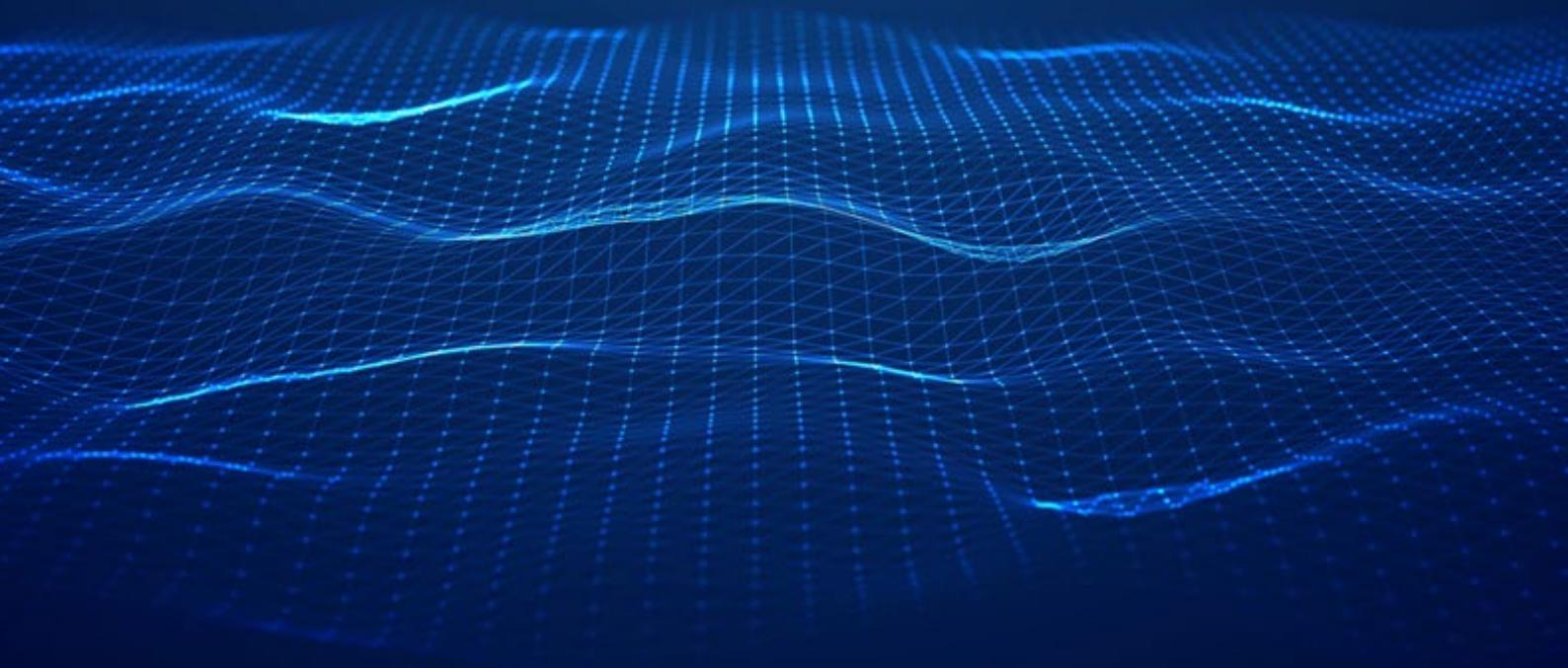
WELDING ANALITIX

COMPLETE WELDING SOLUTIONS

PRODUCT CATALOGUE 2024



www.weldinganalitix.com

Welding Analitix (Pty) Ltd. is headquartered in Durban, South Africa.

We provide turn-key welding solutions to all industries; Maritime and Oil & Gas, Automotive, Heavy Machinery, Construction, Sugar and the Mining industry. From consulting to consumable and equipment supplies, we are your solutions provider.

We have a strategic partnership with **KISWEL,** a specialized welding consumable manufacturer with Headquarters in South Korea, whom provide a full spectrum of welding solutions, for all industries.

We also represent **AMPCO® Metal's** special copper-based and **MIG WELD's** aluminium welding products in Southern Africa. AMPCO® provides a full range of aluminum bronze and other copper-based arc welding alloys that are suited for a wide range of applications. MIG WELD based in France is one of Europe's leading aluminium welding wire producers.

Welding Analitix is also an authorized distributor for **FRONIUS** welding machines. Fronius is a global leader when it comes to welding machines and technology. Fronius provides the full range of welding machines, from small battery powered MMA machines to robotic welding machines used by the world's leading manufacturers.

Leave the regulatory, procedure qualifications and consumable requirements to us and let us help you integrate welding technology into your business seamlessly.

STRATEGIC PARTNERS

KISWEL
www.kiswel.com
BUILDING A BETTER WORKING WORLD TOGETHER

KISWEL
WELDING BUSINESS
Solution by Industry

Envisioning tomorrow
Starting today

PROFESSIONAL WELDING TOOLS

South Africa

AMPCO® WELDING PRODUCTS

Welding Wire and Covered Electrodes

- Aluminum Bronze
- Nickel Aluminum Bronze
- Manganese Nickel Aluminum Bronze
- Copper

AMPCO METAL EXCELLENCE IN ENGINEERED ALLOYS

MIG WELD

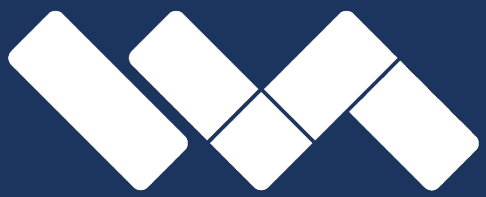
The Original

The quality aluminium welding wire

www.mig-weld.fr

Contents

CONSUMABLE SPECIFICATION SUMMARY



Consumables				
Consumable Brand	Product Name	AWS Classification	Base Metal	Page
COVERED ELECTRODES – (SMAW)				
Unalloyed, Fine Grained and Low Alloyed Steel				
KISWEL	KCL-10	A5.1-04: E6010	Mild Steel (420 MPa) – Pipe welding	18
KISWEL	KR-3000	A5.1-04: E6013	Mild Steel (420 MPa)	19
KISWEL	K-7024	A5.1-04: E7024	High tensile steel (490 MPa)	20
KISWEL	K-7018NP	A5.1-04: E7018-1 H4R	High tensile steel (490 MPa)	21
KISWEL	K-8018	A5.5-06: E8018-G	High tensile steel (560 MPa)	22
KISWEL	K-8018B2	A5.5-06: E8018-B2	Heat-resisting steel (1.25%Cr-0.5%Mo)	23
KISWEL	K-8018C1	A5.5-06: E8018-C1	Low temperature steel (560Mpa)	24
KISWEL	K-9018M	A5.5-06: E9018-M	High tensile steel (690 MPa)	25
KISWEL	K-10018M	A5.5-06: E10018-M	High tensile steel (690 MPa)	26
KISWEL	K-11018M	A5.5-06: E11018-M	High tensile steel (690 MPa)	27
Cast Iron				
KISWEL	KFN-50	A5.15-2006: ENiFe-Cl	Cast Iron	29
KISWEL	KSN-100	A5.15-2006: ENi-Cl	Cast Iron	30
Stainless Steel				
KISWEL	KST-308L	A5.4-06: E308L-16	Stainless steel (Low C, 18%Cr-8%Ni)	32
KISWEL	KST-308L-17	A5.4-06: E308L-17	Stainless steel (Low C, 18%Cr-8%Ni)	33
KISWEL	KST-309L	A5.4-06: E309L-16	Stainless steel (Dissimilar joints)	34
KISWEL	KST-309L-17	A5.4-06: E309L-17	Stainless steel (Dissimilar joints)	35
KISWEL	KST-312	A5.4-06: E312-16	Stainless steel (Cladding and Dissimilar joints)	36
KISWEL	KST-316L	A5.4-06: E316L-16	Stainless steel (Low C, 18%Cr-12%Ni-Mo)	37
KISWEL	KST-316L-17	A5.4-06: E316L-17	Stainless steel (Low C, 18%Cr-12%Ni-Mo)	38
KISWEL	KST-410	A5.4-06: E410-16	Stainless steel (13%Cr, Hardfacing)	39
KISWEL	KST-2209	A5.4-06: E2209-16	Duplex stainless steel (22%Cr-9%Ni-Mo)	40
KISWEL	KST-2594	A5.4-06: E2594-16	Super duplex stainless steel (25%Cr-9%Ni-Mo)	41

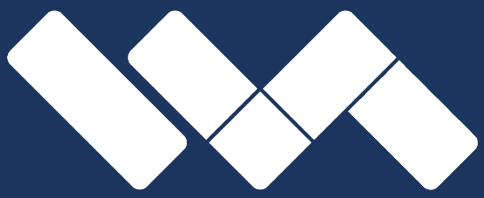
Consumables				
Consumable Brand	Product Name	AWS Classification	Base Metal	Page
COVERED ELECTRODES – (SMAW)				
Nickel Alloys				
KISWEL	KW-A82	A5.11-05: ENiCrFe-3	Nickel alloy (Inconel 600,601)	43
KISWEL	KW-A82M	A5.11-05: ENiCrFe-3 (mod)	Nickel alloy	44
KISWEL	KW-A625	A5.11-05: ENiCrMo-3	Nickel alloy (Inconel 625)	45
Copper Alloys				
AMPCO	AMPCO-TRODE® 10	A5.6 Class E CuAl-A2	Refer to technical data sheet	47
AMPCO	AMPCO-TRODE® 40	A5.6 Class E CuMnNiAl	Refer to technical data sheet	48
AMPCO	AMPCO-TRODE® 46	A5.6 Class E CuNiAl	Refer to technical data sheet	49
FLUX CORED WIRES – (FCAW)				
Unalloyed, Fine Grained and Low Alloyed Steel				
KISWEL	K-71TLF	A5.36-2016: E71T1-C1A0-CS1-H4	High tensile steel (490 MPa)	52
KISWEL	K-71TM	A5.36-2016: E71T1-C1/M21A2-CS1-H8	High tensile steel (490 MPa)	53
KISWEL	K-71TSR	A5.20-2005: E71T-12CJ H4/ A5.36-2016: E71T1-C1/P4-CS2-H4	Low temperature steel (490Mpa)	54
KISWEL	K-71UT	A5.36-2016: E71T1-C1A4-CS1-H4	Low temperature steel (490Mpa)	55
KISWEL	K-81TM	A5.29-10: E81T1-NiM	High tensile steel (560 MPa)	56
KISWEL	K-81TK2	A5.36-2016: E81T1-C1A8-K2-H4	Low temperature steel (560Mpa, 1.5% Ni)	57
KISWEL	K-NGS11	A5.20: E71T-11	High tensile steel (490 MPa) – Self-shielded	58
KISWEL	KX-706M	A5.18-2005: E70C-6M	High tensile steel (490 MPa) – Metal Cored	59
Stainless Steel				
KISWEL	K-410NiMoTC	A5.22-2012: E410NiMoT1-1	Martensite stainless alloys	61
MIG/MAG WIRES – (GMAW)				
Unalloyed, Fine Grained and Low Alloyed Steel				
KISWEL	KC-25M	A5.18-05: ER70S-3	Mild steel and 490MPa tensile strength steel	64
KISWEL	KC-28	A5.18-05: ER70S-6	Mild steel and 490 MPa tensile strength steel	65
KISWEL	KC-28CF (*Cu-Free*)	A5.18-05: ER70S-6	Mild steel and 490 MPa tensile strength steel	66
KISWEL	KC-29	A5.18-05: ER70S-6	Mild steel and 490 MPa tensile strength steel	67
KISWEL	KC-37S	A5.18-2005: ER70S-G	Mild steel and 490 MPa tensile strength steel	68
KISWEL	ZH-100	A5.28-05: ER 100S-1	High strength steel & 690Mpa tensile strength steel	69
KISWEL	KC-90SB3	A5.28-05: ER90S-B3	Heat resistant steel, 2.25%Cr-1%Mo	70

