

# Welding consumables for steel <460 MPa

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## Stick electrodes

<b>Product name</b>	<b>C</b>	<b>Si</b>	<b>Mn</b>	<b>Mo</b>
Phoenix Grün	0.08	0.35	0.50	
Phoenix Blau	0.09	0.35	0.50	
BÖHLER FOX OHV	0.06	0.40	0.45	
BÖHLER FOX ETI	0.07	0.40	0.50	
BÖHLER FOX SPE	0.08	0.20	0.45	
Phoenix SH Multifer 130	0.07	0.40	0.60	
Phoenix K 50	0.06	0.50	1.20	
BÖHLER FOX EV 47	0.06	0.30	0.90	
Phoenix Spezial D	0.06	0.65	1.05	
BÖHLER FOX EV 50-W	0.07	0.50	1.10	
BÖHLER FOX EV 50	0.08	0.40	1.20	
Phoenix SH Multifer 180	0.07	0.33	0.70	
Phoenix Rot R 160	0.07	0.35	0.65	
Phoenix Rot AR 160	0.08	0.30	0.90	
Phoenix Rot BR 160	0.08	0.40	0.85	
BÖHLER FOX NUT				

## GTAW rods

<b>Product name</b>	<b>C</b>	<b>Si</b>	<b>Mn</b>
BÖHLER EML 5	0.10	0.60	1.20
BÖHLER EMK 6	0.08	0.90	1.45
BÖHLER EMK 8	0.10	1.00	1.70

## Solid wires

<b>Product name</b>	<b>C</b>	<b>Si</b>	<b>Mn</b>
BÖHLER EMK 4	0.07	0.60	1.20
BÖHLER EMK 4 NC	0.07	0.70	1.20
BÖHLER EMK 6	0.08	0.90	1.45
BÖHLER EMK 6 D	0.08	0.90	1.45
BÖHLER EMK 6 NC	0.08	0.90	1.45
BÖHLER SG 2	0.07	0.85	1.50
BÖHLER EMK 8	0.10	1.00	1.70
BÖHLER EMK 8 D	0.10	1.00	1.70
BÖHLER EMK 8 NC	0.01	1.00	1.70
BÖHLER SG 3	0.09	0.95	1.70

## SAW wire/flux combinations

Product name	C	Si	Mn
Union S 2 - UV 305	0.06	0.50	1.25
Union S 2 - UV 306	0.06	0.60	1.40
Union S 2 - UV 400	0.07	0.40	1.40
Union S 2 Si - UV 305	0.06	0.60	1.30
Union S 2 Si - UV 306	0.06	0.75	1.60
Union S 2 Si - UV 421 TT	0.07	0.30	1.10
Union S 3 Si - UV 310 P	0.05	0.30	1.50
Union S 3 Si - UV 418 TT	0.08	0.30	1.55
Union S 3 Si - UV 421 TT	0.08	0.30	1.55
Union S 3 Si - UV 419 TT-W	0.08	0.35	1.65
Union S 3 Si - UV 422 TT-LH	0.08	0.45	1.55
BÖHLER SUBARC T55 HP - UV 306	0.04	0.70	1.80
BÖHLER SUBARC T55 HP - UV 421 TT	0.07	0.40	1.40
BÖHLER SUBARC T55 HP - UV 419 TT-W	0.07	0.40	1.50

## Flux cored wires

Product name	C	Si	Mn	Ni
BÖHLER HL 51 L-MC	0.07	0.70	1.50	
BÖHLER Ti 46 T-FD	0.06	0.45	1.30	
BÖHLER Ti 42 T-FD	0.04	0.50	1.30	
BÖHLER Ti 46-FD	0.05	0.50	1.20	
BÖHLER Ti 52-FD	0.06	0.50	1.20	
BÖHLER Ti 52 T-FD	0.06	0.40	1.45	
BÖHLER Ti 52 T-FD (HP)	0.06	0.45	1.30	0.35
BÖHLER Ti 52 T-FD (CO <sub>2</sub> )	0.07	0.45	1.30	
BÖHLER Ti 52 T-FD SR (CO <sub>2</sub> )	0.04	0.40	1.30	0.40
BÖHLER HL 46-MC	0.07	0.70	1.50	
BÖHLER HL 46 T-MC	0.06	0.80	1.50	
BÖHLER HL 51 T-MC	0.06	0.80	1.60	
BÖHLER Kb 46 T-FD	0.07	0.40	1.40	
BÖHLER Kb 52 T-FD	0.07	0.55	1.40	

## Gas welding rods

Product name	C	Si	Mn	Ni
BÖHLER BW VII	0.08	0.10	0.60	
BÖHLER BW XII	0.01	0.15	1.10	0.45

# Phoenix Grün

Stick electrode, unalloyed, rutile coated

## Classifications

EN ISO 2560-A  
E 42 0 R 1 2

AWS A5.1 / SFA-5.1  
E6012

## Characteristics and typical fields of application

Rutile coated electrode for tank construction and structural engineering. Particularly suitable for welding thin sheets in all welding positions ( $\emptyset$  2.0/2.5 mm also in PG (3F) position).

Soft arc; low spatter; excellent striking and re-striking ability. Easy slag removal.

## Base materials

S235JRG2 - S355J2, weld able thin sheets

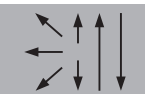
## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.08	0.35	0.5

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength $R_{p0.2}$ MPa	Tensile strength $R_m$ MPa	Elongation A ( $L_0=5d_0$ ) %	Impact values ISO-V KV J 20°C
u u untreated	420	510	22	50

## Operating data



**Polarity** DC (-) / AC

**Dimension mm**      **Current A**

2.5 × 350                      65 - 100

3.2 × 350                      80 - 140

## Approvals

DB (10.014.51), CE

## Classifications

EN ISO 2560-A  
E 42 0 RC 1 1

AWS A5.1 / SFA-5.1  
E6013

## Characteristics and typical fields of application

Rutile cellulose coated electrode. General purpose; useable in all positions; excellent gap-bridging and arc-striking ability; for tack-welding and bad fit-ups. Well suited for welding rusty and primed plates (roughly 40 µm); excellent vertical down characteristics. Useable on small transformers (42 V, open circuit).

## Base materials

S235JRG2 - S355J2; GS-38; GS-45; St35; St45; St35.8; boiler steels P235GH, P265GH, P295GH; shipbuilding steels corresp. to app.-grade 2; fine grained structural steels up to P355N; weldable ribbed reinforcing steel bars. ASTM A36 and A53 Gr. all; A106 Gr. A, B, C; A135 Gr. A, B; A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr. 45; A936 Gr. 50; API 5 L Gr. B, X42-X52

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.09	0.35	0.50

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	MPa	MPa	%	20°C	0°C
u	440 (≥ 420)	540 (≥ 500 – 640)	22 (≥ 20)	80	55 (≥ 47)

## Operating data



**Polarity** DC (-) AC  
**Electrode identification** Phoenix Blau / E 42 0 RC / E 6013

Dimension mm	Current A
2.0 × 250	50 – 60
2.5 × 250	60 – 90
2.5 × 350	60 – 90
3.2 × 350	90 – 140
4.0 × 350	150 – 190
4.0 × 450	150 – 190
5.0 × 350	190 – 240
5.0 × 450	190 – 240

## Approvals

TÜV (00425), DB (10.014.86), ABS, BV, LR, DNV GL, CE

# BÖHLER FOX OHV

Stick electrode, mild steel, rutile coated

SMAW

## Classifications

**EN ISO 2560-A**  
E 38 0 RC 1 1

**AWS A5.1 / SFA-5.1**  
E6013

## Characteristics and typical fields of application

Rutile-cellulosic coated electrode with good weldability in all positions including vertical-down. Most popular E 6013 type.

For small welding machines, very good operating characteristics, flexible coating, good for tack welding. Versatile applications in structural welding, vehicle construction, boiler and tank welding, and in shipbuilding, also suitable for galvanised components.

## Base materials

Steels up to a yield strength of 380 MPa (52 Ksi)

S235JR-S355JR, S235JO-S355JO, P195TR1-P265TR1, P195GH-P265GH, L245NB-L360NB, L245MB-L360MB, ship building steels: A, B, D  
ASTM A 106, Gr. A, B; A 283 Gr. A, C; A 285 Gr. A, B, C; A 501, Gr. B; A 573, Gr. 58, 65; A 633, Gr. A, C; A 711 Gr. 1013; API 5 L Gr. B, X42, X52

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.06	0.4	0.45

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J		
	MPa	MPa	%	20°C	0°C	-10°C
u	460 (≥ 380)	540 (470 – 600)	25 (≥ 20)	75	60 (≥ 47)	47
u untreated, as welded						

## Operating data



<b>Polarity</b>	DC – / AC
<b>Electrode identification</b>	FOX OHV 6013 E 38 0 RC
<b>Redrying</b>	not necessary

Dimension mm	Current A
2.0 × 250	45 – 80
2.5 × 250	60 – 100
2.5 × 350	60 – 100
3.2 × 350	90 – 130
3.2 × 450	90 – 130
4.0 × 350	110 – 170
4.0 × 450	110 – 170
5.0 × 450	170 – 240

## Approvals

TÜV (05687), DB (10.014.12), ABS, DNV GL, LR, CE

## Classifications

EN ISO 2560-A  
E 42 0 RR 1 2

AWS A5.1 / SFA-5.1  
E6013

## Characteristics and typical fields of application

Rutile coated electrode offering top weldability in all positions except vertical-down. Extremely smooth beads, self-detaching slag, minimum spattering and excellent welding properties on A.C. Excellent re-striking characteristics and easy handling. Good deposition lengths attainable. Versatile applications in trade and industry.

## Base materials

Steels up to a yield strength of 420 MPa (60ksi)

S235JR-S355JR, S235JO-S355JO, P195TR1-P265TR1, P195GH-P265GH, L245NB-L360NB, L245MB-L360MB, L415NB, L415MB, ship building steels: A, B, D

ASTM A 106, Gr. A, B; A 283 Gr. A, C; A 285 Gr. A, B, C; A 501, Gr. B; A 573, Gr. 58, 65, 70; A 633, Gr. A, C; A 711 Gr. 1013; API 5 L Gr. B, X42, X52, X60

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.07	0.4	0.5

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				20°C	-0°C
u	430 (≥ 420)	520 (≥ 500 – 640)	28 (≥ 20)	65	55 (≥ 47)
u untreated, as welded					

## Operating data



<b>Polarity</b>	DC – / AC
<b>Electrode identification</b>	FOX ETI 6013 E 42 0 RR
<b>Redrying</b>	not necessary

Dimension mm	Current A
2.0 × 250	45 – 80
2.5 × 250	60 – 110
2.5 × 350	60 – 110
3.2 × 350	90 – 140
3.2 × 450	90 – 140
4.0 × 350	110 – 190
4.0 × 450	110 – 190
5.0 × 450	170 – 240

## Approvals

TÜV (01097), ABS, BV, DNV GL, LR, CE

# BÖHLER FOX SPE

Stick electrode, mild steel, rutile coated

## Classifications

**EN ISO 2560-A**  
E 38 2 RB 1 2

**AWS A5.1 / SFA-5.1**  
E6013 (mod.)

## Characteristics and typical fields of application

Rutile-basic coated electrode especially recommended for out-of-position work except vertical-down. Excellently suited for welding root passes. Produces first class X-ray quality welds. Excellent welding properties on A.C. Preferably used in structural and tank welding as well as in tube & pipe construction. High mechanical properties, thus suitable for many different base metals.

## Base materials

Steels up to a yield strength of 380 MPa (52 ksi)

S235JR-S355JR, S235JO-S355JO, S275N-S355N, S275M-S355M, P235GH-P355GH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L360NB, L245MB-L360MB

ASTM A 106 Gr. A, B; A 283 Gr. A, C; A 285 Gr. A, B, C; A 414 Gr. A, B, D, G; A 501 Gr. B; A 516 Gr. 55, 60, 65, 70; A 573 Gr. 58, 65, 70; A 588 Gr. A, B; A 633 Gr. A, C, D; A 662 Gr. A, B, C; A 711, Gr. 1013; API 5 L Gr. B, X42, X52

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.08	0.2	0.45

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J			
				20°C	0°C	-10°C	-20°C
u	420 (≥ 380)	500 (≥ 470 – 600)	28 (≥ 20)	90	75	70	60 (≥ 47)
u untreated, as welded							

## Operating data



<b>Polarity</b>	DC – / AC
<b>Electrode identification</b>	FOX SPE E 38 2 RB
<b>Redrying</b>	not necessary

Dimension mm	Current A
2.0 × 250	45 – 75
2.5 × 250	60 – 100
2.5 × 350	60 – 100
3.2 × 350	90 – 140
4.0 × 450	110 – 190
5.0 × 450	170 – 250

## Approvals

TÜV (00731), DB (10.014.03), CE



## Classifications

EN ISO 2560-A  
E 42 0 RR 5 3

AWS A5.1 / SFA-5.1  
E7014

## Characteristics and typical fields of application

Rutile coated high performance electrode with 140% weld metal recovery. Little spatter; self releasing slag; useable in diameters up to 4 mm for welding in the overhead and horizontal position; outstanding striking and restriking ability. Well suited for thin fillet welds.

