Rutile/basic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF / PG
<b>Polarity</b>	AC   DC+
<b>Tensile strength, Rm</b>	600 J
<b>Expansion, A5</b>	30 %
<b>Impact energy, Av</b>	20 °C: 70 J
<b>Approvals</b>	CE / TÜV / DB
<b>Base materials</b>	1.4401   1.4404   1.4408   1.4420   1.4435   1.4436   1.4571   1.4573   1.4580   1.4581   1.4583



- Rutile-basic coated, high-alloy stick electrode, creep-resistant
- Self-removing slag, very low spatter tendency
- Excellent ignition and reignition characteristics
- Fine-flaked and smooth seam appearance
- Good resistance to intergranular and pitting corrosion
- Scale resistant up to 1100 °C
- Maximum operating temperature 400 °C
- Primarily for welding stabilised CrNiMo and CrNi steels
- Low-temperature tough up to 120°C

• **Fields of application:**

- Chemical apparatus and container construction

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni	Mo	Nb	Fe
max. 0.08	max. 1.2	max. 2	17 - 20	10 - 13	2.5 - 3	max. 0.64	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	4 kg	2 mm	300 mm	<a href="#">097-005066-20300</a>
3 quivers/covering box	Quiver	4 kg	2.5 mm	300 mm	<a href="#">097-005066-25300</a>
3 quivers/covering box	Quiver	5 kg	3.25 mm	350 mm	<a href="#">097-005066-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005066-40350</a>
3 quivers/covering box	Quiver	6 kg	5 mm	450 mm	<a href="#">097-005066-50450</a>



### SE 347

<b>Standards</b>	DIN EN ISO 3581-A - E 19 9 Nb R 12 AWS A-5.4 - E 347-16
<b>Material number</b>	1.4551
<b>Coating type</b>	Rutile/basic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	AC   DC+
<b>Tensile strength, Rm</b>	600 MPa
<b>Expansion, A5</b>	30 %
<b>Impact energy, Av</b>	20 °C: 65 J
<b>Base materials</b>	1.4301   1.4303   1.4306   1.4308   1.4310   1.4312   1.4319   1.4541   1.4550   1.4552

- Rutile-basic coated, high-alloy stick electrode, creep-resistant
- Excellent ignition and reignition characteristics
- Fine-flaked and smooth seam appearance
- Good resistance to intergranular corrosion
- Good slag removal characteristics, low spatter tendency
- Primarily for welding stabilised CrNi steels
- Can be welded in any position except vertical down
- Maximum operating temperature 400 °C

#### • Fields of application:

- Chemical apparatus, container and pipeline construction

#### Chemical analysis (in %)

C	Si	Mn	Cr	Ni	Nb	Fe
max. 0.08	max. 1.2	max. 2	18 - 21	9 - 11	max. 0.64	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	4 kg	2 mm	300 mm	<a href="#">097-005067-20300</a>
3 quivers/covering box	Quiver	4 kg	2.5 mm	300 mm	<a href="#">097-005067-25300</a>
3 quivers/covering box	Quiver	5 kg	3.25 mm	350 mm	<a href="#">097-005067-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005067-40350</a>
3 quivers/covering box	Quiver	6 kg	5 mm	450 mm	<a href="#">097-005067-50450</a>

### SE Hard 300 P

<b>Standards</b>	DIN EN 14700 - E Fe 1-300-p DIN 8555 - E1-UM-300 P
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	AC   DC+
<b>Hardness</b>	300 HB



- Basic coated stick electrode
- 120% metal recovery
- Welding of wear-resistant applications
- Crack-free and impact-resistant applications
- The weld metal consists of Cr-Mn steel

#### Chemical analysis (in %)

C	Si	Mn	Cr	Fe
0.1 - 0.15	max. 1.3	1.5	2.5 - 3	Remainder

#### • Fields of application:

- Applications on rollers, bearing surfaces, cable winches, running wheels

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	5 kg	2.5 mm	350 mm	<a href="#">097-004806-25350</a>
3 quivers/covering box	Quiver	5 kg	3.2 mm	350 mm	<a href="#">097-004806-32350</a>
3 quivers/covering box	Quiver	6 kg	4 mm	450 mm	<a href="#">097-004806-40450</a>
3 quivers/covering box	Quiver	6 kg	5 mm	450 mm	<a href="#">097-004806-50450</a>