Consumables				
Consumable Brand	Product Name	AWS Classification	Base Metal	Page
MIG/MAG WIRES – (GMAW)				
Stainless Steel				
KISWEL	M-307Si	*EN ISO 14343-A:2009: G 18 8 Mn	Austenite stainless steel (18%Cr-8%Ni STS)	72
KISWEL	M-308L	A5.9:2012: ER308L	Austenite stainless steel (Low C, 18%Cr-8%Ni STS)	73
KISWEL	M-308LSi	A5.9:2012: ER308LSi	Austenite stainless steel (Low C, 18%Cr-8%Ni STS)	74
KISWEL	M-309LSi	A5.9:2012: ER309LSi	Austenite stainless steel (Low C, Dissimilar steels)	75
KISWEL	M-316L	A5.9:2012: ER316L	Austenite stainless steel (Low C, 18%Cr-12%Ni-Mo STS)	76
KISWEL	M-316LSi	A5.9:2012: ER316LSi	Austenite stainless steel (Low C, 18%Cr-12%Ni-Mo STS)	77
KISWEL	M-420	A5.9:2012: ER420	Austenite stainless steel (12%Cr STS)	78
KISWEL	M-430LNb	*EN ISO 14343-A:2009: G 18 L Nb	For ferrite stainless steel (16%Cr-Nb STS)	79
Nickel Alloys				
KISWEL	KW-M82	A5.14-07: ERNiCr-3	Nickel alloy (Inconel 600,601,690/Incoloy 800, 800HT)	81
KISWEL	KW-M625	A5.14-2011: ERNiCrMo-3	Nickel alloy (Inconel 625/Incoloy 825)	82
Aluminium				
MIG WELD	ML4043	A5.10: ER4043 (AlSi5)	Aluminium (Wire Tensile Strength ≥ 130 MPa)	84
MIG WELD	ML4047	A5.10: ER4047 (AlSi12(A))	Aluminium (Wire Tensile Strength ≥ 130 MPa)	85
MIG WELD	ML5183	A5.10: ER5183 (AlMg4.5Mn0.7)	Aluminium (Wire Tensile Strength ≥ 275MPa)	86
MIG WELD	ML5356	A5.10: ER5356 (AlMgCr)	Aluminium (Wire Tensile Strength ≥ 240 MPa)	87
Copper Alloys				
AMPCO	AMPCO-TRODE® 10	A5.7 Class ER CuAl-A2	Refer to technical data sheet	89
AMPCO	AMPCO-TRODE® 40	A5.7 Class ER CuMnNiAl	Refer to technical data sheet	90
AMPCO	AMPCO-TRODE® 46	A5.7 Class ER CuNiAl	Refer to technical data sheet	91
AMPCO	SIL-TRODE®	A5.7 Class ER CuSi-A	Refer to technical data sheet	92
TIG RODS – (GTAW)				
Unalloyed, Fine Grained and Low Alloyed Steel				
KISWEL	T-50	A5.18:2005: ER70S-6	Mild steel and 490MPa tensile strength steel	95
KISWEL	T-80SB2	A5.28:2005: ER80S-B2	1.25%Cr-0.5%Mo Heat-resistant steel	96

Consumables				
Consumable Brand	Product Name	AWS Classification	Base Metal	Page
TIG RODS – (GTAW)				
Stainless Steel				
KISWEL	T-308L	A5.9:2012: ER308L	Austenite stainless steel (Low C, 18%Cr-8%Ni STS)	98
KISWEL	T-309L	A5.9:2012: ER309L	Austenite stainless steel (Low C, Dissimilar joints)	99
KISWEL	T-312	A5.9:2012: ER312	Austenite stainless steel (Dissimilar steels)	100
KISWEL	T-316L	A5.9:2012: ER316L	Austenite stainless steel (Low C, 18%Cr-8%Ni-Mo STS)	101
KISWEL	T-2209	A5.9-15: ER2209	Duplex stainless steel (Low C, 22%Cr-9%Ni-Mo STS)	102
KISWEL	T-2594	A5.9-2012: ER2594	Super duplex stainless steel (25%Cr-9%Ni-4%Mo STS)	103
Nickel Alloys				
KISWEL	KW-T82	A5.14-2011: ERNiCr-3	Nickel alloy (Inconel 600,601,690 / Incoloy 800,800HT)	105
KISWEL	KW-T625	A5.14-2011: ERNiCrMo-3	Nickel alloy (Inconel 625 / Incoloy 825)	106
Aluminium				
MIG WELD	ML4043	A5.10: ER4043 (AlSi5)	Aluminium (Rod Tensile Strength ≥ 130 MPa)	108
MIG WELD	ML4047	A5.10: ER4047 (AlSi12(A))	Aluminium (Rod Tensile Strength ≥ 130 MPa)	109
MIG WELD	ML5183	A5.10: ER5183 (AlMg4.5Mn0.7)	Aluminium (Rod Tensile Strength ≥ 275MPa)	110
MIG WELD	ML5356	A5.10: ER5356 (AlMgCr)	Aluminium (Rod Tensile Strength ≥ 240 MPa)	111
Copper Alloys				
KISWEL	KW-TCuNi	A5.7: ERCuNi	Monel 450, Cupronickel	113
AMPCO	AMPCO-TRODE® 10	A5.7 Class E CuAl-A2	Refer to technical data sheet	114
AMPCO	AMPCO-TRODE® 40	A5.7 Class E CuMnNiAl	Refer to technical data sheet	115
AMPCO	AMPCO-TRODE® 46	A5.7 Class E CuNiAl	Refer to technical data sheet	116
AMPCO	SIL-TRODE®	A5.7 Class E CuSi-A	Refer to technical data sheet	117
COVERED ELECTRODES – (SMAW)				
Hard facing				
KISWEL	KM-650	DIN 8555: E10-UM-60	Hard facing (HV 735)	121
KISWEL	KM-700	Other: KS D 7035-2002: DF2B-700-B	Hard facing (HV 700)	123
KISWEL	KM-800	Other: KS D 7035: DF3C-700-B	Hard facing (HV 700)	124
KISWEL	KM-900	Other: KS 7035: DFMA-250-B	Hard facing (HV 700)	125

Consumables				
Consumable Brand	Product Name	AWS Classification	Base Metal	Page
FLUX CORED WIRES– (FCAW)				
Hard facing				
KISWEL	K-CCHT	DIN 8555: MF 10-GF-65-G	Hard facing	126
KISWEL	K-HCRHT	DIN 8555: MF 10-GF-60-G	Hard facing	127
KISWEL	K-700HT	-	Hard facing (HV 600-800)	129
KISWEL	K-800HT	-	Hard facing (HV 700-850)	130