## Base materials

S235JRG2 – S355J2;

Boiler steels P235GH/P265GH/P295GH/P355GH;

Fine grained structural steels up to P355N- and M-grades;

Shipbuilding steels acc. A – E-grades, AH 32 - DH 36

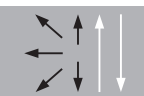
## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.07	0.40	0.60

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	MPa	MPa	%	20°C	0°C
u	420	510	22	70	47
s	410	470	27	70	

## Operating data



Polarity	DC – / AC	Dimension mm	Current A
Electrode identification	SH Multifer 130 / E 42 0 RR / E 7014	4.0 × 450	180 – 220
		5.0 × 450	240 – 320

## Approvals

TÜV (00583), DB (10.014.94), ABS, BV, DNV GL, LR CE

# Phoenix K 50

Stick electrode, mild steel, basic coated

## Classifications

**EN ISO 2560-A**  
E 42 4 B 4 2

**AWS A5.1 / SFA-5.1**  
E7015

## Characteristics and typical fields of application

Basic coated stick electrode. The smooth and stabile arc offers good welding characteristics and an easy handling.

Specially designed for welding of fine grained steels and fine grained structural steels, for boiler plates, tank construction and ship building.

Steels up to a C-content of 0.4% can be welded safe without cracks.

115% weld metal recovery; cold toughness down to -40°C.

## Base materials

Boiler steels P235GH, P265GH, P295GH, P355GH

S235JRG2 – S355J2, E335

fine grained structural steel up to S420N

Pipeline steels P235, P265; X42 – X60.

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.06	0.5	1.2

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				20°C	-40°C
u	420	510	22	120	47
s	380	490	27	130	47

## Operating data



<b>Polarity</b>	DC+
<b>Electrode identification</b>	Phoenix K 50/E 42 4 B/E 7015
<b>Redrying</b>	250-350°C/2h

Dimension mm	Current A
2.5 × 350	65 – 95
3.2 × 350	90 – 130
3.2 × 450	90 – 130
4.0 × 350	140 – 180
4.0 × 450	140 – 180
5.0 × 450	190 – 250

## Approvals

DB (10.014.96), CE

## Classifications

EN ISO 2560-A  
E 38 4 B 4 2 H5

AWS A5.1 / SFA-5.1  
E7016-1 H4 R

## Characteristics and typical fields of application

Basic coated electrode for high-quality welds. Good weldability in all positions except vertical-down. Metal recovery about 110%. Very low hydrogen content (according AWS condition HD < 4 ml/100g weld metal). Weld metal extremely ductile, crack resistant and ageing resistant thus especially suited for rigid welds with heavy seam cross sections.

## Base materials

Steels up to a yield strength of 380 MPa (52 ksi)

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S355N, S275M-S355M, P235GH-P355GH, P355N, P275NL1-P355NL1, P215NL, P265NL, P285NH-P355NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L360NB, L245MB-L360MB, GE200-GE240

Ship-building steels: A, B, D, E, A 32-E 36

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, LF2; 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. A, C, D; A 662 Gr. A, B, C; A 678 Gr. A, B; A 711 Gr. 1013; API 5 L Gr. B, X42, X52, X56

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.06	0.3	0.9

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J			
				20°C	-20°C	-40°C	-45°C
u	440 (≥ 380)	530 (≥ 470 – 600)	27 (≥ 20)	200	130	100 (≥ 47)	≥ 27
s	390 (≥ 380)	490 (≥ 470 – 600)	29 (≥ 20)	200	150	100 (≥ 47)	

u untreated, as welded

s stress relieved 600 °C/2h / furnace down to 300 °C / air

## Operating data



<b>Polarity</b>	DC (+)
<b>Electrode identification</b>	FOX EV 47 7016-1 E 38 4 B
<b>Redrying</b>	if necessary 300 – 350°C, min. 2h

Dimension mm	Current A
2.5 × 250	80 – 110
2.5 × 350	80 – 110
3.2 × 350	100 – 140
3.2 × 450	100 – 140
4.0 × 350	130 – 180
4.0 × 450	130 – 180
5.0 × 450	180 – 230
6.0 × 450	240 – 280

## Approvals

TÜV (01098), DB (10.014.09), ABS, BV, DNV GL, LR, RMR, RINA, CE

# Phoenix Spezial D

Stick electrode, mild steel, basic coated

## Classifications

**EN ISO 2560-A**  
E 42 3 B 1 2 H10

**AWS A5.1 / SFA-5.1**  
E7016

## Characteristics and typical fields of application

Basic double coated electrode with excellent weldability in all positions except vertical-down.

Especially suited for out-of-position welding thanks to the well controlled arc. Excellent root penetration. Good suitability for welding on AC. Minimum spatter loss, very easy slag removal with uniform beads. well-suited for small transformers. Low hydrogen content in the weld deposit (HD < 10 ml/100 g deposit).

## Base materials

Steels up to a yield strength of 420 MPa (60 ksi)

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S420N, S275M-S420M, P235GH-P355GH, 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 414 Gr. A, B, C, D, E, F, G; A 501 Gr. B; A 516 Gr. 55, 60, 65, 70; A 573 Gr. 58, 65, 70; A 588 Gr. A, B; A 633 Gr. A, C, D; A 662 Gr. A, B, C; A 678 Gr. A, B; A 711 Gr. 1013; API 5 L Gr. B, X42, X52, X56, X60

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.06	0.65	1.05

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength $R_{p0.2}$ MPa	Tensile strength $R_m$ MPa	Elongation A ( $L_0=5d_0$ ) %	Impact values ISO-V KV J	
				20°C	-30°C
u	440 (≥ 420)	550 (500 - 640)	28 (≥ 20)	170	50 (≥ 47)
s	400	520	28	170	50

u untreated, as welded

s stress relieved 580 °C/2h / furnace down to 300 °C / air

## Operating data



<b>Polarity</b>	DC+ / AC
<b>Electrode identification</b>	7016 E 42 3 B
<b>Redrying</b>	300 °C/2 h

Dimension mm	Current A
2.5 × 350	60 – 90
3.2 × 350	100 – 150
3.2 × 450	100 – 150
4.0 × 450	140 - 190
5.0 × 450	190 – 250

## Approvals

TÜV (10572), DB (10.138.12), CE

## Classifications

EN ISO 2560-A  
E 42 5 B 1 2 H5

AWS A5.1 / SFA-5.1  
E7016-1 H4 R

## Characteristics and typical fields of application

Basic coated electrode for high-quality joint welds. Especially suited for root pass welding. Excellent weldability in all positions except vertical-down. Smooth and slag-free welds. Crack resistant deposits of high toughness at sub-zero temperatures. Very low hydrogen contents in the weld deposit (acc. AWS condition HD < 4 ml/100 g weld metal). Especially suited for welding on AC. For root pass welding, DC negative polarity is recommended.

## Base materials

Steels up to a yield strength of 420 MPa (60ksi)

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S420N, S275M-S420M, P235GH-P355GH, P355N, P215NL, P275NL1-P355NL1, P265NL, P285NH-P420NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L245MB-L415MB, GE200-GE240, GE300, Ship building steels: A, B, D, E, A 32-E 36

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. A, C, D; A 662 Gr. A, B, C; A 678 Gr. A, B; A 711 Gr. 1013; API 5 L Gr. B, X42, X52, X56, X60

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.07	0.5	1.1

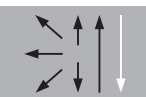
## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				20°C	-20°C	-50°C
u	480 (≥ 420)	570 (≥ 500 – 640)	28 (≥ 20)	200	150	80 (≥ 47)
s	430	540	28	200	160	

u untreated, as welded

s stress relieved 580 °C/2h / furnace down to 300 °C / air

## Operating data



<b>Polarity</b>	DC+ / AC/DC- for root pass only
<b>Electrode identification</b>	FOX EV 50-W 7016-1 E 42 5 B
<b>Redrying</b>	if necessary 300 – 350°C, min. 2h

Dimension mm	Current A
2.5 × 350	55 – 85
3.2 × 350	80 – 140
3.2 × 450	80 – 140
4.0 × 350	110 – 180
4.0 × 450	110 – 180
5.0 × 450	180 – 230

## Approvals

TÜV (04180), DNV GL

# BÖHLER FOX EV 50

Stick electrode, mild steel, basic coated

SMAW

## Classifications

**EN ISO 2560-A**  
E 42 5 B 4 2 H5

**AWS A5.1 / SFA-5.1**  
E7018-1 H4 R

## Characteristics and typical fields of application

Basic coated electrode engineered for high-quality welds. Excellent strength and toughness properties down to -50°C. Metal recovery approximately 110%. Good weldability in all position except for vertical-down. Very low hydrogen content (acc. AWS condition HD < 4 ml/100g weld metal). Suitable for welding steels with low purity and high carbon content. Welding in steel construction, boiler and tank manufacture, vehicle construction, shipbuilding, and machine construction as well as for buffer layers on build ups on high carbon steels. Especially suitable for off-shore construction, CTOD tested at -10 °C. BÖHLER FOX EV 50 can be used in sour gas applications (HIC-Test acc. NACE TM-02-84). Test values for SSC-test are available too.

## Base materials

Steels up to a yield strength of 420 MPa (60 ksi)

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S420N, S275M-S420M, S275NLS420NL,  
S275ML-S420ML, P235GH-P355GH, P275NL1-P355NL1, P275NL2-P355NL2, P215NL,  
P265NL, P355N, P285NH-P420NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH,  
L245NB-L415NB, L245MB-L415MB, GE200-GE240, GE300

Ship building steels: A, B, D, E, A 32-F 36, A 40-F 40

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, LF2;  
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. A, C, D, E; A 662 Gr. A, B, C; A 707 Gr. L1, L2, L3; A 711 Gr.  
1013; A 841 Gr. A, B, C; API 5 L Gr. B, X42, X52, X56, X60

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.08	0.4	1.2

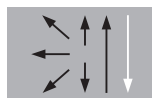
## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				20°C	-20°C	-50°C
u	460 (≥ 420)	570 (500 – 640)	30 (≥ 20)	190	160	70 (≥ 47)
s	430	520	32	200		90

u untreated, as welded

s stress relieved 600°C/2h / furnace down to 300°C / air

## Operating data



<b>Polarity</b>	DC+
<b>Electrode identification</b>	FOX EV 50 7018-1 E 42 5 B
<b>Redrying</b>	300-350°C/2h

Dimension mm	Current A
2.5 × 250	80 – 110
2.5 × 350	80 – 110
3.2 × 350	100 – 140
3.2 × 450	100 – 140
4.0 × 350	130 – 180
4.0 × 450	130 – 180
5.0 × 450	180 – 230

## Approvals

TÜV (00426), DB (10.014.02), ABS, BV, DNV GL, LR, RMR, RINA, CWB (Ø3,2-6,0 mm), CE

## Classifications

EN ISO 2560-A  
E 42 0 RR 7 3

AWS A5.1 / SFA-5.1  
E7024

## Characteristics and typical fields of application

Rutile coated high performance electrode with 180% weld metal recovery.

High deposition rate; good strike and restrike ability; low spatter; self releasing slag; finely rippled weld pattern.

Preferred for fillet welds. Useable for shipbuilding, mechanical and structural engineering.

## Base materials

S235JRG2 – S355J2;

Boiler steels P235GH/P265GH/P295GH/P355GH;

Fine grained structural steels up to P355N- and M-grades;

Shipbuilding steels acc. A – E-grades, AH 32 – DH 36;

ASTM A36 Gr. all; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A366; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr. 45; A936 Gr. 50

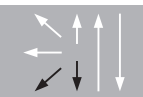
## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.07	0.33	0.70

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				20°C	0°C
u	420	510	22	70	47

## Operating data



<b>Polarity</b>	DC (-) AC
<b>Electrode identification</b>	SH Multifer 180 / E 42 0 RR / E7024

Dimension mm	Current A
3.2 × 450	120 – 180
4.0 × 450	180 – 220
5.0 × 450	250 – 330

## Approvals

TÜV (01598), DB (10.014.97), ABS, BV LR, DNV GL, CE

# Phoenix Rot R 160

Stick electrode, mild steel, rutile

## Classifications

**EN ISO 2560-A**  
E 42 0 RR 5 3

**AWS A5.1 / SFA-5.1**  
E7024-1

## Characteristics and typical fields of application

Rutile coated high performance electrode with 160% weld metal recovery. Low spatter; fine rippled weld pattern; good striking and restriking ability; self releasing slag.

Well suited for thin fillet welds.

## Base materials

S235JRG2 - S355J2;

Boiler steels P235GH/P265GH/P295GH/P355GH

Fine grained structural steels up to P355N- and M-grades;

Shipbuilding steels acc. A - E-grades, AH 32 - DH 36; ASTM

A36 Gr. all; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A366; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B;

A907 Gr. 30, 33, 36, 40; A935 Gr. 45; A936 Gr. 50

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.07	0.35	0.65

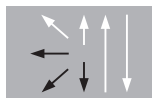
## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				20°C	0°C
u	420	510	22	80	47
s	410	470	26	85	

u untreated, as welded

s stress released 600 °C / 2 h / oven down to 300 °C / air

## Operating data



<b>Polarity</b>	DC (-) AC
<b>Electrode identification</b>	Phoenix Rot R 160 / E 42 0 RR / E7024-1

Dimension mm	Current A
3.2 × 450	120 – 160
4.0 × 450	160 – 230
5.0 × 450	250 – 340
6.0 × 450	300 – 400

## Approvals

TÜV (00349), DB (10.014.53) ABS, BV, DNV GL, LR, CE



## Classifications

EN ISO 2560-A  
E 42 2 RA 5 3

AWS A5.1 / SFA-5.1  
E7024-1

## Characteristics and typical fields of application

Rutile acid coated high performance electrode with roughly 160% weld metal recovery.

Particularly high deposition rate; outstanding welding characteristics on alternating current; the weld metal exhibits good runout qualities also in tight corners. High radiographic soundness. Useable for gravity and auto contact welding; unproblematic for welding rusty and primer-coated plates.