### SE Hard 60

<b>Standards</b>	DIN EN 14700 - E Fe 8-55-gpt DIN 8555 - E 6-UM-60
<b>Material number</b>	1.4718
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	AC   DC+
<b>Hardness</b>	54 - 60 HRC



- Basic coated stick electrode
- For very hard surfacing
- Very high wear resistance
- High resistance to frictional wear and impact loads
- The weld metal consists of Cr-Mn-V steel

#### Chemical analysis (in %)

C	Si	Mn	Cr	Mo	V	Fe
0.5 - 0.8	max. 0.6	0.8	7 - 10	0.5 - 0.7	1 - 1.2	Remainder

#### • Fields of application:

- Applications on rollers, bearing surfaces, cable winches, running wheels, excavator parts, clamping jaws

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	5 kg	2.5 mm	350 mm	<a href="#">097-005071-25350</a>
3 quivers/covering box	Quiver	5 kg	3.2 mm	350 mm	<a href="#">097-005071-32350</a>
3 quivers/covering box	Quiver	6 kg	4 mm	450 mm	<a href="#">097-005071-40450</a>
3 quivers/covering box	Quiver	6 kg	5 mm	450 mm	<a href="#">097-005071-50450</a>
3 quivers/covering box	Quiver	6 kg	6 mm	450 mm	<a href="#">097-005071-60450</a>

### SE Ni

<b>Standards</b>	DIN EN ISO 1071 - E C Ni-CI 1 AWS - E Ni-CI
<b>Coating type</b>	Basic-graphitic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Hardness</b>	160 HB
<b>Base materials</b>	EN 1561: EN-GJL-100 (GG 10) - EN-GJL-350 (GG 35) EN 1562: EN-GJMB-350 (GTS 35) - EN-GJMB-550 (GTS 55)   EN-GJMW-350 (GTW 35) - EN-GJMW-550 (GTW 55)



- Basic graphite-coated stick electrode
- Good slag removal characteristics, low spatter tendency
- Soft, low spatter arc
- Cold welding of grey and malleable cast iron
- Graphitic separation of the carbon in the weld metal

• **Fields of application:**

- Repair and servicing of cast parts, e.g. engine blocks, pump housings, gearboxes, foundry defects

#### Chemical analysis (in %)

C	Si	Mn	Cu	Fe	Ni
max. 2	max. 4	max. 2.5	max. 2.5	max. 8	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	5 kg	2.5 mm	350 mm	<a href="#">097-005068-25350</a>
3 quivers/covering box	Quiver	5 kg	3.25 mm	350 mm	<a href="#">097-005068-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005068-40350</a>

### SE NiFe

<b>Standards</b>	DIN EN ISO 1071 - E C NiFe 1 1 AWS A-5.15 - E NiFeCl
<b>Coating type</b>	Basic-graphitic
<b>Welding positions</b>	PA / PB / PC / PD / PE / PF
<b>Polarity</b>	AC   DC+
<b>Hardness</b>	200 HB
<b>Base materials</b>	EN 1561: EN-GJL-100 (GG 10) - EN-GJL-350 (GG 35) EN 1562: EN-GJMB-350 (GTS 35) - EN-GJMB-550 (GTS 55)   EN-GJMW-350 (GTW 35) - EN-GJMW-550 (GTW 55) EN1563: EN-GJS-400 (GGG 40) - EN-GJS-700 (GGG 70)



- Basic graphite-coated stick electrode
- Good slag removal characteristics, low spatter tendency
- Soft, low spatter arc
- Cold welding of grey cast iron, malleable cast iron and spheroidal cast iron
- Graphitic separation of the carbon in the weld metal
- **Fields of application:**
  - Repair and servicing of cast parts, e.g. engine blocks, pump housings, gearboxes, foundry defects

#### Chemical analysis (in %)

C	Si	Mn	Ni	Cu	Fe
max. 2	max. 4	max. 2.5	50 - 60	max. 4	Remainder

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
3 quivers/covering box	Quiver	5 kg	2.5 mm	300 mm	<a href="#">097-005074-25300</a>
3 quivers/covering box	Quiver	5 kg	3.25 mm	350 mm	<a href="#">097-005074-32350</a>
3 quivers/covering box	Quiver	5 kg	4 mm	350 mm	<a href="#">097-005074-40350</a>