MARITIME CLASSIFICATIONS SUMMARY



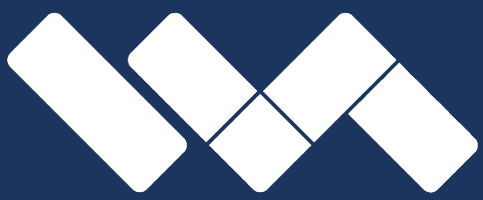
WELDING ANALITIX
COMPLETE WELDING SOLUTIONS

Maritime Classification Type Approvals

Brand	Product Name	ABS	BUREAU VERITAS	DNV	Lloyd's Register	KR KOREAN REGISTER	ClassNK
KISWEL	KCL-10	3,E6010	3	3	3m	-	KMW 3
KISWEL	KR-3000	2	2	2	2m NR	2	NKY-1239
KISWEL	K-7024	2Y, E7024	2Y	2Y	2Ym No	2Y	KMW52
KISWEL	K-7018NP	3Y H5	3Y H5	3Y H5	3Ym H5	-	-
KISWEL	K-8018	3Y	-	-	-	-	-
KISWEL	K-8018B2	3YH10, E8018-B2	-	2YH15	2YmH15	-	-
KISWEL	K-8018C1	3YH10, E8018-C1	-	3YH15	3YmH15	-	-
KISWEL	K-9018M	E9018M-H8	-	-	-	-	-
KISWEL	K-11018M	E11018M-H8	-	-	-	-	-
KISWEL	KST-308L	E308L-16	308L	VL 308L	304Lm	-	-
KISWEL	KST-309L	E309L-16	-	-	-	-	-
KISWEL	KST-316L	E316L-16	316L	VL 316L	316L m	RD 316L	-
KISWEL	K-71TLF	E71T-1M	3S,3YS,H10	III YMS (H10)	3YS H10	3YSG(C)H10	KSW53G(C)H 10
KISWEL	K-71TSR	4YSA H5 E71T-12J	4YS H5	IV YMS (H5)	BF 4YS	4YSG (C) H5	KSW54G (C) H5
KISWEL	K-71UT	4YSA, 4Y400SA H5	S4Y40H5	IV Y40MS(H5)	4Y40S H10	-	KSW54Y40G (C) H5
KISWEL	K-81TM	4YSAH5	4YSH5	IV YMS(H5)	4YSH5	-	-
KISWEL	K-81TK2	5YSA H5, 5Y400SA H5,	5Y40S H5	V Y40MS(H5)	5Y40S H5	L 3SG(C)H5	KSWL3G (C) H5
KISWEL	KC-28	3SA, 3YSA	SA3YM	III YMS	3YS H15	3YSG	KSW53G
KISWEL	M-316L	-	M-316L	VL 316L	-	RY316LG(M1)	-
MIG WELD	ML5356	ER5356	ER5183	ER5183	-	-	-
MIG WELD	ML5183	ER5183	ER5183	ER5183	ER5183	ER5183	-
KISWEL	T-50	2Y	4Y	IV YM	4YMH15	4YSG(I)	-
KISWEL	T-308L	ER308L	T-308L	NV 308 L	304Lm	RY308LG(I)	-
KISWEL	T-309L	-	T309L	VL 309 L	SS/CMn m	RY309LG(I)	-
KISWEL	T-316L	ER316L	T-316L	VL 316 L	316Lm	RY316LG(I)	-
KISWEL	T-2209	ER2209	ER2209	ER2209	S31803m	RY 31803	-
KISWEL	KW-TCuNi	ERCuNi	-	CuNi 30 Fe	-	-	-
AMPCO	AMPCO-TRODE® 10	ER CuAl-A2	-	-	-	-	-
AMPCO	AMPCO-TRODE® 40	ER CuMnNiAl	-	-	-	-	-
AMPCO	AMPCO-TRODE® 46	ER CuNiAl	-	-	-	-	-

COVERED ELECTRODES (SMAW)

- Unalloyed, Fine Grained and Low Alloyed Steel
- Cast Iron
- Stainless Steel
- Nickel Alloys
- Copper Alloys



UNALLOYED, FINE GRAINED & LOW ALLOYED STEEL

- KCL-10
- KR-3000
- K-7024
- K-7018NP
- K-8018
- K-8018B2
- K-8018C1
- K-9018M
- K-10018M
- K-11018M

Covered Electrodes

KCL-10

For 420MPa mild steel

KISWEL

Classifications

EN ISO 2560-A:2006	: E 38 0 C 22
EN ISO 2560-B:2006	: E 43 10 A
AWS A5.1-04	: E6010
KS D 7004	: E4311
JIS Z 321	: E4310

Approvals

ABS	: 3,E6010
BV	: 3
DNV	: 3
LR	: 3m
NK	: KMW3
Other	: JIS, CE

Description

- Covering is high cellulose type for welding of pipe, shipbuilding, tanks or galvanized surfaces and steel casting repairs
- Good penetration combined with freedom from lack of fusion makes this electrode an excellent choice for pipe welding
- Gives high ductility root weld and easy slag removal
- Redry the electrode at 70 - 80 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	V
0.11	0.36	0.63	0.015	0.013	0.02	0.03	0.01	0.01

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	0 °C	-30 °C	
AWS A5.1	Min. 330	Min. 430	Min. 22		≥ 27	
EN ISO 2560-A	Min. 380	470-600	Min. 20	≥ 47		
Example	420	500	29	60	40	AW

*AW: As-welded

Sizes available and recommended currents (DC+)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	350	350	350	350
Amperage	F	50-80	70-110	110-150	160-200
	V . OH	40-70	60-100	90-130	140-170

Covered Electrodes

KR-3000

For 420MPa mild steel

KISWEL

Classifications

EN ISO 2560-A:2006	: E 38 0 R 11
EN ISO 2560-B:2006	: E 43 13 A
AWS A5.1-04	: E6013
KS D 7004	: E4313
JIS Z 3211	: E4313

Approvals

ABS	: 2
BV	: 2
DNV	: 2
LR	: 2m
KR	: 2
NK	: NKY-1239
Other	: KS, JIS, CE

Description

- Covering is high titania type for welding of all kinds of light constructional work in all positions
- Excellent striking and restriking properties
- Excellent slag removal and bead appearance without undercut
- Redry the electrode at 70 - 100 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	V
0.06	0.35	0.40	0.020	0.011	0.02	0.03	0.01	0.01

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	RT	0 °C	
AWS A5.1	Min. 330	Min. 430	Min. 17			
EN ISO 2560-A	Min. 380	470-600	Min. 20		≥ 47	
Example	430	490	28	75	60	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +/-)

Diameter	(mm)	2.6	3.2	4.0	5.0	6.0
Length	(mm)	350	350	400	400	450
Amperage	F	60-100	80-130	130-180	160-220	210-280
	V . OH	60-90	80-110	90-140	120-190	-

Covered Electrodes

K-7024

For 490MPa high tensile steel

KISWEL

Classifications

EN ISO 2560-A:2006	: E 42 A RR 53
EN ISO 2560-B:2006	: E 49 24 A
AWS A5.1-04	: E7024
KS D 7004	: E4324
JIS Z 3211	: E4924

Approvals

ABS	: 2Y, E7024
BV	: 2Y
DNV	: 2Y
LR	: 2Ym No
NK	: KMW52
Other	: JIS, CWB, CE

Description

- Covering is iron powder, titania type for flat and horizontal fillet welding of ship structure, bridges, structural steels for buildings and general structures
- Designed for high efficiency in single pass
- Excellent slag removal and good bead appearance
- Redry the electrode at 120 – 150 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn*	P	S	Ni*	Cr*	Mo*	V*	*Sum
0.08	0.35	0.78	0.020	0.014	0.02	0.03	0.01	0.01	0.85

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	RT	0 °C	
AWS A5.1	Min. 400	Min. 490	Min. 17			
EN ISO 2560-A	Min. 420	500-640	Min. 20	≥ 47		
Example	480	570	28	65	50	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +/-)

Diameter	(mm)	3.2	4.0	4.5	5.0	5.5	6.0
Length	(mm)	400	450	450	450	450	450
Amperage	F	100-150	140-190	180-230	200-250	230-270	260-300
	H-Fillet						

Covered Electrodes

K-7018NP

For 490MPa high tensile steel

KISWEL

Classifications

EN ISO 2560-A:2006	: E 42 4 B 42 H5
EN ISO 2560-B:2006	: E 49 18-1 A U H5
AWS A5.1-04	: E7018-1 H4R
JIS Z 3211	: E4918-1 H5

Approvals

ABS	: 3YH5
BV	: 3YH5
DNV	: 3YH5
LR	: 3YmH5

Description

- Covering is low hydrogen, iron powder type for welding of nuclear reactor vessels, LPG tankers, LPG storage tanks and similar installations at low temperatures
- Good impact properties at -45 °C
- Excellent mechanical properties and radiographic soundness
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn*	P	S	Ni*	Cr*	Mo*	V*	*Sum
0.05	0.45	1.18	0.013	0.012	0.25	0.03	0.01	0.02	1.49

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-30 °C	-45 °C	
AWS A5.1	Min. 400	Min. 490	Min. 22		≥ 27	
EN ISO 2560-A	Min. 420	500-640	Min. 20	≥ 47		
Example	510	570	32	110	75	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0	6.0
Length	(mm)	350	350	400	400	450
Amperage	F	70-100	90-130	150-190	160-220	180-230
	V . OH	60-90	85-120	110-160	130-180	-

Covered Electrodes

K-8018

For 560MPa high tensile steel

KISWEL

Classifications

EN ISO 2560-A:2006	: E 46 3 B 32 H10
EN ISO 2560-B:2006	: E 55 18-G A H10
AWS A5.5-06	: E8018-G
KS D 7006	: E5316
JIS Z 3211	: E5518-G

Approvals

ABS	: 3Y
Other	: JIS, CE

Description

- Covering is low hydrogen, iron powder type for welding of 560MPa class high tensile steel in ships, bridges, penstocks and rails
- Excellent mechanical properties and radiographic soundness
- Satisfactory bead appearance and slag removal
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	V
0.06	0.56	1.32	0.018	0.011	0.35	0.03	0.25	0.01

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-20 °C	-30 °C	
AWS A5.5	Min. 460	Min. 550	Min. 19			
EN ISO 2560-A	Min. 460	530-680	Min. 20		≥ 47	
Example	490	590	28	95	80	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0	6.0
Length	(mm)	350	350	400	400	450
Amperage	F	60-90	90-130	140-190	180-230	250-310
	V . OH	50-80	80-110	120-170	160-200	-

Covered Electrodes

K-8018B2

For heat-resisting steel (1.25%Cr-0.5%Mo)

KISWEL

Classifications

EN ISO 3580-A:2006	: E CrMo1 B 32 H10
EN ISO 3580-B:2006	: E 55 18-1CM H10
AWS A5.5-06	: E8018-B2
KS D 7022	: DT2318
JIS Z 3223	: DT2318

Approvals

ABS	: 3YH10, E8018-B2
DNV	: 2YH15
LR	: 2YmH15
Other	: CE

Description

- Covering is low hydrogen, iron powder type for welding of 1.25%Cr-0.5%Mo steel used for steam pipes of boilers, oil refining industries pressure vessels for high temperature service
- Preheat at 150 - 300 °C and post heat treat at 680 - 730 °C
- High deposition rate in all positions
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	V
0.06	0.61	0.70	0.014	0.011	0.2	1.32	0.55	0.01

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	20 °C	0 °C	
AWS A5.5	Min. 460	Min. 550	Min. 19			
EN ISO 3580-A	Min. 355	Min. 510	Min. 22	≥ 47		
Example	590	670	25	80	65	PWHT

*PWHT: 690 °C x 1Hr

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0	6.0
Length	(mm)	350	350	400	400	450
Amperage	F	65-95	90-130	130-190	190-250	250-300
	V . OH	60-90	80-120	110-170	-	-

Covered Electrodes

K-8018C1

For low temperature service steel (560MPa)

KISWEL

Classifications

EN ISO 2560-A:2006	: E 46 6 2Ni B 32 H10
EN ISO 2560-B:2006	: E 55 18-N5 P U H10
AWS A5.5-06	: E8018-C1
JIS Z 3211	: E5518-N5 P U