## Base materials

S235JRG2 - S355J2;

Boiler steels P235GH/P265GH/P295GH/P355GH;

Fine grained structural steels up to P355N- and M-grades;

Shipbuilding steels acc. A - E-grades, AH 32 - DH 36

## Typical analysis of all-weld metal

wt.-%	C	Si	Mn
	0.08	0.3	0.9

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	MPa	MPa	%	20°C	-20°C
u	430 (≥ 420)	520 (≥ 510)	22 (≥ 20)	80	55 (≥ 47)
s	420	500	27	80	

u untreated, as welded

s stress released, 600 °C / 2 h / oven down to 300 °C / air

## Operating data



<b>Polarity</b>	DC- / AC
<b>Electrode identification</b>	Phoenix Rot AR 160 / E 42 2 RA/E 7024-1

Dimension mm	Current A
3.2 × 450	120 – 160
4.0 × 450	160 – 240
5.0 × 450	250 – 350
6.0 × 450	300 – 400

## Approvals

TÜV (00535), DB (10.014.84), ABS, BV, DNV GL, LR, CE

# Phoenix Rot BR 160

Stick electrode, mild steel, rutile-basic

## Classifications

**EN ISO 2560-A**  
E 42 2 RB 5 3

**AWS A5.1 / SFA-5.1**  
E7028

## Characteristics and typical fields of application

Rutile-basic coated high performance electrode with ca. 160% weld metal recovery. Easy slag removal; fine rippled smooth welds; particularly good welding characteristics on primer-coated plates.

## Base materials

S235JRG2 - S355J2;

Boiler steels P235GH/P265GH/P295GH;

Fine grained structural steels up to P355N- and M-grades;

Shipbuilding steels acc. A - E-grades, AH 32 to NVE 36

## Typical analysis of all-weld metal

	C	Si	Mn
wt.-%	0.08	0.4	0.85

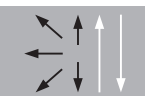
## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	MPa	MPa	%	20°C	-20°C
u	430 (≥ 420)	520 (≥ 510)	22 (≥ 20)	90	≥ 47
s	400	470	27	85	47

u untreated, as welded

s stress released, 600 °C / 2 h / oven down to 300 °C / air

## Operating data



<b>Polarity</b>	DC (+/-) / AC
<b>Electrode identification</b>	Phoenix Rot BR 160 / E 42 2 RB / E7028
<b>Redrying</b>	200-250°C/2h

Dimension mm	Current A
3.2 × 450	120 – 170
4.0 × 450	180 – 230
5.0 × 450	240 – 300

## Approvals

TÜV (01700), DB (10.014.85) ABS, BV LR, DNV GL, CE

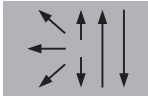
## Characteristics and typical fields of application

Special electrode for gouging of various base materials, unalloyed up to high alloyed, cast steels, non ferro metals except copper. Easy to ignite, high gouging speed in all positions.

Suitable for edge bevelling, cutting grooves, removal of unsound material and cracks prior to repair welding.

For gouging use a flat angle (~ 15°), Keep contact with the base material, pulling forward ensures the expulsion of the molten material. Grinding is necessary before welding the notch.

## Operating data

	<b>Polarity</b>	DC- / AC	<b>Dimension mm</b>	<b>Current A</b>
	<b>Electrode identification</b>	FOX NUT	3.2 × 350	180 – 240
	<b>Redrying</b>	not necessary	4.0 × 350	250 – 320

## Approvals

# BÖHLER EML 5



TIG Rod, mild steel

## Classifications

EN ISO 636-A  
W 2 SiAWS A5.18 / SFA-5.18  
ER70S-3

## Characteristics and typical fields of application

GTAW rod for high integrity welds. The low Si-content renders this filler metal particularly also for joint welds that are subjected to enamelling or galvanising. Especially suited for root pass welding (approved at -50°C). Böhler EML 5 can be used in sour gas applications (HIC-Test acc. to NACE TM-02-84).

## Base materials

Steels up to a yield strength of 460 MPa (67 ksi)

S235J2G3 – S355J2G3, E360, P235T1-P355T1, P235G1TH, L210, L290MB, P255G1TH, P235GH, P265GH, P295GH, P310GH, P255NH, S235JRS1 – S235J4S, S355G1S – S355G3S, S255N – S385N, P255NH-P385NH, GE200-GE260

ASTM A27 a. A36 Gr. all; A214; A242 Gr.1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr.45; A936 Gr. 50; API 5 L Gr. B, X42-X60

## Typical analysis of the wire rod

wt.-%	C	Si	Mn
	0.1	0.6	1.2

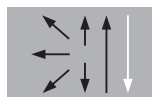
## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				20°C	-20°C	-50°C
u	520 (≥ 460)	620 (≥ 530 - 680)	26 (≥ 23)	220	200	90 (≥ 47)
s	480	580	28	200	210	

u untreated, as welded – shielding gas 100 % Argon

s stress relieved, 600 °C/2 h – shielding gas 100 % Argon

## Operating data



<b>Polarity</b>	DC-
<b>Shielding gas (EN ISO 14175)</b>	I1
<b>Rod marking</b>	W2Si ER70S-3

### Dimension mm

1.2 × 1000
1.6 × 1000
1.6 × 500
2.0 × 1000
2.0 × 500
2.4 × 1000
2.4 × 500
3.0 × 1000
3.2 × 1000

## Approvals

TÜV (01096), DB (42.132.84), Equinor, CE

**Classifications**
**EN ISO 636-A**  
W 3Si1

**AWS A5.18 / SFA-5.18**  
ER70S-6
**Characteristics and typical fields of application**

GTAW rod with high silicon content. The welding rod is suited for joints in boiler and vessel fabrication as well as in structural steel engineering.

BöHLER EMK 6 can be used in sour gas applications (HIC-Test acc. to NACE TM-02-84). SSC-test results are also available.

**Base materials**

Steels with yield strength < 420 MPa (60 ksi)

S235JR-S355JR, S235J0-S355J0, 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, ship building steels: A, B, D, E, A 32-E 36

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

**Typical analysis of the wire rod**

wt.-%	C	Si	Mn
	0.08	0.9	1.45

**Mechanical properties of all-weld metal - typical values (min. values)**

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				20°C	-40°C	-50°C
u	450 (≥ 420)	560 (≥ 500 - 640)	28 (≥ 20)	180	80	≥ 47
s	400	510	28	180	110	

u untreated, as welded – shielding gas 100 % Argon

s stress relieved, 600 °C/2h – shielding gas 100 % Argon

**Operating data**

<b>Polarity</b>	DC-
<b>Shielding gas (EN ISO 14175)</b>	I1
<b>Rod marking</b>	W3Si1 ER70S-6

**Dimension mm**
 1.2 × 1000  
1.6 × 1000
**Approvals**

TÜV (09717), CE

# BÖHLER EMK 8



TIG rod, mild steel

## Classifications

EN ISO 636-A  
W 4Si1AWS A5.18 / SFA-5.18  
ER70S-6

## Characteristics and typical fields of application

GTAW rod of W 4Si / ER70S-6 type with high silicon content. The welding rod is suited for joints in in structural steel engineering.

## Base materials

Steels up to a yield strength &lt; 460 MPa (67 ksi)

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, 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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

## Typical analysis of the wire rod

wt.-%	C	Si	Mn
	0.1	1.0	1.7

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub> MPa	Yield strength R <sub>e</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J -40°C
u	480 (≥ 460)	620 (≥ 530 – 680)	26 (≥ 20)	80 (≥ 47)
s	420 (≥ 355)	530 (≥ 440 – 570)	28 (≥ 22)	90 (≥ 47)

u untreated, as welded – shielding gas 100 % Argon

s stress relieved, 600 °C/2h – shielding gas 100 % Argon

## Operating data



Polarity DC-

Shielding gas  
(EN ISO 14175)

I1

Rod marking

W4Si1  
ER70S-6

Dimension mm

2.4 × 1000  
3.2 × 1000

## Approvals

**Classifications****EN ISO 14341-A**

G 38 3 M21 2Si1

G 35 2 C1 2Si1

**AWS A5.18**

ER70S-3

**Characteristics and typical fields of application**

Coppered solid wire for welding cinqed and aluminized plate material. Well suited for welding before cinq and aluminium plating. Suited for joining of structural steel and pipes.

**Base materials**

Steels up to a yield strength of 355 MPa.

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S355N, P235GH-P355GH, P275NL1-P420NL1, P215NL, P265NL, P355N, P285NH-P355NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH

ship building steels: A, B, D, A 32-E 36

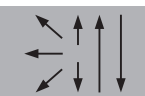
ASTM A 106 Gr. A, B, C; A 181 Gr. 60; A 283 Gr. A, C; A 285 Gr. A, B; A 350 Gr. LF1

**Typical analysis of the solid wire**

wt.-%	C	Si	Mn
	0.07	0.6	1.20

**Mechanical properties of all-weld metal - typical values (min. values)**

Condition	Yield strength R <sub>e</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	MPa	MPa	%	-20 °C	-30 °C
u	440 (≥ 355)	540	≥ 22	80	60 (≥ 47)
u untreated, as welded M21, CO <sub>2</sub>					

**Operating data****Dimension mm**

0.8  
1.0  
1.2  
1.6

**Approvals**

# BÖHLER EMK 4 NC



Solid wire, mild steel, non copper coated

## Classifications

EN ISO 14341-A

G 38 3 M21 2Si

G 35 2 C1 2Si

AWS A5.18

ER70S-3

## Characteristics and typical fields of application

Non coppered solid wire of the G2Si / ER70-3 type for welding mild steel in general construction and pipe steel. It can be used to weld a soft root in constructions of higher tensile steel. It is very well suited for welding cinqed and aluminised plate material, even before cinq and aluminium plating.

The non coppered welding wires of the EMK NC series are characterised by very good feeding properties at high wire feeding rates, by a very stable arc performance and significant lower oxide / silicate forming on the weld surface. This makes them especially suited for fully mechanised processes where the wire comes in BASEdrum or the environmental friendly ECOdrum bulk package.

## Base materials

Steels up to a yield strength of 355 MPa.

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S355N, P235GH-P355GH, P275NL1-P420NL1, P215NL, P265NL, P355N, P285NH-P355NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH

ship building steels: A, B, D

ASTM A 106 Gr. A, B, C; A 181 Gr. 60; A 283 Gr. A, C; A 285 Gr. A, B; A 350 Gr. LF1

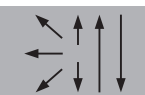
## Typical analysis of the solid wire

wt.-%	C	Si	Mn
	0.07	0.7	1.20

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J -20°C
u	420 (≥ 355)	530	≥ 22	70 (≥ 47)
u untreated, as welded M21, CO <sub>2</sub>				

## Operating data



Dimension mm

0.8

1.0

1.2

1.6

## Approvals

-



**Classifications****EN ISO 14341-A**

G 42 4 M21 3Si1

G 42 4 C1 3Si1

**AWS A5.18 / SFA-5.18**

ER 70S-6

**Characteristics and typical fields of application**

GMAW Copper-coated solid wire of the G 3Si1 / ER70-6 type for metal transfer with minimum spatter when welding with mixed-gases as well as with CO<sub>2</sub>.

Due to the high current load capacity, the stable arc and the nearly residual free weld surface the wire offers the best conditions for productive welding processes. Excellent feeding characteristics provides high wire feed rates especially during robotic welding. The coppered solid wires of the EMK series can be provided in bulk packages from ECOdrum 250 up to SQUAREdrum 550.

**Base materials**

Steels with yield strength < 420 MPa (60 ksi)

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, ship building steels: A, B, D, E, A 32-E 36

ASTM A 106 Gr. A, B, C; A 181 Gr. 60, 70; A 283 Gr. A, B, 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

**Typical analysis of the solid wire**

wt.-%	C	Si	Mn
	0.08	0.9	1.45

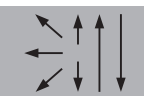
**Mechanical properties of all-weld metal - typical values (min. values)**

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				20°C	-40°C
u	440 (≥ 420)	560 (≥ 500 – 640)	30 (≥ 20)	160	80 (≥ 47)
u2	440 (≥ 420)	540 (≥ 500 – 640)	29 (≥ 20)	120	50 (≥ 47)
s	380	490	30	160	

u untreated, as welded – shielding gas Ar + 15 – 25% CO<sub>2</sub>

u2 untreated, as welded – shielding gas 100% CO<sub>2</sub>

s stress relieved, 620 °C/2h – shielding gas Ar + 15 – 20% CO<sub>2</sub>

**Operating data****Dimension mm**

0.8

1.0

1.2

1.6

**Approvals**

TÜV (03036), DB (42.132.80), ABS, DNV GL, LR, CE

# BÖHLER EMK 6 D



Solid Wire, mild steel

## Classifications

EN ISO 14341-A

G 42 3 M21 3Si1

G 38 2 C1 3Si1

AWS A5.18 / SFA-5.18

ER70S-6

## Characteristics and typical fields of application

GMAW Copper-coated solid wire suited for universal applications in structural steel engineering, with good welding characteristics.