EWM description	Material number	DIN EN ISO	AWS	Approvals	Page
<b>Wire electrodes</b>					
SMA S2	1.0494	S2	EM12	TÜV / DB	137
SMA S3Si	1.0479	S3Si	EH12K		138
<b>Flux</b>					
BF 10		S A FB 1 55 AC H5			139
FW AB 1 67		S A AB 1 67 AC H5		TÜV	140
FW CS 1 63 DC		S F CS 2 5742 DC			141



# Welding filler metals

## Submerged-arc welding

### SMA S2

<b>Standards</b>	DIN EN ISO 14171-A - S2 AWS A-5.17 - EM12
<b>Material number</b>	1.0494
<b>Welding positions</b>	PA / PB / PC
<b>Polarity</b>	DC-/+
<b>Approvals</b>	TÜV / DB
<b>Base materials</b>	Shipbuilding, pressure vessel construction and steel construction, S185-E360   S235JR-S355JR   S235J0-S355J0   S235J2-S355J2   S275N-S355N   S275M-S355M   P235GH-P355GH   P275N-P355N   P355M   P355Q Pipeline steels L210-360, shipbuilding steels A-E, AH36, DH36  ASTM: A36   A106 grades A/B/C   A139   A210 grades A1/C   A216 grades WCA/WCB/WCC   A234 grades WPB   A266 grades 1/2/4   A283 grades A/B/C/D   A285 grades A/B/C   A299 grades A/B   A515 grades 60   A516 grades 55   A656 grades 50 API: 5L grades X42-X56



- Submerged arc welding wire for welding unalloyed and low-alloy construction steels
- Copper-plated, layer wound
- Also suitable for welding fine-grained construction steels
- Optimised for oxygen applications

- **Fields of application:**
  - Offshore industry

#### Chemical analysis (in %)

C	Si	Mn
0.09	0.12	1.05

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	K 415	25 kg	2 mm	-	<a href="#">097-003700-02520</a>
Basket spool	K 415	25 kg	2.5 mm	-	<a href="#">097-003700-02525</a>
Basket spool	K 415	25 kg	3 mm	-	<a href="#">097-003700-02530</a>
Basket spool	K 415	25 kg	4 mm	-	<a href="#">097-003700-02540</a>

# Welding filler metals

## Submerged-arc welding

### SMA S3Si

<b>Standards</b>	DIN EN ISO 14171-A - S3Si AWS A-5.17 - EH12K
<b>Material number</b>	1.0479
<b>Welding positions</b>	PA / PB / PC
<b>Polarity</b>	DC-/+
<b>Base materials</b>	Welding of unalloyed and low-alloy steels with a yield strength of up to ~460 MPa (65ksi) S355J0   S355J2   S355N-S460N   S355NL-S460NL   S355M-S460M   S355ML-S460ML   S460Q   S460QL   P355GH   P355N-P460N   P355NL2-P460NL2   P355M-P460M   ASTM: A36   A106 grades A/B/C   A139   A210 grades A1/C   A216 grades WCA/WCB/WCC   A234 grade WPB   A266 grades 1/2/4   A283 grades A/B/C/D   A285 grades A/B/C   A299 grades A/B   A515 grades 60/65/70   A516 grades 55-70   A656 grade API: 5L grades X42-X56



- Submerged arc welding wire for welding unalloyed and low-alloy construction steels
- Copper-plated, layer wound
- Very good mechanical properties

• **Fields of application:**

- Shipbuilding, pressure vessel and steel construction

#### Chemical analysis (in %)

C	Si	Mn
0.11	0.3	1.72

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Basket spool	K 415	25 kg	2 mm	-	<a href="#">097-004839-02520</a>
Basket spool	K 415	25 kg	2.5 mm	-	<a href="#">097-004839-02525</a>
Basket spool	K 415	25 kg	3 mm	-	<a href="#">097-004839-02530</a>
Basket spool	K 415	25 kg	4 mm	-	<a href="#">097-004839-02540</a>

# Welding filler metals

## Submerged-arc welding

### BF 10



<b>Standards</b>	DIN EN ISO 14174 - S A FB 1 55 AC H5
<b>Welding positions</b>	PA / PB / PC
<b>Polarity</b>	AC   DC-   DC+
<b>Grain size</b>	2 - 20
<b>Base materials</b>	Thick-walled workpieces up to 420 MPa yield strength Off-shore structures up to 460 MPa yield strength on steels such as ASTM A 516 Grade 70 or BS 4360 Grade 50 D and S355 J2G3 in accordance with DIN EN 10025 Low-temperature tough steels with notched impact strength at -60°C or lower High tensile fine-grain construction steels such as S690QL1 and N-A-XTRA 70 Boiler construction steels such as 16Mo3/A204 Grade A, 13CrMo4-5/A387 Grade 12 or 10 CrMo9-10/A387 Grade 22