Approvals

ABS	: 3YH10, E8018-C1
DNV	: 3YH15
LR	: 3YmH15
Other	: CE

Description

- Covering is low hydrogen, iron powder type for welding of 2.5%Ni steel and aluminium-killed steel used at low temperature, LPG tanks, etc.
- Stable are in flat and horizontal fillet welding
- Weld metal of fine ripple mark without undercut can be obtained
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	V
0.06	0.60	0.96	0.015	0.012	2.41	0.03	0.01	0.01

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-50 °C	-60 °C	
AWS A5.5	Min. 460	Min. 550	Min. 19		≥ 27	
EN ISO 2560-A	Min. 460	500-550	Min. 17		≥ 47	
Example	500	600	32	120	100	PWHT

*PWHT: 605 °C x 1Hr

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0	6.0
Length	(mm)	350	350	400	400	450
Amperage	F	65-100	90-130	130-190	190-250	250-300
	V . OH	60-90	85-120	110-160	-	-

Covered Electrodes

K-9018M

For 620MPa high tensile steel

KISWEL

Classifications

EN ISO 2560-A:2006	: E 50 5 Z B 32 H10
AWS A5.5-06	: E9018-M
KS D 7006	: E5816
JIS Z 3211	: E6218-N3M1

Approvals

ABS	: E9018M-H8
Other	: JIS, CE

Description

- Covering is low hydrogen, iron powder type for welding of 620MPa a class high tensile steel in bridges, pressure vessels, penstocks and machinery
- Excellent mechanical properties especially in notch toughness
- Satisfactory bead appearance and slag removal
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	V
0.05	0.51	0.8	0.013	0.011	1.58	0.10	0.20	0.01

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-40 °C	-50 °C	
AWS A5.5	540-620	Min.620	Min. 24		≥ 27	
EN ISO 2560-A	Min. 500	560-720	Min. 18		≥ 47	
Example	570	670	30	110	90	AW

*AW – As-Welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0	6.0
Length	(mm)	350	350	400	400	450
Amperage	F	50-100	90-130	140-190	190-240	250-310
	V . OH	40-80	80-115	110-160	140-170	-

Covered Electrodes

K-10018M

For 690MPa high tensile steel

KISWEL

Classifications

EN 757: 1997	: E 55 3 Z B 32 H10
AWS A5.5-06	: E10018-M
KS D 7006	: E7016
JIS Z 3211	: E6918-N3M2

Approvals

JIS, CE

Description

- Covering is low hydrogen, iron powder type for welding of 690MPa class high tensile steel in bridges, pressure vessels, penstocks and machinery
- Excellent mechanical properties especially in notch toughness
- Satisfactory bead appearance and slag removal
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	V
0.07	0.46	1.35	0.015	0.012	1.63	0.20	0.28	0.01

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-30 °C	-50 °C	
AWS A5.5	610-690	Min. 690	Min. 20		≥ 27	
EN 757	Min. 550	610-780	Min. 18	≥ 47		
Example	640	750	29	80	45	AW

* AW – As-Welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	3.2	4.0	5.0	6.0
Length	(mm)	350	400	400	450
Amperage	F	90-130	130-180	180-240	250-320
	V . OH	80-115	110-170	140-200	-

Covered Electrodes

K-11018M

For 760MPa high tensile steel

KISWEL

Classifications

EN 757: 1997	: E 62 3 Z B 32 H10
AWS A5.5-06	: E11018-M
KS D 7006	: E8016
JIS Z 3211	: E7618-N4M2

Approvals

ABS	: E11018M-H8
Other	: JIS, CE

Description

- Covering is low hydrogen, iron powder type for welding of low alloy high strength steels having tensile properties of about 740-790MPa such as HY80, etc
- Excellent mechanical properties especially in notch toughness
- Satisfactory bead appearance and slag removal
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	V
0.08	0.41	1.49	0.015	0.012	1.86	0.25	0.35	0.01

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-30 °C	-50 °C	
AWS A5.5	680-760	Min. 760	Min. 20		≥ 27	
EN 757	Min. 620	690-890	Min. 18	≥ 47		
Example	730	830	22	80	45	AW

* AW – As-Welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0	6.0
Length	(mm)	350	350	400	400	450
Amperage	F	50-100	90-130	130-180	180-240	240-320
	V . OH	40-90	80-120	110-160	140-200	-

CAST IRON

- **KFN-50**
- **KSN-100**

Covered Electrodes

KFN-50

For cast iron

KISWEL

Classifications

EN ISO 1071:2003	: E C NiFe-CI 1
AWS A5.15-90	: ENiFe-CI
KS D 7008	: DFCNiFe
JIS Z 3252	: DFCNiFe

Approvals

CE

Description

- Covering is graphite type for joining of spheroidal graphite cast iron or repairing of cast iron products such as cylinder covers, motor beds, casings and gears
- Good crack resistance and mechanical properties
- Preheat at 150 – 300 °C. The temperature to be applied varies in accordance with kind, shape and size of base metal
- Redry the electrode at 70 - 120 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Fe	Al
0.8	0.36	0.45	0.008	0.002	55.5	0.05	Rem.	0.05

Typical mechanical properties of all-weld metal

Tensile Strength	Hardness		
(MPa)	HV	HB	HS
550	180-210	171-200	26-30

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	300	350	350	550
Amperage	F	60-90	80-120	120-150	140-190

Covered Electrodes

KSN-100

For cast iron

Classifications

EN ISO 1071:2003	: E C Ni-CI 1
AWS A5.15-90	: ENi-CI
KS D 7008	: DFCNi
JIS Z 3252	: DFCNi

Approvals

CE

Description

- Covering is graphite type for repairing and joining of various kinds of cast iron products such as cylinder covers, motor beds, casings and gears or repairing of co cast iron, alloy cast iron and malleable cast iron
- Easily machinable deposited weld metal
- Chip off base metal completely at the repairing part
- Preheat at 150 – 300 °C. The temperature to be applied varies in accordance with kind, shape and size of base metal.
- Redry the electrode at 70 - 120 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cu	Fe	Al
0.55	0.40	0.35	0.009	0.001	Rem.	0.05	0.85	0.05

Typical mechanical properties of all-weld metal

Tensile Strength	Hardness		
(MPa)	HV	HB	HS
420	160-190	152-181	24-28

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	300	350	350	550
Amperage	F	60-90	70-110	110-130	130-150

STAINLESS STEEL

- KST-308L
- KST-308L-17
- KST-309L
- KST-309L-17
- KST-312
- KST-316L
- KST-316L-17
- KST-410
- KST-2209
- KST-2594

Covered Electrodes

KST-308L

For stainless steel (Low C, 18%Cr-8%Ni)

KISWEL

Classifications	
EN ISO 3581-A:2012	: E 19 9 L R 12
EN ISO 3581-B:2012	: ES308L-16
AWS A5.4-06	: E308L-16
KS D 7014	: E308L-16
JIS Z 3221	: ES308L-16

Approvals	
ABS	: E308L-16
BV	: 308L
DNV	: VL 308L
LR	: 304Lm
Other	: CWB, TUV, CE

Description

- Covering is lime titania type for welding of 18%Cr-8%Ni stainless steel (AISI 301, 302, 304, 308)
- Excellent welding efficiency because of high deposition rate
- Remove water, rust, oil and all foreign matters from the groove prior to welding
- Preheating is not necessary in general
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu	FN
0.03	0.73	0.65	0.028	0.012	10.07	18.86	0.21	0.30	5.3

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS)	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-20 °C	-196 °C	
AWS A5.4		Min. 520	Min. 35			
EN ISO 3581-A	Min. 320	Min. 510	Min. 30			
Example	430	600	44	65	25	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.0	2.6	3.2	4.0	5.0
Length	(mm)	250	300	350	350	350
Amperage	F	40-50	55-80	90-130	110-150	140-180
	V . OH	35-45	40-60	70-90	90-130	-

Covered Electrodes

KST-308L-17

For stainless steel (Low C, 18%Cr-8%Ni)

KISWEL

Classifications

EN ISO 3581-A:2012	: E 19 9 L R 12
EN ISO 3581-B:2012	: ES308L-17
AWS A5.4-06	: E308L-17
KS D 7014	: E308L-16
JIS Z 3221	: ES308L-17

Description

- Covering is lime titania type for welding of 18%Cr-8%Ni stainless steel (AISI 301, 302, 304, 308)
- Excellent welding efficiency because of high deposition rate
- Remove water, rust, oil and all foreign matters from the groove prior to welding
- Good usability with direct current applications
- Preheating is not necessary in general
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu	FN
0.03	0.73	0.65	0.028	0.012	9.82	18.95	0.21	0.30	6.4

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS)	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-20 °C	-196 °C	
AWS A5.4		Min. 520	Min. 35			
EN ISO 3581-A	Min. 320	Min. 510	Min. 30			
Example	440	590	46	70	25	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.0	2.6	3.2	4.0	5.0
Length	(mm)	250	300	350	350	350
Amperage	F	40-50	55-80	90-130	110-150	140-180
	V . OH	35-45	40-60	70-90	90-130	-

Covered Electrodes

KST-309L

For stainless steel (Dissimilar joint welding)

KISWEL

Classifications

EN ISO 3581-A:2012	: E 23 12 L R 12
EN ISO 3581-B:2012	: ES309L-16
AWS A5.4-06	: E309L-16
KS D 7014	: E309L-16
JIS Z 3221	: ES309L-16

Approvals

ABS	: E309L-16
Other	: CWB, CE

Description

- Covering is lime titania type for welding of 22%Cr-12%Ni stainless steel and heat-resisting castings, clad side of type 304 clad steels
- Welding of dissimilar steels such as Cr-Mo steel or carbon steel to stainless steel
- As its deposited weld metal has an austenitic structure, with suitable ferrite, crack resistance is good and intergranular corrosion resistance is superior to that of E309 type
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu	FN
0.03	0.84	0.76	0.027	0.013	12.97	23.04	0.08	0.09	11.1