## Base materials

Steels with yield strength &lt; 420 MPa (60 ksi)

S235JR-S355JR, S235J0-S355J0, 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, ship building steels: A, B, D, E, A 32-E 36

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

## Typical analysis of the solid wire

wt.-%	C	Si	Mn
	0.08	0.9	1.45

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		-30°C ≥ 47
				20°C	-20°C	
u	440 (≥ 420)	530 (≥ 500 – 670)	30 (≥ 20)	160		
u2	420 (≥ 380)	510 (≥ 470 – 600)	26 (≥ 20)	120	≥ 47	

u untreated, as-welded – shielding gas Ar + 15 – 25% CO<sub>2</sub>u2 untreated, as-welded – shielding gas 100% CO<sub>2</sub>

## Operating data



Dimension mm

0.8

1.0

1.2

1.6

## Approvals

TÜV (09780), DB (42.132.81), DNV GL, NAKS, CE

## Classifications

EN ISO 14341-A

G 42 4 M21 3Si1

G 42 4 C1 3Si1

AWS A5.18 / SFA-5.18

ER70S-6

## Characteristics and typical fields of application

Non coppered solid wire designed for welding with a very low spatter level and an extremely stable arc performance over a broad parameter range.

The non coppered welding wires of the EMK NC series are characterised by very good feeding properties at high wire feeding rates, by a very stable arc performance and significant lower oxide / silicate forming on the weld surface. This makes them especially suited for fully mechanised processes where the wire comes in BASEdrum or the environmental friendly ECOdrum bulk package.

## Base materials

Steels up to a yield strength of 420 MPa (60 ksi)

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,

ship building steels: A, B, D, E, A 32-E 36

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

## Typical analysis of the solid wire

	C	Si	Mn
wt.-%	0.08	0.9	1.45

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	MPa	MPa	%	20°C	-40°C
u	440 (≥ 420)	560 (500 – 640)	28	160	80 (≥ 47)
u untreated, as welded M21, CO <sub>2</sub>					

## Operating data



Dimension mm

0.8

1.0

1.2

1.6

## Approvals

TÜV (19133), DB (42.132.66), CE

# BÖHLER SG 2



Solid Wire, mild steel

## Classifications

EN ISO 14341-A

G 42 3 M21 3Si1

G 38 2 C1 3Si1

AWS A5.18 / SFA-5.18

ER70S-6

## Characteristics and typical fields of application

GMAW solid wire for welding unalloyed and low alloy steels. Low spatter in short and spray arc transfer modes with CO<sub>2</sub> or gas mixture.

The wire is used in boiler, pipeline and structural constructions, shipbuilding and vehicle manufacturing.

## Base materials

Steels with yield strength &lt; 420 MPa (60 ksi)

S235JR-S355JR, S235J0-S355J0, 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, ship building steels: A, B, D, E, A 32-E 36

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

## Typical analysis of the solid wire

wt.-%	C	Si	Mn
	0.07	0.85	1.5

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J -30°C
u	≥ 420	≥ 500 - 640	≥ 20	≥ 47
u2	≥ 420	≥ 500 - 640	≥ 20	≥ 47
u untreated, as welded – shielding gas Ar + 15 – 25% CO <sub>2</sub>				
u2 untreated, as welded – shielding gas 100% CO <sub>2</sub>				

## Operating data



Dimension mm

0.8

0.9

1.0

1.2

1.6

## Approvals

TÜV (13009), DB (42.236.01), ABS, DNV GL, CWB, CE

## Classifications

**EN ISO 14341-A**

G 46 4 M21 4Si1

G 46 4 C1 4Si1

**AWS A5.18 / SFA-5.18**

ER70S-6

**Material-No.**

1.5130

## Characteristics and typical fields of application

GMAW Copper-coated solid wire of the G 4Si1 / ER70-6 type for metal transfer with minimum spatter when welding with mixed-gases as well as with CO<sub>2</sub>.

Due to the high current load capacity, the stable arc and the nearly residual free weld surface the wire offers the best conditions for productive welding processes. Excellent feeding characteristics provides high wire feed rates especially during robotic welding. The coppered solid wires of the EMK series can be provided in bulk packages from ECOdrum 250 up to SQUAREdrum 550.

## Base materials

Steels up to a yield strength < 460 MPa (67 ksi)

S235JR-S355JR, S235J0-S355J0, S450J0, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, 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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

## Typical analysis of the solid wire

wt.-%	C	Si	Mn
	0.1	1.0	1.7

## Mechanical properties of all-weld metal - typical values (min. values)

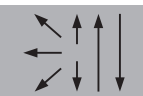
Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				20°C	-40°C	-50°C
u	480 (≥ 460)	620 (≥ 530 – 680)	26 (≥ 20)	150	80 (≥ 47)	≥ 47
u2	470 (≥ 460)	580 (≥ 530 – 680)	28 (≥ 20)	110	50 (≥ 47)	≥ 47
s	410	540	28	130	70	≥ 47

u untreated, as welded – shielding gas Ar + 15 – 25% CO<sub>2</sub>

u1 untreated, as welded – shielding gas 100% CO<sub>2</sub>

s stress relieved, 600 °C/2h – shielding gas Ar + 15 – 25% CO<sub>2</sub>

## Operating data


**Dimension mm**

0.8

1.0

1.2

1.6

## Approvals

TÜV (03038), DB (42.132.82), ABS, DNV GL, LR, CE

# BÖHLER EMK 8 D



Solid Wire, mild steel

## Classifications

EN ISO 14341-A

G 46 4 M21 4Si1

G 46 2 C1 4Si1

AWS A5.18 / SFA-5.18

ER70S-6

## Characteristics and typical fields of application

GMAW Copper-coated solid wire suited for universal applications in structural steel engineering, with good welding characteristics.

## Base materials

Steels with yield strength &lt; 460 MPa (67 ksi)

S235JR-S355JR, S235J0-S355J0, S450J0, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, 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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

## Typical analysis of the solid wire

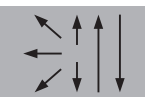
wt.-%	C	Si	Mn
	0.1	1.0	1.7

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		-40°C 50 (≥ 47)
				20°C	-20°C	
u	480 (≥ 460)	610 (≥ 530 - 680)	26 (≥ 20)	150		
u2	470 (≥ 460)	580 (≥ 530 - 680)	27 (≥ 20)	110	60 (≥ 47)	

u untreated, as welded – shielding gas Ar + 15 – 25% CO<sub>2</sub>u2 untreated, as welded – shielding gas 100% CO<sub>2</sub>

## Operating data



### Dimension mm

0.8

1.0

1.2

1.6

## Approvals

TÜV (09781), DB (42.132.83), DNV GL, NAKS, CE



# BÖHLER SG 3



Solid wire, mild steel

## Classifications

EN ISO 14341-A

G 46 4 M21 4Si1

G 42 2 C1 4Si1

AWS A5.18

ER70S-6

## Characteristics and typical fields of application

GMAW solid wire for welding unalloyed and low alloy steels. Low spatter in short and spray arc transfer modes with CO<sub>2</sub> or gas mixture.

The wire is used in boiler, pipeline and structural constructions, shipbuilding and vehicle manufacturing.

## Base materials

Steels up to a yield strength of 460 MPa (67 ksi)

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240,

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

ASTM A 106 Gr. A, B, C; A 181 Gr. 60, 70; A 283 Gr. A, B, 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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65.

## Typical analysis of the solid wire

wt.-%	C	Si	Mn
	0.09	0.95	1.70

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				-40 °C	-20 °C
u	480 (≥ 460)	530 - 680	26 (≥ 20)	50 (≥ 47)	
u2	470 (≥ 460)	530 - 680	27 (≥ 20)		60 (≥ 47)
u untreated, as welded – shielding gas Ar + 15 – 25% CO <sub>2</sub>					
u2 untreated, as welded – shielding gas 100% CO <sub>2</sub>					

## Operating data



Dimension mm

0.8  
1.0  
1.2  
1.6

## Approvals

TÜV(18699), DB (42.236.02), ABS, CWB, DNV GL, CE



# Union S 2 - UV 305

SAW wire/flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 38 0 AR S2

## Characteristics and typical fields of application

**Union S 2 - UV 305** is a wire-flux combination for submerged-arc welding of unalloyed steel grades.

Very good slag detachability and nice bead appearance. It is recommended to be used for single-wire or Twin-arc welding with small wire diameter (e.g. with 2,0 mm) with high welding speed, especially for fillet welding in low wall thickness. (< 10 mm).

It is particularly well-suited to welding of water walls (tube-web-tube joint) for steam water-tube boiler.

**UV 305** is an aluminate-rutile agglomerated flux suited for direct and alternating current. For information regarding this welding flux see our detailed data sheet.

## Base materials

General and fine grained structural steels, shipbuilding steels, pipe steels up to 400 MPa minimum yield strength and boiler plates and tubes.

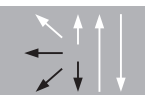
## Typical analysis of the weld metal

wt.-%	C	Si	Mn
wire	0.1	0.1	1.1
all-weld metal	0.06	0.5	1.25

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J 0°C
u, DC+ u untreated / as welded	425 (≥ 400)	520 (≥ 500)	29 (≥ 24)	65 (≥ 47)

## Operating data



**Polarity** DC / AC  
**Redrying** 300 – 350 °C / 2 hrs min.

### Dimension mm

1.6  
2.0  
2.5  
3.0  
3.2  
4.0

## Approvals

# Union S 2 - UV 306

SAW wire/flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 42 3 AR S2

## Characteristics and typical fields of application

**Union S 2 - UV 306** is a wire-flux combination for submerged-arc welding of unalloyed steel grades.

It is used in general purpose applications in structural steel and pipe. It can be used for single- and multi-wire welding with high welding speed using the two-run technique as well as for fillet welding. The flux is donating Mn and Si to the weld pool (desoxidation) and therefore it is less sensitive for porosity issues due to dirt and rust on the plate.

Most suitable for single run or 2-run procedures. Multi-run procedures should be limited to weld thickness of max 20 mm. For higher wall thickness UV 400 or UV 418 TT to be preferred.

**UV 306** is an aluminate-rutile agglomerated flux with medium Si and Mn pick-up for joining un-alloyed and low alloyed steel grades. Very good slag detachability and nice bead appearance. For more information regarding this welding flux see our detailed data sheet.

## Base materials

General and fine grained structural steels, shipbuilding steels, pipe steels up to 420 MPa minimum yield strength.

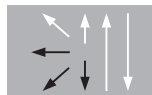
## Typical analysis of the weld metal

wt.-%	C	Si	Mn
wire	0.1	0.1	1.1
all-weld metal	0.06	0.6	1.4

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-30°C	-20°C	20°C
u, DC+	500 (≥ 420)	580 (≥ 530)	26 (≥ 22)	≥ 47	65 (≥ 47)	≥ 60
u untreated / as welded						

## Operating data



**Polarity** DC / AC

**Dimension mm**

1.6  
2.0  
2.5  
3.0  
3.2  
4.0

## Approvals

TÜV (02590), DB (51.132.04), ABS, DNV GL, LR, CE

# Union S 2 - UV 400

SAW wire/flux combination, mild steel

## Classifications

<b>Type</b>	<b>EN ISO 14171-A</b>
Multi-run	S 38 4 AB S2
2-run	S 3T 2 AB S2

## Characteristics and typical fields of application

**Union S 2 - UV 400** is a wire-flux combination for submerged arc welding of unalloyed, fine grained and pipeline steel grades.

**UV 400** is an agglomerated, aluminate-basic flux. Its characteristic is a low Silicon and a middle Manganese pickup. It can be used on AC and DC. The good weld ability and the good mechanical properties offer a universal application. For information regarding UV 400 flux see our detailed data sheet.

## Base materials

Steels up to a yield strength of 380 MPa (56 ksi)

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S355N, S275M-S355M, S275NL-S355NL, S275ML-S355ML, P235GH-P355GH, P275NL1-P355NL1, P275NL2-P355NL2, P215NL, P265NL, P355N, P285NH-P355NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L360NB, L245MB-L360MB, 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, LF2; 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; A 633 Gr. A, C, D; A 662 Gr. A, B, C; A 707 Gr. L1, L3; A 711 Gr. 1013; A 841 Gr. A, B, C; API 5 L Gr. B, X42, X52, X56

## Typical analysis of the weld metal

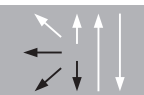
wt.-%	C	Si	Mn
wire	0.1	0.1	1.1
all-weld metal	0.07	0.4	1.4

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-40°C	0°C	20°C
u, DC+	420 (≥ 400)	520 (≥ 480)	27 (≥ 22)	60 (≥ 47)	100 (≥ 47)	100 (≥ 47)
a1, DC+	400 (≥ 355)	500 (≥ 480)	28 (≥ 25)	70 (≥ 47)	120 (≥ 47)	120 (≥ 47)
a2, DC+	≥ 290	≥ 460	≥ 22		≥ 60	

u untreated, as welded ; a1 = 5 hours 580°C ; a2 = 1 hour 920 °C + air

## Operating data



<b>Polarity</b>	DC +/-
<b>Redrying</b>	300 – 350 °C / 2 hrs min.

### Dimension mm

1.6  
2.0  
2.5  
3.0  
3.2  
4.0

## Approvals

TÜV (06170), DB (51.132.03), ABS, BV, LR, DNV GL, CE

# Union S 2 Si - UV 305



SAW wire/flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 42 A AR S2Si

AWS A5.17 / SFA-5.17  
F7AZ-EM12K

## Characteristics and typical fields of application

**Union S 2 Si - UV 305** is a wire-flux combination for submerged-arc welding of unalloyed steel grades. It is recommended to be used for single-wire or Twin-arc welding with small wire diameter (e.g. with 2,0 mm) with high welding speed, especially for fillet welding in low wall thickness (< 10 mm). It is particularly well-suited to welding of "water walls" (tube-web-tube joint) for steam water-tube boiler. It has outstanding good slag detachability and allows high welding speed with a nice bead appearance

**UV 305** is an aluminate-rutile agglomerated flux with medium Si and Mn pick-up for joining un-alloyed and low alloyed steel grades. For more information regarding this welding flux see our detailed data sheet.