#### Chemical analysis (in %)

- Highly basic, agglomerated welding flux
- Low oxygen values in the weld metal
- Good mechanical properties and high toughness at low temperatures
- Suitable for welding on direct and/or alternating current
- Suitable for single and multi-wire welding

SiO <sub>2</sub> + TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub> + MnO	CaO + MgO	CaF <sub>2</sub>
15	20	40	25

#### • Fields of application:

- Offshore structures, pipeline construction, container and boiler construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Sack	-	25 kg	-	-	<a href="#">097-004840-00000</a>

# Welding filler metals

## Submerged-arc welding

### FW AB 1 67



<b>Standards</b>	DIN EN ISO 14174 - S A AB 1 67 AC H5
<b>Welding positions</b>	PA / PB / PC
<b>Polarity</b>	AC   DC-   DC+
<b>Approvals</b>	TÜV
<b>Grain size</b>	3 - 20
<b>Base materials</b>	Construction steels up to 420 N/mm <sup>2</sup> yield strength, fine-grained steels up to 460 N/mm <sup>2</sup> upper yield strength Pressure vessel steels up to P 355 N/mm <sup>2</sup> Creep-resistant steels such as 16Mo3, tube steels up to L480 or X 70, high tensile shipbuilding steels up to EH36



#### Chemical analysis (in %)

- Neutral, medium-basic agglomerated welding flux
- Suitable for fillet and joint welding of low-alloy steels, fine-grained and boiler steels
- Constant metallurgical behaviour
- Good weld forming ability and self-detaching slag
- Constant grades and low-temperature ductility in connection with Mo, Ni or NiMo alloy wires
- Very low hydrogen contents (H<sub>2</sub>diff. <4 ml/100 g) in the weld metal
- Good weld forming ability and self-detaching slag
- Constant grades and low-temperature ductility in connection with Mo, Ni or NiMo alloy wires
- Very low hydrogen content (H<sub>2</sub>diff. <5 ml/100g) in the weld metal

SiO <sub>2</sub> + TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub> + MnO	CaO + MgO	CaF <sub>2</sub>
20	30	30	15

#### • Fields of application:

- Pipeline, ship and boiler construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Sack	-	25 kg	-	-	097-003711-00025

# Welding filler metals

## Submerged-arc welding

### FW CS 1 63 DC

<b>Standards</b>	DIN EN ISO 14174 (stainless steels) - S F CS 2 5742 DC DIN EN ISO 14174 (unalloyed/low-alloy steels) - S F CS 1 63 DC
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<b>Welding positions</b>	PA / PB / PC
<b>Polarity</b>	AC   DC-   DC+
<b>Grain size</b>	1 - 16
<b>Base materials</b>	Creep-resistant CrMo steels such as 12 CrMo 19 5/A378 gr. 5 or X 20 CrMoWV 12 1/A351 for boiler, container and pipe construction



	Martensitic (soft martensite) and ferritic Cr(NiMo) steels in acc. w. DIN EN 10088 and austenitic CrNi(Mo) steels in acc. w. DIN EN 10088 Low-temperature tough and heat-resisting high-alloy CrNi(Mo) steels, dissimilar joints and nickel-base alloys
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#### Chemical analysis (in %)

SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub> + MnO	CaO + MgO	CaF <sub>2</sub>
30	5	35	20

- Molten neutral welding flux
- Suitable for high-alloy stainless steels, Ni-based alloys and low-alloy steels
- Especially crack-resistant in connection with similar or over-alloyed wire electrodes (solid or flux cored wire)
- For welding low-alloy, creep-resistant steels and high-alloy Cr, CrNi and CrNiMo steels
- Also suitable for joint welding of nickel alloys
- Can be used for surfacing and dissimilar joints
- Self-dissolving slag
- Good seam deformation capacity
- Particularly crack-resistant in conjunction with similar or over-alloyed wire electrodes (solid or flux-cored wire types)

#### • Fields of application:

- Pipeline, container and boiler construction

Sales packing drum	Packing drum	Weight	Ø	Length	Item no.
Sack	-	15 kg	-	-	<a href="#">097-004848-00015</a>

Notizen / Notes