*FN: WRC 1992

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS)	Tensile Strength	Elongation	Remarks
	(MPa)	(MPa)	(%)	
AWS A5.4		Min. 520	Min. 30	
EN ISO 3581-A	Min. 320	Min. 510	Min. 25	
Example	480	600	40	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.0	2.6	3.2	4.0	5.0
Length	(mm)	250	300	350	350	350
Amperage	F	30-50	50-80	80-110	110-150	140-180
	V . OH	25-45	45-60	70-90	90-130	-

Covered Electrodes

KST-309L-17

For stainless steel (Dissimilar joint welding)

KISWEL

Classifications

EN ISO 3581-A:2012	: E 23 12 L R 12
EN ISO 3581-B:2012	: ES309L-17
AWS A5.4-06	: E309L-17
KS D 7014	: E309L-16
JIS Z 3221	: ES309L-17

Description

- Covering is lime titania type for welding of 22%Cr-12%Ni stainless steel and heat-resisting castings, clad side of type 304 clad steels
- Welding of dissimilar steels such as Cr-Mo steel or carbon steel to stainless steel
- As its deposited weld metal has an austenitic structure, with suitable ferrite, crack resistance is good and intergranular corrosion resistance is superior to that of E309 type
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu	FN
0.03	0.84	0.76	0.027	0.013	12.95	23.14	0.08	0.09	11.2

*FN: WRC 1992

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS) (MPa)	Tensile Strength (MPa)	Elongation (%)	Remarks
AWS A5.4		Min. 520	Min. 30	
EN ISO 3581-A	Min. 320	Min. 510	Min. 25	
Example	460	580	46	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.0	2.6	3.2	4.0	5.0
Length	(mm)	250	300	350	350	350
Amperage	F	30-50	50-80	80-110	110-150	140-180
(A)	V . OH	25-45	45-60	70-90	90-130	-

Covered Electrodes

KST-312

For stainless steel (Cladding or Dissimilar joint)

KISWEL

Classifications

EN ISO 3581-A:2012	: E 29 9 R 12
EN ISO 3581-B:2012	: ES312-16
AWS A5.4-06	: E312-16
KS D 7014	: E312-16
JIS Z 3221	: ES312-16

Approvals

Other	: CE

Description

- Covering is lime titania type for welding of 29%Cr-9%Ni type cast steels and difficult to weld steel
- Joint welding and hardfacing of stainless steel and heat resisting steels
- Good crack resistance because of extremely high quantity of ferrite of the deposited weld metal
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu
0.08	0.45	1.30	0.028	0.012	8.49	29.13	0.10	0.11

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS)	Tensile Strength	Elongation	Remarks
	(MPa)	(MPa)	(%)	
AWS A5.4		Min. 660	Min. 22	
EN ISO 3581-A	Min. 450	Min. 650	Min. 15	
Example	510	760	25	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	300	350	350	350
Amperage	F	40-80	70-110	110-140	140-180
	V . OH	35-75	70-90	80-120	-

Covered Electrodes

KST-316L

For stainless steel (Low C, 18%Cr-12% Ni-Mo)

KISWEL

Classifications

EN ISO 3581-A:2012	: E 19 12 3 L R 12
EN ISO 3581-B:2012	: ES316L-16
AWS A5.4-06	: E316L-16
KS D 7014	: E316L-16
JIS Z 3221	: ES316L-16

Approvals

ABS	: E316L-16
BV	: 316L
DNV	: VL 316L
LR	: 316Lm
KR	: RD316L
Other	: CWB, TUV, CE

Description

- Covering is lime titania type for welding of 18%Cr-12%Ni stainless steel (AISI 316) or dissimilar steels
- Especially suitable for flat and horizontal fillet welding
- Excellent corrosion resistance against sulphurous acid, phosphoric acid and acetic acid
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu	FN
0.03	0.75	0.80	0.028	0.011	11.71	17.95	2.60	0.12	5.7

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS)	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-20 °C	-196 °C	
AWS A5.4		Min. 490	Min. 30			
EN ISO 3581-A	Min. 320	Min. 510	Min. 25			
Example	390	570	43	75	40 (0.47)	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.0	2.6	3.2	4.0	5.0
Length	(mm)	250	300	350	350	350
Amperage	F	40-50	55-70	80-110	120-150	140-180
	V . OH	35-45	45-60	70-90	90-130	-

Covered Electrodes

KST-316L-17

For stainless steel (Low C, 18%Cr-12% Ni-Mo)

KISWEL

Classifications

EN ISO 3581-A:2012	: E 19 12 3 L R 12
EN ISO 3581-B:2012	: ES316L-17
AWS A5.4-06	: E316L-17
KS D 7014	: E316L-16
JIS Z 3221	: ES316L-17

Description

- Covering is lime titania type for welding of 18%Cr-12%Ni stainless steel (AISI 316) or dissimilar steels.
- As low carbon welded can be obtained, intergranular corrosion resistance is superior to that of E316 type.
- Good crack resistance and usability of austenitic structure with suitable ferrite of the deposited W.M.
- Excellent usability with direct current applications.

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu	FN
0.03	0.75	0.80	0.028	0.011	11.71	18.02	2.75	0.12	6.2

*FN: WRC 1992

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS)	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-20 °C	-196 °C	
AWS A5.4		Min. 490	Min. 30			
EN ISO 3581-A	Min. 320	Min. 510	Min. 25			
Example	420	590	45	75	26	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.0	2.6	3.2	4.0	5.0
Length	(mm)	250	300	350	350	350
Amperage	F	40-50	55-70	80-110	120-150	140-180
	V . OH	35-45	45-60	70-90	90-130	-

Covered Electrodes

KST-410

For stainless steel (13%Cr, Hardfacing)

KISWEL

Classifications

EN ISO 3581-A:2012	: E 13 R 12
EN ISO 3581-B:2012	: ES410-16
AWS A5.4-06	: E410-16
KS D 7014	: E410-16
JIS Z 3221	: ES410-16

Approvals

CE

Description

- Covering is lime titania type for welding of 13%Cr steel and surfacing of the part where cavitation or corrosion resistance is required
- Excellent oxidation corrosion and abrasion resistance of the deposited weld metal
- Preheat at 100-250°C and postheat treat at 700-800°C because of high self-hardening property of the deposited weld metal
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu
0.08	0.70	0.76	0.030	0.004	0.15	12.10	0.10	0.08

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS) (MPa)	Tensile Strength (MPa)	Elongation (%)	Remarks
AWS A5.4		Min. 450	Min. 20	
EN ISO 3581-A	Min. 250	Min. 450	Min. 15	
Example	400	560	24	PWHT

*PWHT: 750°C x 1Hr

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	300	350	350	350
Amperage	F	60-90	80-110	110-150	150-180
	V . OH	45-60	70-90	90-130	-

Covered Electrodes

KST-2209

For duplex stainless steel (22%Cr-9% Ni-Mo)

KISWEL

Classifications

EN ISO 3581-A:2012	: E 22 9 3 N L R 12
EN ISO 3581-B:2012	: ES2209-16
AWS A5.4-06	: E2209-16
JIS Z 3221	: ES2209-16

Approvals

CE

Description

- Covering is lime titania type for welding of 22%Cr-9%Ni-3%Mo duplex stainless steel, the principal applications are chemical plant and shipbuilding as well as nuclear plant industries. (UNS S31803)
- Excellent pitting corrosion resistance and stress corrosion cracking resistance
- Please perform welding with selecting proper heat input according to the required mechanical properties
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	N	PREN
0.02	0.62	0.80	0.025	0.011	8.73	22.63	3.19	0.18	35.0

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS)	Tensile Strength	Elongation	Remarks
	(MPa)	(MPa)	(%)	
AWS A5.4		Min. 690	Min. 20	
EN ISO 3581-A	Min. 450	Min. 550	Min. 20	
Example	550	780	24	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	300	350	350	350
Amperage	F	50-80	80-110	110-150	140-180
	V . OH	40-60	70-100	90-130	-

Covered Electrodes

KST-2594

Super duplex stainless steel (25%Cr-9% Ni-Mo)

KISWEL

Classifications

EN ISO 3581-A:2012	: E 25 9 4 N L R 12
EN ISO 3581-B:2012	: ES2594-16
AWS A5.4-06	: E2594-16 :

Description

- Covering is lime titania type for welding of 25%Cr-9%Ni-4%Mo-02%N super duplex stainless steel

The principal applications are chemical plant and shipbuilding as well as nuclear plant industries (UNS S32750)

- Excellent pitting corrosion resistance and stress corrosion cracking resistance
- Please perform welding with selecting proper heat input according to the required mechanical properties
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	N	PREN
0.03	0.54	0.75	0.025	0.011	9.59	25.11	3.90	0.25	42.0

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS) (MPa)	Tensile Strength (MPa)	Elongation (%)	Remarks
AWS A5.4		Min. 760	Min. 15	
EN ISO 3581-A	Min. 550	Min. 620	Min. 18	
Example	810	930	28	AW

*AW: As-welded

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	300	350	350	350
Amperage	F	50-80	80-110	110-150	140-180
	V . OH	40-60	70-100	90-130	-

NICKEL ALLOYS

- KW-A82
- KW-A82M
- KW-A625

Covered Electrodes

KW-A82

For nickel alloy (Inconel 600, 601)

Classifications

EN ISO 14172:2004	: E Ni 6182
AWS A5.11-05	: ENiCrFe-3
JIS Z 3224	: DNiCrFe-3
KS D 7021	: DNiCrFe-3

Description

- Covering is low hydrogen type for welding of Ni-Cr-Fe alloy steel (Inconel 600,601) or different materials such as Inconels, Inconel and low alloy steels, stainless steels and low alloy steels.
- KNCF-A82 makes safety welding with good weldability and usability.
- Excellent heat resistance, corrosion resistance and mechanical quality of all weld metal.
- Redry the electrode at 300 - 400 °C for 1 – 2 hours prior to use.