## Base materials

General and fine grained structural steels, shipbuilding steels, pipe steels up to 420 MPa minimum yield strength and boiler plates and tubes.

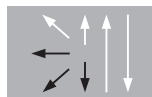
## Typical analysis of the weld metal

wt.-%	C	Si	Mn
wire	0.10	0.30	1.10
all-weld metal	0.06	0.60	1.30

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J 20°C
u, DC+ u untreated, as welded	450 (≥ 420)	550 (≥ 550)	18 (≥ 24)	70 (≥ 47)

## Operating data



**Polarity** DC / AC

**Dimension mm**

2.4  
2.5  
3.0  
3.2  
4.0

## Approvals

# Union S 2 Si - UV 306

SAW wire/ flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 42 3 AR S2Si

AWS A5.17 / SFA-5.17  
F7A2-EM12K / F7P2-EM12K

## Characteristics and typical fields of application

**Union S 2 Si - UV 306** is a wire-flux combination for submerged-arc welding of unalloyed steel grades. It is used in general purpose applications in structural steel and pipe. It can be used for single- and multi-wire welding with high welding speed using the two-run technique as well as for fillet welding. The flux is donating Mn and Si to the weld pool (desoxidation) and therefore it is less sensitive for porosity issues due to dirt and rust on the plate. Most suitable for single run or 2-run procedures. Multi-run procedures should be limited to weld thickness of max 20 mm. For higher wall thickness UV 400 or UV 418 TT is to be preferred. Very good slag detachability and nice bead appearance.

**UV 306** is an aluminate-rutile agglomerated flux with medium Si and Mn pick-up for joining un-alloyed and low alloyed steel grades. For more information regarding this welding flux see our detailed data sheet.

## Base materials

General and fine grained structural steels, shipbuilding steels, pipe steels up to 420 MPa minimum yield strength.

## Typical analysis of the weld metal

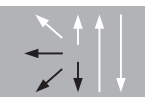
wt.-%	C	Si	Mn
wire	0.10	0.30	1.10
all-weld metal	0.06	0.75	1.60

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-30°C	-20°C	20°C
u, DC+	500 (≥ 420)	590 (≥ 540)	26 (≥ 22)	≥ 47	65 (≥ 47)	≥ 70
a1, DC+	480 (≥ 420)	570 (≥ 520)	26 (≥ 22)	≥ 27	≥ 35	≥ 50

u untreated, as welded; a1 = 1 hour 620 °C

## Operating data



**Polarity** DC / AC

### Dimension mm

2.4  
2.5  
3.0  
3.2  
4.0

## Approvals

LR, CE

# Union S 2 Si - UV 421 TT

SAW wire/flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 42 5 FB S2Si

AWS A5.17 / SFA-5.17  
F7A6-EM12K / F6P8-EM12K

## Characteristics and typical fields of application

**Union S 2 Si - UV 421 TT** is an agglomerated fluoride-basic flux with high basicity and neutral metallurgical behavior. It is suitable for single (AC and DC) and tandem (DC and AC or AC and AC) welding. Very good slag detachability also for narrow gap welding. Flux can especially be used for multi-pass butt welding of medium and high tensile steels. Very good impact toughness of weld metal at low temperatures.

**UV 421 TT** is an agglomerated fluoride-basic flux with high basicity and neutral metallurgical behavior. For more information regarding this welding flux see our detailed data sheet.

## Base materials

General purpose structural steels and fine grained structural steels up to 420 MPa min. yield strength. S235J2G3 – S355J2G3, S255N – S380N, S255NL – S420NL, P275NL1 – P420NL1, P235GH – P355GH, L210 – L360

ASTM A36 Gr. all; A106 Gr. all, A214; A266, A283 Gr. all; A285 Gr. all; A299, A515 Gr. all; A516 Gr. all; A556; A570, A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B

## Typical analysis of the weld metal

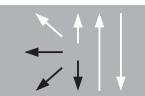
wt.-%	C	Si	Mn
wire	0.10	0.30	1.10
all-weld metal	0.07	0.30	1.10

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-60°C	-40°C	20°C
u, DC+	≥ 420	≥ 530	≥ 22	≥ 47	≥ 80	≥ 150
a1, DC+	≥ 360	≥ 480	≥ 25	≥ 60	≥ 120	≥ 180

u untreated, as welded; a1 = 1 hour 620 °C

## Operating data



**Polarity** DC / AC  
**Redrying** 300 - 350 °C / 2 hrs min.

### Dimension mm

2.4  
2.5  
3.0  
3.2  
4.0

Preheating and Interpass temperature: 180 – 220°C

Heat Input < 2,0 kJ/mm

## Approvals



# Union S 3 Si - UV 310 P

SAW wire/flux combination, mild steel

## Classifications

Type	EN ISO 14171-A	AWS A5.23 / SFA-5.23	AWS A5.17 / SFA-5.17
Multi-run	S 42 4 AB S3Si		F7A6-EH12K
2-run	S 3T 2 AB S3Si	F7TA0G-EH12K	

## Characteristics and typical fields of application

**Union S 3 Si - UV 310 P** is a wire-flux combination for submerged-arc welding of unalloyed and low-alloyed steel grades. This wire-flux combination can be used for 2-run and multi-run welding technique with single wire (DC+) and tandem (DC+ and AC) welding processes, with very good welding performance and low failure rate.

**UV 310 P** is an agglomerated neutral flux, that does not add Manganese, neither Silicon to the weld metal, with very low hydrogen content. For more details on the flux, see our detailed datasheet of UV 310 P.

## Base materials

Fine grained structural and pipe steel grades up to YS = 420 MPa.

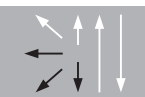
## Typical analysis of the weld metal

wt.-%	C	Si	Mn
wire	0.10	0.30	1.65
all-weld metal	0.05	0.30	1.50

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	MPa	MPa	%	-50 °C	-40 °C
u, DC+	450 (≥ 420)	540 (500-640)	29 (≥ 22)	45 (≥ 27)	65 (≥ 47)
u untreated, as welded, single wire					

## Operating data



**Polarity** DC / AC

**Dimension mm**

2.5

3.0

4.0

4.8

The mechanical properties of weld metal by two-run technique are strongly influenced by:

- the high dilution rate (60 up to 70%)
- chemical composition of the base metal
- relative long cooling time  $t_{8/5}$  of the weld cycle, depending on
  - o welding parameters (heat input)
  - o wall thickness (2 - resp. 3 dimensional cooling)
  - o preheat / interpass temperature

## Approvals

# Union S 3 Si - UV 418 TT

SAW wire/flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 46 6 FB S3Si

AWS A5.17 / SFA-5.17  
F7A8-EH12K / F7P8-EH12K

## Characteristics and typical fields of application

**Union S 3 Si - UV 418 TT** is a wire flux combination for submerged arc welding of unalloyed steel grades up to a minimum specified yield strength of 460 MPa. Especially recommended to be used for multi-pass butt welding. Very good impact toughness. Suitable for single wire, twin-arc and tandem welding configurations. Very good slag detachability also for narrow gap welding preparations.

**UV 418 TT** is an agglomerated fluoride basic flux for submerged arc welding of unalloyed and low alloyed steel grades. It has a high basicity and neutral metallurgical behaviour and is designed for medium and high strength fine grained structural steels. Detailed information about the flux can be found in the separate datasheet of the flux.

## Base materials

General purpose structural steels and fine grained structural steels up to 460 MPa min. yield strength. S235J2G3 – S355J2G3, GE200 – GE260, S255N – S380N, S255NL – S460NL, P275NL1 – P460NL1, P235GH – P355GH, L210 – L415NB

ASTM A36 Gr. all; A 106 Gr. all, A214; A 242; A266 Gr. 1, 2, 4; A285; A299; A328; A366; A515 Gr. all; A516 Gr. all; A570 Gr. 30 – 45; A572 Gr. 42, 50; A606 Gr. all; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr.45; A936 Gr. 50; API 5L X42 – X60

## Typical analysis of the weld metal

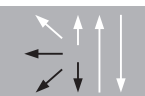
wt.-%	C	Si	Mn
wire	0.10	0.30	1.65
all-weld metal	0.08	0.30	1.55

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-73 °C	-60 °C	-10 °C
u	475 (≥ 460)	560 (530-650)	28 (≥ 25)		150 (≥ 47)	170 (≥ 70)
a1	450 (≥ 420)	535 (520-630)	28 (≥ 25)		160 (≥ 80)	175 (≥ 80)
a2	450 (≥ 420)	550 (520-630)	28 (≥ 25)	50 (≥ 27)	200 (≥ 80)	-
a3	380 (≥ 360)	500 (485-590)	30 (≥ 25)	150 (≥ 27)	220 (≥ 80)	-

u untreated, as welded; a1 = 15 hours 580 °C; a2 = 1 hour 620 °C; a3 = 16 hours 620 °C

## Operating data



### Dimension mm

2.0  
2.5  
3.0  
4.0  
4.8

### Recommendation :

Single wire DC+ : Preheating and interpass temperature 180 – 220°C,  
heat input < 2,0 kJ/mm.

## Approvals

TÜV (07276), DB (51.132.05), CE, DNV GL, LR, BV, ABS



# Union S 3 Si - UV 421 TT

SAW wire/flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 46 6 FB S3Si

AWS A5.17 / SFA-5.17  
F7A8-EH12K / F7P8-EH12K

## Characteristics and typical fields of application

**Union S 3 Si - UV 421 TT** is a wire flux combination for submerged arc welding of unalloyed steel grades up to a minimum specified yield strength of 460 MPa. Especially recommended to be used for multi-pass butt welding. Very good impact toughness. Suitable for single wire, twin-arc and tandem welding configurations. Very good slag detachability also for narrow gap welding preparations.

**UV 421 TT** is an agglomerated fluoride basic flux for submerged arc welding of unalloyed and low alloyed steel grades. It has a high basicity and neutral metallurgical behaviour and is designed for medium and high strength fine grained structural steels. Detailed information about the flux can be found in the separate datasheet of the flux.

## Base materials

General purpose structural steels and fine grained structural steels up to 460 MPa min. yield strength. S235J2G3 – S355J2G3, GE200 – GE260, S255N – S380N, S255NL – S460NL, P275NL1 – P460NL1, P235GH – P355GH, L210 – L415NB

ASTM A36 Gr. all; A 106 Gr. all, A214; A 242; A266 Gr. 1, 2, 4; A285; A299; A328; A366; A515 Gr. all; A516 Gr. all; A570 Gr. 30 – 45; A572 Gr. 42, 50; A606 Gr. all; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr.45; A936 Gr. 50; API 5L X42 – X60

## Typical analysis of the weld metal

wt.-%	C	Si	Mn
wire	0.10	0.30	1.65
all-weld metal	0.08	0.30	1.55

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-73°C	-60°C	-40°C
u, DC+	475 (≥460)	560 (530-650)	28 (≥25)		150 (≥47)	170 (≥70)
a1, DC+	450 (≥420)	535 (520-630)	28 (≥25)		160 (≥80)	175 (≥80)
a2, DC+	450 (≥420)	550 (520-630)	28 (≥25)	50 (≥27)	200 (≥80)	-

u untreated, as welded ; a1 = 15 hours 580 °C ; a2 = 1 hour 620 °C

## Operating data

	Polarity	DC+	Dimension mm	
				2.0
				2.5
				3.0
				4.0
				4.8

Preheating and Interpass temperature: 180 – 220°C

Heat Input < 2,0 kJ/mm

## Approvals

TÜV (10424), DNV GL, LR, CE, ABS

# Union S 3 Si - UV 419 TT-W

SAW wire/flux combination, mild steel

## Classifications

**EN ISO 14171-A**  
S 46 6 FB S3Si

**AWS A5.17 / SFA-5.17**  
F7A8-EH12K / F7P8-EH12K

## Characteristics and typical fields of application

**Union S 3 Si - UV 419 TT-W** is a wire flux combination for submerged arc welding of unalloyed steel grades up to a minimum specified yield strength of 460 MPa. Especially recommended to be used for multi-pass butt welding. Very good impact toughness and strength in as welded condition and after PWHT. Suitable for single wire, twin-arc and tandem welding configurations. Very good slag detachability also for narrow gap welding preparations.

**UV 419TT-W** is an agglomerated fluoride basic flux for submerged arc welding of unalloyed and low alloyed steel grades. It has a high basicity and neutral metallurgical behaviour and is designed for medium and high strength fine grained structural steels. Detailed information about the flux can be found in the separate datasheet of the flux.

## Base materials

General purpose structural steels and fine grained structural steels up to 460 MPa min. yield strength.

S235J2G3 – S355J2G3, GE200 – GE260, S255N – S380N, S255NL – S460NL, P275NL1 – P460NL1, P235GH – P355GH, L210 – L415NB  
ASTM A36 Gr. all; A 106 Gr. all, A214; A 242; A266 Gr. 1, 2, 4; A285; A299; A328; A366; A515 Gr. all; A516 Gr. all; A570 Gr. 30 – 45; A572 Gr. 42, 50; A606 Gr. all; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr.45; A936 Gr. 50; API 5L X42 – X60

## Typical analysis of the weld metal

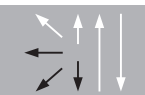
wt.-%	C	Si	Mn
wire	0.10	0.30	1.65
all-weld metal	0.08	0.35	1.65

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				-60 °C	-40 °C
u, DC+	475 (≥460)	550 (530-650)	27 (≥25)	130 (≥47)	170 (≥70)
a1, DC+	450 (≥420)	530 (520-630)	28 (≥25)	160 (≥80)	175 (≥80)
a2, DC+	450 (≥420)	540 (520-630)	28 (≥25)	100 (≥80)	170 (≥80)
a3, DC+	420 (≥400)	530 (>500)	29 (≥25)	110 (≥80)	170 (≥80)

u untreated, as welded ; a1 = 15 hours 580 °C ; a2 = 1 hour 620 °C ; a3 = 12 hours 620 °C

## Operating data


**Polarity** DC + / AC

**Dimension mm**

 2.0  
2.5  
3.0  
4.0  
4.8

Preheating and Interpass temperature: 180 – 220°C

Heat Input ≤ 2,0 kJ/mm

## Approvals

TÜV (12935)

# Union S 3 Si - UV 422 TT-LH

SAW wire/flux combination, mild steel

## Classifications

AWS A5.17 / SFA-5.17

F7A8-EH12K-H4 / F7P8-EH12K-H4

## Characteristics and typical fields of application

**Union S 3 Si - UV 422 TT-LH** is a wire flux combination for submerged arc welding of unalloyed steel grades up to a minimum specified yield strength of 460 MPa. Especially recommended to be used for multi-pass butt welding with very low hydrogen level. Very good impact toughness. Suitable for single wire, twin-arc and tandem welding configurations. Very good slag detachability also for narrow gap welding preparations.

**UV 422 TT-LH** is an agglomerated fluoride-basic flux with high basicity, neutral metallurgical behavior and very low level of diffusible hydrogen. For information regarding this welding flux see our detailed data sheet.

## Base materials

General purpose structural steels and fine grained structural steels up to 460 MPa min. yield strength.

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S235J2G3-S355J2G3, GE200- GE260, S275M-S460M, S255N-S380N, S255NL-S460NL, P275NL1- P460NL1, P235GH- P355GH, L210- L415NB

ASTM A36 Gr. all; A 106 Gr. all, A214; A 242; A266 Gr. 1, 2, 4; A285; A299; A328; A366; A515 Gr. all; A516 Gr. all; A570 Gr. 30 – 45; A572 Gr. 42, 50; A606 Gr. all; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr.45; A936 Gr. 50; API 5L X42 – X60

## Typical analysis of the weld metal

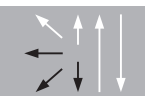
wt.-%	C	Si	Mn
wire	0.10	0.30	1.65
all-weld metal	0.08	0.45	1.55

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-60°C	-40°C	-20°C
u, DC+	485 (≥460)	585 (530-650)	28 (≥25)	110 (≥47)	140 (≥70)	165 (≥47)
a1, DC+	435 (≥420)	550 (520-630)	30 (≥25)	120 (≥80)	-	150 (≥80)
a2, DC+	375	510	31 (≥25)	135 (≥80)	-	165 (≥80)

u untreated, as welded ; a1 = 1 hour 620 °C ; a2 = 16 hours 620 °C

## Operating data



Polarity DC +

Dimension mm

2.0

2.5

3.0

4.0

4.8

Preheating and Interpass temperature: 180 – 220 °C

Heat Input &lt; 2,0 kJ/mm

## Approvals

# BÖHLER SUBARC T55 HP - UV 306



SAW-flux cored wire/flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 50 4 AR T3 H5

AWS A5.17 / SFA-5.17  
F7A5-ECG

## Characteristics and typical fields of application

**SUBARC T55 HP - UV 306** is a wire-flux combination for submerged arc welding of unalloyed structural steels and fine-grained structural steels up to MSYS = 500 MPa. The weld metal demonstrates relative good toughness properties at low temperatures and can be used in a very wide range of applications. The aluminate-rutile flux has a relative low basicity index and is selected for its excellent welding properties and is suitable for high welding speed. Also a very good welding behavior in PC position and for 2-run technology this combination shows an improved welding behavior (nicer bead appearance and higher welding speed) compared to a solid wire.

The wire is a coppered seamless basic flux cored wire with a good resistance to deformation (wire feed rollers) and is very easy to straighten to ensure the best current transfer with a low contact tip consumption. The wire is not sensitive to moisture pick up.

This combination gives the fabricator the possibility to weld with high productivity: e.g. single wire 3,2 mm, 800 Amps (~17 kg/hour) with a good bead appearance, nice fusion and good slag detachability. The combination can be used for joining applications in unlimited thickness, with DC+ or AC current, which allows Tandem process (~ 30 kg/hour) with 2 wires (3,2 or 4,0 mm).

## Base materials

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S460N, S275M-S460M, S275NL-S460NL, S275ML-S460ML, P235GH-P460GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P355NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L445NB, L245MB-L445MB, GE200-GE240

Ship building steels: A, B, D, E, A 32-E 36

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, LF2; 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; A 633 Gr. A, C, D; A 662 Gr. A, B, C; A 707 Gr. L1, L3; A 711 Gr. 1013; A 841 Gr. A, B, C; API 5 L Gr. B, X42, X52, X56, X60, X65

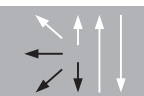
## Typical analysis of the weld metal

wt.-%	C	Si	Mn
all-weld metal	0.04	0.7	1.8

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J		
	MPa	MPa	%	-46°C	-40°C	-20°C
u, DC+	560 (≥ 500)	630 (480-650)	25 (≥ 20)	40 (≥ 27)	50 (≥ 47)	90 (≥ 47)
u untreated						

## Operating data



Polarity

DC+

Dimension mm

2.4

3.2

4.0

Mechanical properties depend of the applied welding procedure; e.g. possible reduction in ISO-V toughness to 40J @-20°C in as welded condition when welded with heat input 3,5 kJ/mm.

## Approvals

TÜV (in progress); DB (in progress)



# BÖHLER SUBARC T55 HP - UV 421 TT

Seamless SAW-basic flux cored wire/flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 46 6 FB T3 H5

AWS A5.17 / SFA-5.17  
F7A8-EC1 / F7P8-EC1

## Characteristics and typical fields of application

**SUBARC T55 HP - UV 421 TT** is a wire-flux combination for submerged arc welding of unalloyed structural steels and fine-grained structural steels up to MSYS = 460 MPa. The weld metal demonstrates very good toughness properties at low temperatures.

The wire is a coppered seamless basic flux cored wire with a good resistance to deformation (wire feed rollers) and is very easy to straighten to ensure the best current transfer with a low contact tip consumption. The wire is not sensitive to moisture pick up.

This combination gives the fabricator the possibility to weld with high productivity: e.g. single wire 3,2 mm, 800 Amps (~17 kg/hour) with a good bead appearance, nice fusion and good slag detachability. The combination can be used for joining applications in unlimited thickness, with DC+ or AC current, which allows Tandem process (~ 30 kg/hour) with 2 wires (3,2 or 4,0 mm).

**UV 421 TT** is an agglomerated flux with a high basicity index and has been designed to be applied in unlimited thickness (neutral metallurgical behavior) with low level of diffusible hydrogen level. For more flux properties see separate datasheet of the flux.

## Base materials

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S460N, S275M-S460M, S275NL-S460NL, S275ML-S460ML, P235GH-P460GH, P275NL1-P460NL1, P275NL2-P460NL2, P215NL, P265NL, P355N, P285NH-P355NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L445NB, L245MBL445MB, GE200-GE240,

Ship building steels: A, B, D, E, A 32-E 36

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, LF2; 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; A 633 Gr. A, C, D; A 662 Gr. A, B, C; A 707 Gr. L1, L3; A 711 Gr. 1013; A 841 Gr. A, B, C; API 5 L Gr. B, X42, X52, X56, X60, X65

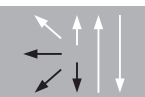
## Typical analysis of the weld metal

wt.-%	C	Si	Mn
all-weld metal	0.07	0.4	1.4

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				-60°C	-40°C
u, DC+	470 (≥ 460)	560 (530-680)	27 (≥ 22)	150 (≥ 47)	160 (≥ 47)
a1, DC+	450 (≥ 420)	530 (490-660)	28 (≥ 22)	150 (≥ 47)	160 (≥ 47)
u untreated, as welded ; a1 = 1 hour 620 °C					

## Operating data



**Polarity** DC +/- / AC

**Dimension mm**

2.4  
3.2  
4.0

Mechanical properties depend of the applied welding procedure; e.g. a possible reduction in ISO-V toughness to 70J @-40°C in as welded condition when welded with heat input 3,5 kJ/mm.

## Approvals

DNV GL, LRS, ABS, TÜV

# BÖHLER SUBARC T55 HP - UV 419 TT-W



Seamless SAW-basic flux cored wire/flux combination, mild steel

## Classifications

EN ISO 14171-A  
S 46 6 FB T3 H5

AWS A5.17 / SFA-5.17  
F7A8-EC1 / F7P8-EC1

## Characteristics and typical fields of application

**BÖHLER SUBARC T55 HP - UV 419 TT-W** is a wire-flux combination for submerged arc welding of unalloyed structural steels and fine-grained structural steels up to MSYS = 460 MPa. Especially recommended for applications with PWHT. The weld metal maintains very good strength properties after relative long PWHT durations (e.g. pressure vessels 16 hours at 620°C).

The wire is a coppered seamless basic flux cored wire with a good resistance to deformation (wire feed rollers) and is very easy to straighten to ensure the best current transfer with a low contact tip consumption. The wire is not sensitive to moisture pick up.

This combination gives the fabricator the possibility to weld with high productivity: e.g. single wire 3,2 mm, 800 Amps (~17 kg/hour) with a good bead appearance, nice fusion and good slag detachability. The combination can be used for joining applications in unlimited thickness, with DC+ or AC current, which allows Tandem process (~ 30 kg/hour) with 2 wires (3,2 or 4,0 mm).

**UV 419 TT-W** is an agglomerated flux with a high basicity index and has been designed to be applied in unlimited thickness (neutral metallurgical behavior) with low level of diffusible hydrogen level. For more flux properties see separate datasheet of the flux.

## Base materials

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S460N, S275M-S460M, S275NL-S460NL, S275ML-S460ML, P235GH-P460GH, P275NL1-P460NL1, P275NL2-P460NL2, P215NL, P265NL, P355N, P285NH-P355NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L445NB, L245MBL445MB, GE200-GE240, Ship building steels: A, B, D, E, A 32-E 36

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, LF2; 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; A 633 Gr. A, C, D; A 662 Gr. A, B, C; A 707 Gr. L1, L3; A 711 Gr. 1013; A 841 Gr. A, B, C; API 5 L Gr. B, X42, X52, X56, X60, X65

## Typical analysis of the weld metal

wt.-%	C	Si	Mn
all-weld metal	0.07	0.4	1.5

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	MPa	MPa	%	-60 °C	-40 °C
u, DC+	490 (≥460)	580 (530-680)	27 (≥22)	120 (≥47)	160 (≥47)
a1, DC+	460 (≥420)	550 (490-660)	29 (≥22)	160 (≥47)	170 (≥47)
a2, DC+	450 (≥400)	540 (490-660)	29 (≥22)	170 (≥47)	200 (≥47)

u untreated; a1 = 4 hours 620 °C; a2 = 16 hours 620 °C

## Operating data

	Polarity	DC+ (AC)	Dimension mm
			2.4
			3.2
			4.0

Mechanical properties depend of the applied welding procedure.

## Approvals

## Classifications

### EN ISO 17632-A

T 42 4 B M21 1 H5

T 42 4 B C1 1 H5

### AWS A5.36 / SFA-5.36

E71T5-M21A4-CS1-H4

E71T5-C1A4-CS1-H4

## Characteristics and typical fields of application

Seamless basic flux-cored wire for single or multilayer welding of carbon, carbon-manganese steels and similar steels, including fine grain steels with Argon-CO<sub>2</sub> shielding gas or pure CO<sub>2</sub>. Main features: excellent weldability in flat and horizontal position, smooth and bright bead, very low spatter losses, easy to remove slag and exceptional mechanical properties even at low temperatures.

## Base materials

S235JR-S355JR, S235JO-S355JO, S235J2-S355J2, S275N-S355N, S275M-S355M, S275NL-S355NL, S275ML-S355ML, P235GH-P355GH, P275NL1-P355NL1, P275NL2-P355NL2, P215NL, P265NL, P355N, P285NH-P355NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L360NB, L245MB-L360MB, GE200-GE240

Ship building steels: A, B, D, E, A 32-E 36

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, LF2; 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; A 633 Gr. A, C, D; A 662 Gr. A, B, C; A 707 Gr. L1, L3; A 711 Gr. 1013; A 841 Gr. A, B, C; API 5 L Gr. B, X42, X52, X56

## Typical analysis of the wire

	Gas	C	Si	Mn
wt.-%	M21	0.07	0.40	1.40
wt.-%	C1	0.06	0.30	1.30

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				-40°C	-60°C
u	450 (≥ 420)	550 (500-640)	28 (≥ 20)	140 (≥ 47)	100
u1	430 (≥ 420)	530 (500-640)	30 (≥ 20)	90 (≥ 47)	80

u untreated, as welded – shielding gas M21

u1 untreated, as welded – shielding gas C1

## Operating data



<b>Polarity</b>	DC+
<b>Shielding gas (EN ISO 14175)</b>	M21 – M35, C1

### Dimension mm

1.2  
1.6

Welding with conventional or pulsed power sources using DC+

## Approvals

TÜV, CE

# BÖHLER Kb 52 T-FD



Flux-cored wire, seamless, mild steel, basic type

## Classifications

EN ISO 17632-A

T 46 4 B M21 3 H5

T 42 4 B C1 3 H5

AWS A5.36 / SFA-5.36

E70T5-M21A4-CS1-H4

E70T5-C1A4-CS1-H4

## Characteristics and typical fields of application

Seamless basic flux-cored wire for singleor multilayer welding of carbon, carbon-manganese steels and similar steels, including fine grain steels with Argon-CO<sub>2</sub> shielding gas or pure CO<sub>2</sub>. Main features: excellent weldability in flat and horizontal position, smooth and bright bead, very low spatter losses, easy to remove slag and exceptional mechanical properties even at low temperatures. This wire is especially suitable for welding components of different material or as buffer layer for hardfacing applications.