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Fe	Ni	Cr	Ti	Nb + Ta
0.02	0.57	5.57	0.010	0.004	7.32	Rem.	15.27	0.12	2.16

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS) (MPa)	Tensile Strength (MPa)	Elongation (%)	Remarks
AWS A5.11		Min. 550	Min. 30	
EN ISO 14172	Min. 360	Min. 550	Min. 27	
Example	510	660	48	AW

*AW: As-welded

Sizes available and recommended currents (DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	300	300	350	350
Amperage	F	60-80	80-120	120-150	150-180
	V . OH	50-70	70-100	100-140	-

Covered Electrodes

KW-A82M

For nickel alloy

Classifications

EN ISO 14172:2004	: E Ni 6082
AWS A5.11-05	: ENiCrFe-3 (mod)

Description

- Covering is low hydrogen type for welding of Ni-Cr-Fe alloy steel or different materials such as Inconels, Inconel and low alloy steels, stainless steels and low alloy steels
- Excellent heat resistance, corrosion resistance and mechanical quality of all weld metal
- Redry the electrode at 300 - 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Fe	Ni	Cr	Mo	Nb + Ta
0.04	0.34	4.24	0.003	0.010	2.96	Rem.	20.20	1.73	1.95

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS)	Tensile Strength	Elongation	Remarks
	(MPa)	(MPa)	(%)	
EN ISO 14172	Min. 360	Min. 600	Min. 22	
Example	430	690	47	AW

*AW: As-welded

Sizes available and recommended currents (DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	300	300	350	350
Amperage	F	60-80	80-120	120-150	150-180
(A)	V . OH	50-70	70-100	100-140	-

Covered Electrodes

KW-A625

For nickel alloy (Inconel 625)

KISWEL

Classifications

EN ISO 14172:2004	: E Ni 6625
AWS A5.11-05	: ENiCrMo-3
JIS Z 3224	: DNiCrMo-3
KS D 7021	: DNiCrMo-3

Approvals

DNV	: NV 1.5 Ni. NV 3.5 Ni, NV 5Ni and 9 Ni. Test temperature -196°C
Other	: CE

Description

- Covering is lime titania type for welding of Inconel 625, Incoloy 825 and other molybdenum containing stainless steels

The weld metal has high strength at room and elevated temperatures and has exceptional corrosion resistance, including resistance to pitting, crevice corrosion, etc

- The electrodes provide excellent operability for groove and fillet welding in the down hand position
- Easy slag removal, low spatter generation and stable arc characteristics
- Redry the electrode at 250 - 350 °C for 30 – 60 minutes prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Fe	Ni	Cr	Mo	Nb + Ta
0.03	0.22	0.54	0.008	0.004	1.64	Rem.	21.9	8.6	3.8

Typical mechanical properties of all-weld metal

	Yield Strength (0.2%OS) (MPa)	Tensile Strength (MPa)	Elongation (%)	Remarks
AWS A5.11		Min. 760	Min. 30	
EN ISO 14172	Min. 420	Min. 760	Min. 27	
Example	520	770	40	AW

*AW: As-welded

Sizes available and recommended currents (DC +)

Diameter	(mm)	2.6	3.2	4.0	5.0
Length	(mm)	300	350	350	350
Amperage	F	60-90	90-120	140-180	170-210
	V . OH	60-90	70-100	120-160	130-170

COPPER ALLOYS

- AMPCO-TRODE® 10
- AMPCO-TRODE® 40
- AMPCO-TRODE® 46

Covered Electrodes

AMPCO-TRODE® 10

Aluminium-Bronze

Classifications

AWS A5.6	: E CuAl-A2
ASME SFA 5.6	: E CuAl-A2

Approvals

ABS Certified	: ERCuAl-A2

Description

- AMPCO-TRODE® 10 aluminum bronze is the most versatile welding electrode in AMPCO's family of alloys
- AMPCO-TRODE® 10 contains an additive to inhibit inter- granular stress corrosion cracking. This is particularly important when welding C61300 and C61400 base metal
- AMPCO-TRODE® 10 will weld and join many ferrous and nonferrous metals and combinations of dissimilar metals. These metals include the more weld-able grades of cast iron, high and low carbon steels, copper, bronzes and copper-nickel alloys
- Applications for AMPCO-TRODE® 10 include building up bearing surfaces, joining and fabricating copper alloys, overlaying for resistance to corrosion and erosion and general maintenance and repair welding

Typical Applications

Cast iron, malleable iron, cast iron to steel, cast iron to bronze, steel to bronze, aluminium bronze, silicon bronze, manganese bronze, cupro-, nickel, tool steel, copper to steel, bearings, bushings, pump housings, condenser boxes, hydraulic pistons, brake drums, tractor gear housings idler pulleys, pickling hooks, paper mill rolls, motor bases, tin plate mill rolls, impellers, valve seats, gears, mixer arms, press rams, ship propellers, lance heads, turbine runners adjusting and spindles.

Limiting chemical composition of all-weld metal (%)

Cu*	Al	Fe	Si	Other
Rem.	6.5-9.0	0.50-5.0	1.5 max	0.5 max

*Including silver

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (3000 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	241	531	27	27	119

Sizes available

Diameter	(mm)	3.2	4.0
Length	(mm)	305	356

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

AMPCO-TRODE® 40

Manganese-Nickel-Aluminium-Bronze

Classifications	
AWS A5.6	: ER CuMnNiAl
ASME SFA 5.6	: E CuMnNiAl

Approvals	
ABS Certified	: ERCuMnNiAl

Description

- AMPCO-TRODE® 40 manganese-nickel-aluminium bronze is for welding cast ship propellers conforming to MIL-B-21230, Alloy 2 for high resistance to corrosion, erosion and cavitation
- AMPCO-TRODE® 40 also exhibits good ability to join dissimilar metals
- Typical applications include ship propellers, marine components, welding cast iron, joining dissimilar metals

Typical Applications

Ship propellers, marine components, welding cast iron and joining dissimilar metals.

Limiting chemical composition of all-weld metal (%)

Cu*	Al	Fe	Ni	Mn	Si	Other
Rem.	7.0-8.50	2.0-4.0	1.5-3.0	11.0-14.0	1.5 max	0.5 max

*Including silver

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (3000 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	386	655	27	38	185

Sizes available

Diameter	(mm)	3.2	4.0
Length	(mm)	305	356

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

Covered Electrodes

AMPCO-TRODE® 46

Nickel-Aluminium-Bronze

Classifications

AWS A5.6	: E CuNiAl
ASME SFA 5.6	: E CuNiAl

Approvals

ABS Certified	: ERCuNiAl

Description

- AMPCO-TRODE® 46 nickel-aluminium bronze was developed for the welding of cast and wrought nickel-aluminium bronze
- AMPCO-TRODE® 46 is also recommended for weld repairing NiBral boat propellers
- Typical applications include ship fittings, power plant valves, intake screens, welding AMPCO® 45, oil recovery pumps, propeller gear housings, marine propulsion systems, ship propellers, piping systems and welding AMPCO® 483

Typical Applications

Ship fittings, ship propellers, power plant valves, piping systems, intake screens, welding AMPCO® 483, welding AMPCO® 45, marine propulsion systems, propeller gear housings and oil recovery pumps.

Limiting chemical composition of all-weld metal (%)

Cu*	Al	Fe	Ni	Mn	Si	Other
Rem.	8.50-9.50	3.0-6.0	4.0-6.0	0.5-3.50	1.5 max	0.5 max

*Including silver

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (3000 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	400	683	25	22	187

Sizes available

Diameter	(mm)	3.2	4.0
Length	(mm)	356	356

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

FLUX CORED WIRES (FCAW)

- Unalloyed, Fine Grained and Low Alloyed Steel
- Stainless Steel

UNALLOYED, FINE GRAINED & LOW ALLOYED STEEL

- K-71TLF
- K-71TM
- K-71TSR
- K-71UT
- K-81TM
- K-81TK2
- K-NGS11 (Self-shielded)
- KX-706M (Metal Cored)

Flux Cored Welding Wire

K-71TLF

For 490MPa high tensile steel

KISWEL

Classifications

EN ISO 17632-A:2015	: T 42 2 P C1 1 H5
	: T 46 2 P M21 1 H10
EN ISO 17632-B:2015	: T 49 2 T1-1C1A-U H5
	: T 49 2 T1-1M21A-U H10
JIS Z 3313-2009	: T 49 2 T1-1C/M A-U H10
AWS A5.20-2005(R2015)	: E71T-1C/-M
AWS A5.36-2016	: E71T1-C1A0-CS1-H4
	: E71T1-M21A0-CS1-H8
D 7104-2012	: YFW-C(A)50DR

Approvals – C1 (100% CO_2)

ABS	: E71T-1M
BV	: 3S,3YS,H10
DNV	: III YMS (H10)
LR	: 3YS H10
KR	: 3YSG(C)H10
NK	: KSW53G(C)H10
RINA	: 3Y S
Other	: CCC, RS, CWB, JIS, TUV, DB

Approvals – M21 (Ar 80% + CO_2 20%)

ABS	: 3YSA H10
BV	: 3S,3YS
DNV	: III YMS
LR	: 3YS No
RINA	: 3Y S H10

Description

- It is designed for welding of 490MPa high tensile steel with outstanding mechanical properties
- Typical applications include machineries, shipbuilding, offshore structures, bridges and general fabrications
- Wire is titania type of flux cored wire for all-position welding
- It provides low fume generation and has good impact strength at low temp

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2 (15 – 25 l/min)
- Mix: Ar 80% + CO_2 20%

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S
CO_2	0.03	0.38	1.35	0.015	0.010

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-20 °C	-30 °C	
AWS A5.20	Min. 390	490-670	Min. 22	≥ 27		
EN ISO 17632-B	Min. 390	490-670	Min. 18	≥ 47		
Example	520	570	28	80	50	CO_2

Notes on usage and welding condition

- Refer to KISWEL welding handbook page 219-221 for more information on usage

Package

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	5, 12.5, 15, 20
Pailpack (kg)	100 - 300

Flux Cored Welding Wire

K-71TM

For 490MPa high tensile steel

Classifications

EN ISO 17632-A:2015	: T42 0 R C1 1 H5
	: T46 0 R M21 1 H10
EN ISO 17632-B:2015	: T49 2 T1-1C1(M21)A-U H5(H10)
JIS Z 3313-2009	: T49 2 T1-1MA-U H10
AWS A5.20-2005(R2015)	: E7 1T-1C/-1M
AWS A5.36-2016	: E7 1T1-C1/M21A2-CS1-H8
KS D 7104-2012	: YFW-A(C)502R

Approvals – M21 (Ar 80% + CO_2 20%)