## Base materials

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH- P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2- P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240

Ship building steels: A, B, D, E, A 32-E 36

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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

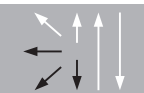
## Typical analysis of the wire

	Gas	C	Si	Mn
wt.-%	M21	0.07	0.55	1.4
wt.-%	C1	0.06	0.50	1.2

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				20°C	-40°C	-60°C
u	500 (≥ 460)	610 (550-660)	28 (≥ 20)	160 (≥ 47)	100 (≥ 47)	80
u1	430 (≥ 420)	510 (500-640)	29 (≥ 20)	140	80 (≥ 47)	
u untreated, as welded – shielding gas M21						
u1 untreated, as welded – shielding gas C1						

## Operating data



**Polarity** DC+

**Shielding gas (EN ISO 14175)** M21 – M35, C1

**Dimension mm**

1.2  
1.4  
1.6  
2.4

Welding with conventional or pulsed power sources using DC+

## Approvals

TÜV, DB, DNV GL, ABS, LR, BV, RINA, CE



# BÖHLER Ti 42 T-FD

Flux cored wire, seamless, mild steel, rutile type

## Classifications

**EN ISO 17632-A**  
T 46 2 R M21 3 H5  
T 42 0 R C1 3 H5

**AWS A5.36 / SFA-5.36**  
E70T1-M21A0-CS1-H4  
E70T1-C1AZ-CS1-H4

## Characteristics and typical fields of application

Seamless rutile flux-cored wire for single or multilayer welding of carbon, carbon-manganese steels and similar types of steels including fine grain steels with Argon-CO<sub>2</sub> shielding gas or pure CO<sub>2</sub>.

Main features: good weldability in both flat and horizontal positions, slow freezing and easy to remove slag and bead is smooth and bright. This wire is especially suitable for ship building, steel structural work or wherever good bead appearance is required.

## Base materials

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240

ship building steels: A, B, D

AH 32-DH 40

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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A

## Typical analysis of the wire

	Gas	C	Si	Mn
wt.-%	M21	0.04	0.50	1.30
wt.-%	C1	0.03	0.35	1.10

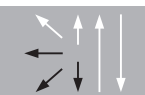
## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				0°C	-20°C
u	500 (≥ 460)	590 (550-660)	28 (≥ 22)	100	70 (≥ 47)
u1	450 (≥ 420)	520 (500-640)	26 (≥ 22)	60 (≥ 47)	

u untreated, as welded – shielding gas M21

u1 untreated, as welded – shielding gas C1

## Operating data



**Polarity** DC+

**Shielding gas (EN ISO 14175)** M21, C1

### Dimension mm

1.0  
1.2  
1.4  
1.6  
2.0  
2.4

Welding with standard GMAW-facilities possible

## Approvals

CE

# BÖHLER Ti 46 T-FD



Flux cored wire, seamless, mild steel, rutile type

## Classifications

EN ISO 17632-A  
T46 3 P M21 1 H5  
T42 2 P C1 1 H5

AWS A5.36 / SFA A5.36  
E71T1-M21A2-CS2-H4  
E71T1-C1A0-CS2-H4

## Characteristics and typical fields of application

Seamless copper coated flux-cored wire for single- or multipass welding of carbon- and high strength steels, using M21 (Ar/CO<sub>2</sub>) shielding gas or pure CO<sub>2</sub>. The weld deposit has excellent mechanical properties till -30°C in mix gas application. The main features of this wire are excellent weldability in all positions, excellent bead appearance, low amount of spatters and easy to remove slag. In position PF very high welding speeds are possible due to an optimized slag characteristic. Due to the seamless design of the wire: hydrogen pickup during operation and storage can be avoided; no porosity issues even on primer plates and very good feeding performance are achievable. The average hydrogen content of the pure weld metal is about 1-3 ml/100g weld metal.

## Base materials

Steels up to a yield strength of 460 MPa (67 ksi)

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240,

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

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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

## Typical analysis of the wire

	Gas	C	Si	Mn
wt.-%	M21	0.06	0.45	1.3
wt.-%	C1	0.05	0.35	1.2

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>p0.2</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	Mpa	Mpa	%	-20°C	-30°C
u	530 (≥460)	590 (550-660)	24 (≥22)	90	70 (≥47)
u1	470 (≥420)	550 (500-640)	25 (≥22)	60 (≥47)	

u untreated, as welded – shielding gas M21: Argon+15-25% CO<sub>2</sub>

u1 untreated, as welded – shielding gas C1: 100% CO<sub>2</sub>

## Operating data

	<b>Polarity</b>	DC+	<b>Dimension mm</b>
	<b>Shielding gas</b>	M21 , C1	1.0
	<b>(EN ISO 14175)</b>		1.2
			1.6

Welding with standard GMAW-facilities possible

## Approvals

ABS; BV; DNV-GL; LR; TÜV, DB, CE

## Classifications

### EN ISO 17632-A

T 46 2 P M21 1 H10

T 42 2 P C1 1 H5

### AWS A5.36 / SFA-5.36

E71T1-M21A0-CS1-H8

E71T1-C1A0-CS1-H4

## Characteristics and typical fields of application

All position rutile flux-cored wire with fast freezing slag system. User friendly welding characteristics in all positions with one wire diameter 1,2 mm and same parameter setting. Excellent mechanical properties, easy slag removal, low spatter loss, smooth, finely rippled bead surface, high X-ray safety. The product performs to the highest productivity with significant savings in time and economical aspects when used for positional welding.

## Base materials

Steels up to a yield strength of 460 MPa (67 ksi)

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1 - P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240, shipbuilding steels: A, B, D, E, A 32-E 36

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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

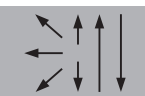
## Typical analysis of the wire

	Gas	C	Si	Mn
wt.-%	-	-	-	-
wt.-%	M21	0.05	0.5	1.2

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				20°C	-20°C
u	500 (≥ 460)	580 (530 – 680)	26 (≥ 20)	160	90 (≥ 47)
u1	480 (≥ 420)	550 (500 – 640)	25 (≥ 20)	140	80 (≥ 47)
u untreated, as welded – shielding gas M21					
u1 untreated, as welded – shielding gas C1					

## Operating data



**Polarity** DC+

**Shielding gas  
(EN ISO 14175)** M21, C1

**Dimension mm**

1.2

Welding with standard GMAW-facilities possible

## Approvals

TÜV, ABS, LR, DNV GL, CWB, CE

# BÖHLER Ti 52-FD



Flux-cored wire, mild steel, rutile

## Classifications

EN ISO 17632-A

T 46 4 P M21 1 H10

T 42 2 P C1 1 H5

AWS A5.36 / SFA-5.36

E71T1-M21A4-CS1-H8

E71T1-C1A2-CS1-H4

## Characteristics and typical fields of application

All position rutile flux-cored wire with fast freezing slag system. User friendly welding characteristics in all positions with one wire diameter 1.2 mm and same parameter setting. Excellent mechanical properties, easy slag removal, low spatter loss, smooth, finely rippled bead surface, high X-ray safety. The product performs to the highest productivity with significant savings in time and economical aspects when used for positional welding.

## Base materials

Steels up to a yield strength of 460 MPa (67 ksi) (shielding gas M21)

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1 - P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240,

shipbuilding steel: A, B, D, E, A 32-E 36

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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

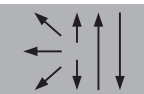
## Typical analysis of the wire

	Gas	C	Si	Mn
wt.-%	M21	0.06	0.50	1.20
wt.-%	C1	0.05	0.45	1.10

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				20°C	-20°C	-40°C
u	500 (≥ 460)	580 (550 – 740)	26 (≥ 20)	180	130	90 (≥ 47)
u1	480 (≥ 420)	550 (500 – 670)	25 (≥ 20)	160	110 (≥ 47)	
u untreated, as welded – shielding gas M21						
u1 untreated, as welded – shielding gas C1						

## Operating data



**Polarity** DC+

**Shielding gas**  
(EN ISO 14175) M21, C1

**Dimension mm**  
1.2  
1.6

Welding with standard GMAW-facilities possible

## Approvals

TÜV, DB, ABS, LR, DNV GL, BV, CRS, CE

## Classifications

### EN ISO 17632-A

T 46 4 P M 1 H5

T 46 2 P C 1 H5

### AWS A5.36 / SFA-5.36

E71T1-M21A4-CS1-DH4

E71T1-C1A2-CS1-DH4

## Characteristics and typical fields of application

Seamless rutile flux cored wire for single- or multilayer welding of Carbon, Carbon-Manganese steels and similar types of steels including fine grain steels with Argon-CO<sub>2</sub> shielding gas or pure CO<sub>2</sub>. Main features: excellent weldability in all positions with high performance welding speed, very low spatter losses, good bead appearance, fast freezing and easy to remove slag. This wire is especially suitable for ship building, structural steel work or wherever good bead appearance is required. D1.8 Seismic Supplement approved. Typical hydrogen value 2.5 – 3.5ml/100g weld metal.

## Base materials

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240

ship building steels: A, B, D, E, A 32-E 36

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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

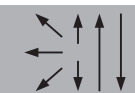
## Typical analysis of the wire

	Gas	C	Si	Mn
wt.-%	M21	0.06	0.40	1.45
wt.-%	C1	0.04	0.35	1.25

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J	
				-20°C	-40°C
u	500 (≥ 460)	590 (550-660)	26 (≥ 20)	100 (≥ 47)	70 (≥ 47)
u1	470 (≥ 460)	560 (550-660)	28 (≥ 20)	80 (≥ 47)	
u untreated, as welded – shielding gas M21					
u1 untreated, as welded – shielding gas C1					

## Operating data



<b>Polarity</b>	DC+
<b>Shielding gas (EN ISO 14175)</b>	M21 , C1

### Dimension mm

1.0
1.2
1.4
1.6

Welding with standard GMAW-facilities possible

## Approvals

TÜV, DB, DNV GL, DNV, ABS, LR, BV, RINA, RS, CE; D1.8 seismic supplement;

# BÖHLER Ti 52 T-FD (CO<sub>2</sub>)



Flux-cored wire, seamless, mild steel, rutile

## Classifications

EN ISO 17632-A  
T 46 3 P C1 1 H5AWS A5.36 / SFA-5.36  
E71T1-C1A2-CS1-H4

## Characteristics and typical fields of application

Seamless rutile flux-cored wire for single or multilayer welding of carbon, carbon-manganese steels and similar types of steels including fine grain steels with pure CO<sub>2</sub> shielding gas. Main features: excellent weldability in all positions especially vertical upward position, also with high parameters (300 A), very low spatter losses, fast freezing, easy to remove slag and smooth and bright bead. This wire is especially suitable for ship building where excellent performance and welding speed are needed.

## Base materials

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240

Ship building steels: A, B, D, E, A 32-E 36

ASTM A 106 Gr. A, B, C; A 181 Gr. 60, 70; A 283 Gr. A, C; A 285 Gr. A, B, C; 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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

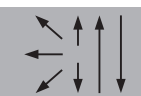
## Typical analysis of the wire

wt.-%	C	Si	Mn
	0.065	0.45	1.3

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J		
	MPa	MPa	%	20°C	-20°C	-30°C
u	520 (≥ 460)	580 (550-660)	25 (≥ 20)	100	95	70 (≥ 47)
u untreated, as welded – shielding gas C1						

## Operating data



**Polarity** DC+

**Shielding gas (EN ISO 14175)** C1

**Dimension mm**  
1.2  
1.6

Welding with standard GMAW-facilities possible

## Approvals

TÜV, DB, DNV GL, ABS, LR, BV, RINA, RS, CE



# BÖHLER Ti 52 T-FD (HP)

Flux-cored wire, seamless, mild steel, rutile

## Classifications

EN ISO 17632-A  
T 46 5 P M21 1 H5  
T 42 2 P C 1 H5

AWS A5.36 / SFA-5.36  
E71T1-M21AP6-CS2-H4  
E71T1-C1A0-CS2-H4

## Characteristics and typical fields of application

High performance seamless rutile flux cored wire for single or multipass welding of Carbon, Carbon-Manganese steels and similar including fine grain steels with Argon-CO<sub>2</sub> shielding gas or pure CO<sub>2</sub>. Main features: excellent weldability in all positions, excellent bead appearance, very low spatter losses, fast freezing slag with an easy removal. The good mechanical properties of this wire make it especially suitable for hardest applications in off-shore and ship building industry even at low temperatures. This product can be used in sour gas applications. (HIC tested acc. to NACE TM-0284). Test values for SSC are available upon request.