ABS	: 3YSA H10
BV	: SA3YM
DNV	: III YMS
LR	: 3YS
Other	: TUV

Description

- It is designed for welding of 490MPa high tensile steel with outstanding mechanical properties
- Typical applications include machineries, shipbuilding, offshore structures, bridges and general fabrications
- Wire is titania type of flux cored wire for all-position welding
- The shielding gas should be used is Ar+20% CO_2, low spatter generation, smooth bead shape, high X-ray safety

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Mix: 80% Ar + 20% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S
Mix	0.03	0.59	1.44	0.013	0.010

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-20 °C	-30 °C	
AWS A5.20	Min. 390	490-670	Min. 22	≥ 27		
EN ISO 17632-B	Min. 390	490-670	Min. 18	≥ 47		
Example	550	610	30	65	50	Mix

Notes on usage and welding condition

- Refer to KISWEL welding handbook page 219-221 for more information on usage
- For Mix gas, voltage should be lowered by 1-2 volts compared to when you weld with 100% CO_2

Package

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	5, 12.5, 15, 20
Pailpack (kg)	100 - 300

Flux Cored Welding Wire

K-71TSR

For 490MPa low temperature service steel (PWHT)

KISWEL

Classifications

EN ISO 17632-A2015	: T42 4 P C1 1 H5
EN ISO 17632-B:2015	: T49 4 T1-1C1 AP-N1-U H5
JIS Z 3313-2009	: T49 4 T1-1C AP-N1-U H5
AWS A5.20-2005(R2015)	: E71T-12CJ H4
ASW A5.36-2016	: E71T1-C1A/P4-CS2-H4
KS D 7104-2012	: YFL-C504R

Approvals – C1 (100% CO_2)

ABS	: 4YSA H5 E71T-12J
BV	: 4YS H5
DNV	: IV YMS (H5)
LR	: BF 4YS
KR	: 4YSG (C) H5
NK	: KSW54G (C) H5
Other	: RS, JIS

Description

- It is designed for welding of 490MPa low temperature steels (NACE/API steel)
- Typical applications include railcar, automotive machinery, shipbuilding, bridges, heavy equipment etc
- Wire is titania type of flux cored wire for all-position welding
- It features excellent mechanical properties, easy slag removal, low spatter generation and good impact value at low temperatures down to -40°C in PWHT conditions

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S	Ni
CO_2	0.02	0.45	1.41	0.010	0.009	0.41

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-30 °C	-40 °C	
AWS A5.20	Min.390	490-620	Min.22	≥ 27		
EN ISO 17632-B	Min.390	490-670	Min.18		≥ 47	
Example As-Weld	578	612	25	138	119	
(CO_2) PWHT	558	600	27	69	52	620°C x 2 Hr

Notes on usage and welding condition

- Refer to KISWEL welding handbook page 219-221 for more information on usage

Package

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	5, 12.5, 15, 20
Pailpack (kg)	100 - 300

Flux Cored Welding Wire

K-71UT

For 490MPa low temperature service steel

Classifications

EN ISO 17632-A:2015	: T 42 4 P C1 1 H5
EN ISO 17632-B:2015	: T 49 4 T1-1C1 A-U H5
JIS Z 3313-2009	: T 49 4 T1-1C A-U H5
AWS A5.20-2005(R2015)	: E71T-9CJ H4
AWS A5.36-2016	: E71T1-C1A4-CS1-H4
KS D 7104-2012	: YFL-C504R

Approvals – C1 (100% CO_2)

ABS	: 4YSA, 4Y400SA H5
BV	: S4Y40H5
DNV	: IV Y40MS(H5)
LR	: 4Y40S H10
Other	: JIS

Description

- It is designed for welding of 490MPa low temperature steels
- Typical applications include railcars, automotive machinery, shipbuilding, bridges, heavy equipment etc
- Wire is titania type of flux cored wire for all-position welding
- It features excellent mechanical properties, easy slag removal, low spatter generation and good impact at low temperature down to -40 °C

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S	Ni
CO_2	0.04	0.30	1.35	0.014	0.010	0.39

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-30 °C	-40 °C	
AWS A5.20	Min. 390	490-670	Min. 22		≥ 27	
EN ISO 17632-B	Min. 390	490-670	Min. 18		≥ 47	
Example	540	600	27	76	55	CO_2

Notes on usage and welding condition

- To prevent cracks at low temperatures, preheat and maintain Interpass temperature at 100 – 200 °C.
- Refer to KISWEL welding handbook page 219-221 for more information on usage

Package

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	5, 12.5, 15, 20
Pailpack (kg)	100 - 300

Flux Cored Welding Wire

K-81TM

For 560MPa high tensile steel

Classifications

EN ISO 17632-A:2008	: T50 4 1Ni P M 1 H5
EN ISO 17632-B:2008	: T55 4 T1-1MA-N2 H5
JIS Z 3313	: T57 4 T1-1MA-N2-U H5
AWS A5.29-10	: E81T1-Ni1M
AWS A5.36-12	: E81T1/T9-M21A4-Ni1-H4
KS D 7104	: YFW-A604R

Approvals – M21 (Ar 80% + CO_2 20%)

ABS	: 4YSAH5
BV	: 4YSH5
DNV	: IV YMS(H5)
LR	: 4YSH5

Description

- It is designed for welding of 560MPa high tensile steel with outstanding mechanical properties
- Typical applications include machineries, shipbuilding, offshore structures, bridges and general fabrications
- Wire is a titania type of flux cored wire for all-position welding with 1.0% Ni
- It provides good wet-in capabilities along with high impact values at low temperature (-40 °C)

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Mix: Ar + 20% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S	Ni
Mix	0.03	0.35	1.17	0.013	0.010	0.92

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-30 °C	-40 °C	
AWS A5.29	Min. 470	550-690	Min. 19	≥ 27		
EN ISO 17632-B	Min. 460	550-740	Min. 17		≥ 27	
Example	590	650	28	120	100	Mix

Notes on usage and welding condition

- For Mix gas, voltage should be lowered by 1-2 volts compared to when you weld with 100% CO_2
- Refer to KISWEL welding handbook page 219-221 for more information on usage

Package

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	5, 12.5, 15, 20
Pailpack (kg)	100 - 300

Flux Cored Welding Wire

K-81TK2

For 560MPa low temperature service steel (1.5%Ni)

Classifications

EN ISO 17632-A:2015	: T50 6 1.5Ni P C1 1 H5
EN ISO 17632-B:2015	: T55 6 T1-1C1 A-N3-U H5
JIS Z 3313-2009	: T55 6 T1-1C A-N3-U H5
AWS A5.29-2010	: E81T1-K2C H4
AWS A5.36-2016:	: E81T1-C1A8-K2-H4
KS D 7104-2012	: YFL-C506R

Approvals – C1 (100% CO_2)

ABS	: 5YSA H5, 5Y400SA H5, E81T1-KC2 H4
BV	: 5Y40S H5
DNV	: V Y40MS(H5)
LR	: 5Y40S H5
KR	: L 3SG(C)H5
NK	: KSWL3G(C)H5

Description

- It is designed for welding of 560MPa high tensile steel for low temperature service
- Typical applications include offshore structures, LNG and LPG carriers and storage tank
- Wire is metal type of flux cored wire for all-position welding
- The weld metal contains about 15%Ni along with high impact values at low temp(-60°C)
- It features good porosity resistance and easy slag removal, and deposition rate is higher than a titania type wire

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S	Ni
CO_2	0.03	0.45	1.50	0.012	0.009	1.50

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-30 °C	-60 °C	
AWS A5.29	Min. 470	550-690	Min. 19	≥ 27		
EN ISO 17632-B	Min. 460	550-740	Min. 17		≥ 47	
Example	550	640	25	120	55	CO_2

Notes on usage and welding condition

- To prevent crack at low temperatures, preheat and maintain Interpass temperatures at 100-200 °C
- Refer to KISWEL welding handbook page 219-221 for more information on usage

Package

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	5, 12.5, 15, 20
Pailpack (kg)	100 - 300

Flux Cored Welding Wire

K-NGS11

For 490MPa high tensile steel (self-shielded, multi-pass)

KISWEL

Classifications

EN ISO 17632-A:2016	: T 42 Z Y NO 1
EN ISO 17632-B:2016	: T 49 Z T11-1NOA
JIS Z 3313-2009:	: T 49 T7-1 N A
AWS A5.20-2005	: E71T-11
AWS A5.36-2016	: E71T11-AZ-CS3
KS D 7104-2012	: YFL-S50GB

Description

- For 490MPa high tensile steel and self-shielded wire to facilitate outdoor conditions
- Typical applications include general fabrication and structural work requiring no impact properties (ASTM A36 Gr. All; A109 Gr. All; A283 Gr. A, B, C, D; A284 Gr. C, D; A285 Gr. A, B, C; A288 Gr. 1; A372 type I; A500 Gr. All; A501 Gr. All)
- For single and multi-pass welding in all positions
- It has good arc stability, low spatter generation, high efficiency, good bead shape and easy slag removal
- The welding polarity is DCEN (wire negative)

Welding positions

Polarity

- DCEN (DC-)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S	Al
None	0.10	0.10	0.55	0.015	0.006	1.21

Typical mechanical properties of all-weld metal

	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Remarks
AWS A5.20	Min. 390	490-670	Min. 20	
EN ISO 17632-B	Min. 390	490-670	Min. 18	
Example	500	530	23	

Notes on usage and welding condition

- Self shielded FCW generates more fumes than titania type FCW Ventilation system to be used in small and confined spaces
- To prevent crack at low temperatures, preheat and maintain Interpass temperatures at 100-200 °C

Package

Diameter (mm)	0.9, 1.2, 1.6
Spool (kg)	4.5, 12.5, 15, 20
Coil (kg)	20, 25

Operating data

Diameter	(mm)	0.9	1.2	1.6
Amperage (A)	F (PA/1G)	80-120	120-180	240-280
Voltage (V)		18-22	21-23	22-24

Flux Cored Welding Wire

KX-706M

For 490MPa high tensile steel (METAL Cored - Non-slag type)

KISWEL

Classifications

EN ISO 17632-A:2015	: T 46 2 M M21 3 H5
EN ISO 17632-B:2015	: T 49 3 T15-0 M21A H5
JIS Z 3313-2009	: T 49 3 T15-0 MA H5
AWS A5.18-2005	: E70C-6M
AWS A5.36-2016	: E70T15-M21A2-CS1-H4
KS D 7104-2012	: YFW-A502M