## Base materials

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH- P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2- P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240

Ship building steels: A, B, D, E, A 32-E 36

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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

## Typical analysis of the wire

	Gas	C	Si	Mn	Ni
wt.-%	M21	0.06	0.45	1.30	0.35
wt.-%	C1	0.05	0.35	1.00	0.30

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J			
				-20°C	-40°C	-46°C	-51°C
u	500 (≥ 460)	590 (550-660)	28 (≥ 20)	110	90 (≥ 47)		80 (≥ 47)
u1	450 (≥ 420)	550 (500-640)	24 (≥ 20)	100 (≥ 47)			
s1	510(≥460)	590 (550-660)	26 (≥ 20)			80 (≥ 27)	60 (≥ 27)
s2	500 (≥ 460)	580 (550-660)	22 (≥ 20)	-		62	60

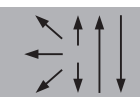
u untreated, as welded – shielding gas M21

u1 untreated, as welded – shielding gas C1

s1 stress released, 620 °C x 1 hr - shielding gas M21

s2 stress released, 620 °C x 5 hr - shielding gas M21

## Operating data



**Polarity** DC+

**Shielding gas (EN ISO 14175)** M21, C1

### Dimension mm

1.0  
1.2  
1.4  
1.6

Welding with standard GMAW-facilities possible

## Approvals

DNV GL, LR, RINA, CWB, CE

# BÖHLER Ti 52 T-FD SR (CO<sub>2</sub>)



Flux cored wire, seamless, mild steel, rutile type

## Classifications

EN ISO 17632-A  
T 42 4 P C1 1 H5AWS A5.36 / SFA-5.36  
E71T12-C1AP4-CS1-H4

## Characteristics and typical fields of application

Seamless rutile flux cored wire for single- or multilayer welding of Carbon, Carbon-Manganese steels and similar types of steels including fine grain steels with pure CO<sub>2</sub> shielding gas.

Main features: excellent weldability in all positions and excellent toughness at low temperatures in as welded conditions and after post weld heat treatments. This wire is especially suitable for ship building, pressure vessels, bridge construction, and earthmoving equipment. The seamless technology guarantees constant low diffusible Hydrogen in all situations of humidity and environment. CTOD tested at -10 °C (14 °F)

## Base materials

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240

Ship building steels: A, B, D, E, A 32-E 36

ASTM A 106 Gr. A, B, C; A 181 Gr. 60, 70; A 283 Gr. A, C; A 285 Gr. A, B, C; 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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

## Typical analysis of the wire

wt.-%	Gas C1	C 0.04	Si 0.40	Mn 1.3	Ni 0.40
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## Mechanical properties of all-weld metal - typical values (min. values)

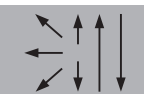
Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-40 °C	-50 °C	-60 °C
u	500 (≥ 420)	570 (500-640)	24 (≥ 20)	110 (≥ 47)	100 (≥ 47)	60
s1	460 (≥ 420)	550 (500-640)	28 (≥ 20)	80 (≥ 47)	75 (≥ 47)	55
s2	460 (≥ 420)	550 (500-640)	29 (≥ 20)	95 (≥ 47)	90 (≥ 47)	60

u untreated, as welded – shielding gas C1

s1 stress released 620°C / 3h – shielding gas C1

s2 stress released 620°C / 13h – shielding gas C1

## Operating data



**Polarity** DC+

**Shielding gas**  
(EN ISO 14175) C1

### Dimension mm

1.2  
1.4  
1.6

Welding with standard GMAW-facilities possible

## Approvals

ABS, DNV-GL, BV, LR, CE



## Classifications

**EN ISO 17632-A**  
T 46 2 M M21 1 H5

**AWS A5.36 / SFA-5.36**  
E70T15-M21A0-CS1-H4

## Characteristics and typical fields of application

Metal-cored high-efficiency wire for semi-automatic and fully automatic joint welding of unalloyed and fine-grained constructional steels and service temperatures from -20°C to +450°C. Very high metal recovery between 93 and 97% and deposition rate up to 9 kg/hr. Steady spray arc-like droplet transfer with minimal spatter formation. Good penetration, high resistance to porosity, good wetting behaviour as well as low hydrogen contents (< 5 ml/100 g deposit) are further quality features of this flux-cored wire. Ideal for horizontal and flat fillet welds. Compared to solid wires 20% higher productivity can be achieved. This wire is designed for minimum oxide residues permit the welding of multi passes without the need for inter-run cleaning.

## Base materials

Steels up to a yield strength of 460 MPa (67 ksi)

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH- P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240, ship building steel: A, B, D, E,

A 32-E 36

ASTM A 106 Gr. A, B, C; A 181 Gr. 60, 70; A 283 Gr. A, C; A 285 Gr. A, B, C; A 414 Gr. A, B, C, D, E, F, G; A 501 Gr. B; A 516 Gr. 55, 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, X65

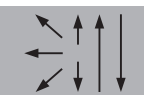
## Typical analysis of the wire

wt.-%	C	Si	Mn
	0.07	0.7	1.5

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub>	Tensile strength R <sub>m</sub>	Elongation A (L <sub>0</sub> =5d <sub>0</sub> )	Impact values ISO-V KV J	
	MPa	MPa	%	20°C	-20°C
u	490 (≥ 460)	590 (≥ 550 – 740)	25 (≥ 20)	110	50 (≥ 47)
u untreated, as welded – shielding gas Ar + 15 – 25% CO <sub>2</sub>					

## Operating data



**Polarity** DC+

**Shielding gas (EN ISO 14175)** M21

**Dimension mm**

1.2  
1.4  
1.6

Welding with conventional or pulsed power sources using DC+

## Approvals

TÜV, DB , DNV GL, LR, BV, ABS, CWB, CE

# BÖHLER HL 46 T-MC



Metal-cored wire, seamless, mild steel

## Classifications

EN ISO 17632-A  
T 46 3 M M21 1 H5AWS A5.36 / SFA-5.36  
E70T15-M21A2-CS1-H4

## Characteristics and typical fields of application

Seamless metal-cored wire for semi-automatic and fully automatic joint welding of unalloyed and fine-grained constructional steels utilizing service temperatures from -30°C to +450°C. Steady spray arc-like droplet transfer with minimal spatter formation. High resistance to porosity, good wetting behaviour as well as low hydrogen contents (< 5 ml/100 g deposit) are further quality features of this metal-cored wire. Ideal for horizontal and flat fillet welds. This wire is designed for minimum oxide residues permit the welding of multi passes without the need for inter-run cleaning.

## Base materials

Steels up to a yield strength of 460 MPa (67 ksi)

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH- P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240, ship building steel: A, B, D, E

A 32-E 36

ASTM A 106 Gr. A, B, C; A 181 Gr. 60, 70; A 283 Gr. A, C; A 285 Gr. A, B, C; A 414 Gr. A, B, C, D, E, F, G; A 501 Gr. B; A 516 Gr. 55, 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, X65

## Typical analysis of the wire

wt.-%	Gas M21	C 0.06	Si 0.8	Mn 1.5
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## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-20°C	-30°C	-40°C
u	480 (≥460)	580 (≥ 550-660)	29 (≥22)	120	90 (≥47)	70 (≥27)
u untreated, as welded – shielding gas Ar + 5 – 25% CO <sub>2</sub>						

## Operating data



**Polarity** DC+

**Shielding gas (EN ISO 14175)** M21; M20; (Ar + 5 – 25% CO<sub>2</sub>)

### Dimension mm

1.0  
1.2  
1.6

Welding with conventional or pulsed power sources using DC+

## Approvals

TÜV; DB; ABS; BV; DNV-GL; LR, CWB, CE



# BÖHLER HL 51 L-MC

Metal cored wire, seamless, mild steel

## Classifications

EN ISO 17632-A  
T46 4 M M21 1 H5

AWS A5.36 / SFA A5.36  
E71T15-M21A4-CS2-H4  
E71T15-M20A4-CS2-H4

## Characteristics and typical fields of application

Seamless all positional metal-cored high-efficiency wire manufactured with seamless laser technology is especially designed for semi-automatic and fully automatic joint welding of unalloyed a fine-grained constructional steels. The production technology by laser welding of wire possesses higher rigidity-as a result it offers exact ignition accuracy. Very high metal recovery between 95-97% are additional benefit of this wire. Steady spray arc-like droplet with minimal spatter formation, good penetration, high resistance to porosity, good wetting behaviour as well as low hydrogens contents (<2 ml/100 g weld deposit) are further quality features of this metal cored wire. Minimum oxide residues permit the welding of multipasses without the need for inter-run cleaning. Ideal for horizontal and flat fillet welds.

## Base materials

steels up to a yield strength of 460 Mpa (67 ksi)

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240, ship building steels: A, B, D, E, A 32-E 36

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, E; A 662 Gr. B; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

## Typical analysis of the wire

wt.-%	Gas	C	Si	Mn
	M21	0.07	0.7	1.5

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>0.2</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				20°C	-40°C	-46°C
u	490 (≥460)	600 (550-740)	27 (≥20)	170	120 (≥47)	70 (≥27)
s1	450	550	27	180	100	
u untreated, as welded - shielding gas Ar + 5 - 25 % CO <sub>2</sub>						
s1 stress relieved, 620 °C/2 h - shielding gas Ar + 5 - 25 % CO <sub>2</sub>						

## Operating data



**Polarity** DC+

**Shielding gas**  
(EN ISO 14175) M21

### Dimension mm

1.0  
1.2  
1.4  
1.6

Welding with standard GMAW power source possible - the wire meets the requirements AWS A5.18: E70C-6MH4

## Approvals

TÜV, DB, ABS, BV, DNV GL, CWB, LR, CE

# BÖHLER HL 51 T-MC



Metal-cored wire, seamless, mild steel

## Classifications

EN ISO 17632-A

T 46 6 M M21 1 H5

T 42 5 M C1 1 H5

AWS A5.36 / SFA-5.36

E70T15-M21A8-CS1-H4

E70T15-C1A6-CS1-H4

## Characteristics and typical fields of application

Seamless metal cored wire for single- or multilayer welding of Carbon, Carbon-Manganese and similar types of steels, including fine grain steels with Argon-CO<sub>2</sub> or pure CO<sub>2</sub> shielding gas. Features include: high yield, good weldability, excellent bead appearance, very low spatter losses and exceptional mechanical properties at low temperatures (-60°C) in as welded conditions as well with post weld heat treatment. This wire is especially suitable for automated-robotized applications and for root pass welding for piping and butt-joints. This product can be used in sour gas applications. (HIC tested acc. to NACE TM-0284). Test values for SSC are available upon request

## Base materials

S235JR-S355JR, S235JO-S355JO, S450JO, S235J2-S355J2, S275N-S460N, S275M-S460M, P235GH-P355GH, P275NL1-P460NL1, P215NL, P265NL, P355N, P285NH-P460NH, P195TR1-P265TR1, P195TR2-P265TR2, P195GH-P265GH, L245NB-L415NB, L450QB, L245MB-L450MB, GE200-GE240

Shipp building steels: A, B, D, E, A 32-E 36

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, E; A 662 Gr. C, E; A 711 Gr. 1013; A 841 Gr. A; API 5 L Gr. B, X42, X52, X56, X60, X65

## Typical analysis of the wire

	Gas	C	Si	Mn
wt.-%	M21	0.06	0.80	1.60
wt.-%	C1	0.05	0.60	1.50

## Mechanical properties of all-weld metal - typical values (min. values)

Condition	Yield strength R <sub>e</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A (L <sub>0</sub> =5d <sub>0</sub> ) %	Impact values ISO-V KV J		
				-40°C	-50°C	-60°C
u	500 (≥ 460)	600 (550-660)	29 (≥ 20)	120		80 (≥ 47)
u1	460 (≥ 420)	560 (530-640)	30 (≥ 20)	80	60 (≥ 47)	
s	420	510	24	90		

u untreated, as welded – shielding gas M21

u1 untreated, as welded – shielding gas C1

s stress relieved 620°C / 2h – shielding gas M21

## Operating data



**Polarity** DC+/- in PG-Position

**Shielding gas**  
(EN ISO 14175) M21, C1

**Dimension mm**

1.0

1.2

1.4

1.6

Welding with conventional or pulsed power sources using DC+

## Approvals

TÜV, DB, DNV-GL, ABS, LR, BV, RINA, CWB, CE

**Classifications**

<b>W.Nr.</b>	<b>EN 12536</b>	<b>AWS A5.2 / SFA-5.2</b>
1.0324	01	R45-G

**Characteristics and typical fields of application**

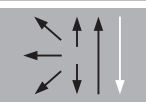
Copper coated unalloyed gas welding rod for joining mild steel up to S235.

**Base materials**

S235JR, P195TR1-P235TR1

ASTM A 29 Gr. 1013; A 510 Gr. 1013, A 711 Gr. 1013

wt.-%	C	Si	Mn
	0.08	0.1	0.6

**Operating data****Dimension mm**

2.0 × 1000

2.5 × 1000

3.2 × 1000

4.0 × 1000

**Approvals**

-

# BÖHLER BW XII



Gas welding rod for gas welding, mild steel

## Classifications

EN 12536  
O IIIAWS A5.2 / SFA-5.2  
R60-GW.Nr.  
1.6215

## Characteristics and typical fields of application

Gas welding rod, nickel alloyed. Easy to operate due to very easy weld pool and slag control and good gap bridging ability.

Weld pools are not susceptible to overheating when welded with a too hot flame.

## Base materials

Steels up to a yield strength of 275 MPa (40 ksi)

S235JR - S275JR, P195GH-P275GH, L245NB-L290NB, L245MB-L290MB

ASTM A 29 Gr. 1013, 1016; A 283 Gr. C, D; A 510 Gr. 1013, A 711 Gr. 1013, A 501 Gr. B; A 512 Gr. 1021; A 513 Gr. 1016, 1021; A 572 Gr. 42, 65; A 633 Gr. A, C; A 659 Gr. 1016; A 709 Gr. 36, 50

wt.-%	C	Si	Mn	Ni
	0.01	0.15	1.1	0.45

## Operating data



### Dimension mm

2.0 × 1000

2.5 × 1000

3.2 × 1000

4.0 × 1000

5.0 × 1000

## Approvals

TÜV (02323), DB (70.132.08), CE