Approvals – M21 (Ar 80% + CO_2 20%)

ABS	: 3YSA H10
BV	: 3SA,3YSA
DNV	: III YMS
LR	: 3YS No

Description

- Metal cored wire designed for welding of 490 MPa high tensile steel with outstanding mechanical properties
- Typical applications include machineries, shipbuilding, offshore structures, bridges and general fabrications
- It has better CVN toughness at low temperatures when compared to the KX-70CM
- It features good penetration, high resistance to porosity, good wetting behavior as well as low hydrogen content
- KX-706M is intended for semi-automatic, automatic, single- and multi pass welding

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Mix: Ar + 20% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S
Mix	0.04	0.60	1.5	0.014	0.010

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-20 °C	-30 °C	
AWS A5.18	Min. 400	Min. 480	Min. 22		≥ 27	
EN ISO 17632-B	Min. 390	490-670	Min. 18		≥ 27	
Example	480	540	29	70	55	Mix

Notes on usage and welding condition

- Self shielded FCW generates more fumes than titania type FCW
Ventilation system to be used in small and confined spaces
- To prevent crack at low temperatures, preheat and maintain
Interpass temperatures at 100-200 °C

Package

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	5, 12.5, 15, 20
Coil (kg)	100 - 300

Operating data

Diameter	(mm)	1.2	1.4	1.6
Amperage (A)	F (PA/1G)	160-340	200-380	240-420
Voltage (V)		24-32	25-33	26-35

STAINLESS STEEL

- **K-410NiMoTC**

Flux Cored Welding Wire

K-410NiMoTC

For Martensitic Stainless welding wire (13%Cr-Ni, Hardfacing)

KISWEL

Classifications

EN ISO 17633-A:2008	: T 13 4 P C 1
EN ISO 17633-B:2008	: TS410NiMo-FC1
AWS A5.22-15	: E410NiMoT1-1
JIS Z 3323	: TS410NiMo-FC1

Description

- K-410NiMoTC is designed for MAG welding of soft-martensite stainless alloys of the 13%Cr-4%Ni-Mo types (AISI 403, 405, 410, JIS SCS3, SCS6, SB410, ASTM CA15M)
- Wire is a titania type of flux cored wire for all-position welding with 100% CO2 gas
- It features self-detaching slag, spray-like transfer, low spatter generation, smooth bead surface and high X-ray safety
- The machinability of the weld metal depends largely upon the kind of base material and the degree of welding dilution

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	Cr	Ni	Mo
CO_2	0.04	0.55	0.45	12.20	4.80	0.55

Typical mechanical properties of all-weld metal

	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	PWHT
AWS A5.22		Min. 760	Min. 15	
EN ISO 17633-B	Min. 500	Min. 750	Min. 15	
Example (CO2)	900	950	18	620 °C

* After machining, but before testing, the specimen was aged at a temperature of 100 °C for up to 48 hours, then allowed to cool to room temperature.

Notes on usage and welding condition

- Preheating and Interpass temperatures in case of thick-walled section 100-160°C and maximum heat input 15KJ/cm and tempering at 580-620°C.

Package

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	5, 12.5, 15, 20
Coil (kg)	100 - 300

Operating data

Diameter	(mm)	1.2	1.4	1.6
Amperage (A)	F (PA/1G)	160-340	200-380	240-420
Voltage (V)		24-32	25-33	26-35

MIG/MAG WIRES (GMAW)

- Unalloyed, Fine Grained and Low Alloyed Steel
- Stainless Steel
- Nickel Alloys
- Aluminium
- Copper Alloys

UNALLOYED, FINE GRAINED & LOW ALLOYED STEEL

- KC-25M
- KC-28
- KC-28CF
- KC-29
- KC-37S
- ZH-100
- KC-90SB3

KC-25M

For mild steel and 490MPa tensile strength steel

Classifications

EN ISO 14341-A:2008	: G 42 2 M G2Si1
EN ISO 14341-B:2008	: G 49A 2 M G3
AWS A5.18-05	: ER70S-3
KS D 7025	: YGW16
JIS Z 3312	: YGW16

Description

- For butt and fillet welding of shipbuilding, bridges, structural steel, steel buildings, machineries and vehicles
- Suited for application of sheet metal with mixture gas and all welding positions
- Low slag formation, high deposition rate and superior arc stability

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Mix: Ar+20% CO_2 (15 – 25 l/min)
- CO_2: 100% CO_2 (15 – 25 l/min)

Typical chemical composition of wire (%)

C	Si	Mn	P	S
0.07	0.67	1.20	0.015	0.011

Typical mechanical properties of all-weld metal

	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Impact Value (J) -30 °C	Remarks
AWS A5.18	Min. 400	Min. 480	Min. 22	≥ 27	CO_2
EN ISO 14341-A	Min. 420	500-640	Min. 20	≥ 47	Mix
Example	440	540	30	100	Mix

Operating data

Diameter (mm)		1.2	1.4
Current (Amp)	Flat (PA/1G)	100-350	140-400
	Vertical (PF/3G)	50-180	100-250
	Overhead (PE/4G)	50-180	100-250

KC-28

For mild steel and 490MPa tensile strength steel

Classifications

EN ISO 14341-A:2008	: G 42 2 C G3Si1
	: G 42 3 M G3Si1
EN ISO 14341-B	: G 49A 3 C G6
	: G 49A 3 M G6
AWS A5.18-05	: ER70S-6
KS D 7025	: YGW12
JIS Z 3312	: YGW12

Approvals – C1 (100% CO_2)

ABS	: 3SA
BV	: SA3YM
DNV	: III YMS
LR	: 3YS H15
KR	: 3YSG
NK	: KSW53G
Other	: CCS, RS, CWB, KS, JIS, TUV

Approvals – M21 (Mix Gas)

ABS	: 3YSA
DNV	: III YMS
LR	: BF 3YS H15

Description

- For butt and fillet welding of shipbuilding, bridges, structural steel, steel buildings, machineries and vehicles
- Served as both carbon dioxide and mixture gas, and stable arc performance in almost all welding currents
- A wide range of use due to low spatter and all welding position
- Suited for application of sheet metal on high welding current without burn through

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2 (15 – 25 l/min)
- Mix: Ar+20% CO_2 (15 – 25 l/min)

Typical chemical composition of wire (%)

C	Si	Mn	P	S
0.07	0.86	1.53	0.012	0.007

Typical mechanical properties of all-weld metal

	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Impact Value (J) -30 °C	Remarks
AWS A5.18	Min. 400	Min. 480	Min. 22	≥ 27	CO_2
EN ISO 14341-A	Min. 420	500-640	Min. 20	≥ 47	CO_2
Example	450 480	550 580	30 28	70 80	CO_2 Mix

Operating data

Diameter (mm)		1.2	1.4
Current (Amp)	Flat (PA/1G)	100-350	140-400
	Vertical (PF/3G)	50-180	100-250
	Overhead (PE/4G)	50-180	100-250

KC-28CF (Cu-free)

For mild steel and 490MPa tensile strength steel

Classifications

EN ISO 14341-A:2008	: G 42 2 C G3Si1
	: G 42 3 M G3Si1
EN ISO 14341-B	: G 49A 3 C G6
	: G 49A 3 M G6
AWS A5.18-05	: ER70S-6
KS D 7025	: YGW12
JIS Z 3312	: YGW12

Approvals – C1 (100% CO_2)

ABS	: 3SA,3YSA
BV	: 3S,3YS
DNV	: III YMS
LR	: 3YS H15
NK	: KSW53G(C)
Other	: JIS

Description

- For butt and fillet welding of shipbuilding, bridges, structural steel, steel buildings, machineries and vehicles
- Served as both carbon dioxide and mixture gas, and stable arc performance in almost all welding currents
- A wide range of use due to low spatter and all welding position
- Suited for application of sheet metal on high welding current without burn through

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2 (15 – 25 l/min)
- Mix: Ar+20% CO_2 (15 – 25 l/min)

Typical chemical composition of wire (%)

C	Si	Mn	P	S
0.07	0.86	1.53	0.012	0.007

Typical mechanical properties of all-weld metal

	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Impact Value (J) -30 °C	Remarks
AWS A5.18	Min. 400	Min. 480	Min. 22	≥ 27	CO_2
EN ISO 14341-A	Min. 420	500-640	Min. 20	≥ 47	CO_2
Example	450	550	30	70	CO_2
Example	480	580	28	80	Mix

Operating data

Diameter (mm)		1.2	1.4
Current (Amp)	Flat (PA/1G)	100-350	140-400
	Vertical (PF/3G)	50-180	100-250
	Overhead (PE/4G)	50-180	100-250

KC-29

For mild steel and 490MPa tensile strength steel

Classifications

EN ISO 14341-A: 2008	: G 46 4 C G4Si1
	: G 46 4 M G4Si1
EN ISO 14341-B: 2008	: G 49A 4U C G6
	: G 49A 4U M G6
AWS A5.18-05	: ER70S-6
JIS Z 33 12	: G 55 A4U C G6

Approvals – C1 (100% CO_2)

Other	: TUV

Description

- For butt and fillet welding of shipbuilding, bridges, structural steel, steel buildings, machineries and vehicles
- Served as both carbon dioxide and mixture gas, and stable arc performance in almost welding current
- A wide range of use due to low spatter and all welding position
- Suited for application of sheet metal on high welding current without burn through

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2
- Mix: Ar+20% CO_2 (15 – 25 l/min)

Typical chemical composition of wire (%)

C	Si	Mn	P	S
0.08	0.99	1.63	0.015	0.007

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)		Remarks
	(MPa)	(MPa)	(%)	-30 ℃	-40 ℃	
AWS A5.18	Min. 400	Min. 480	Min. 22	≥ 27		CO_2
EN ISO 14341-A	Min. 460	530-680	Min. 20		≥ 47	CO_2
Example	510	620	27	110	105	CO_2
Example	560	660	24	90	80	Mix

Operating data

Diameter (mm)		1.2	1.4
Current (Amp)	Flat (PA/1G)	100-350	140-400
	Vertical (PF/3G)	50-180	100-250
	Overhead (PE/4G)	50-180	100-250

KC-37S

For mild steel and 490MPa tensile strength steel

Classifications

EN ISO 14341-B: 2011	: G 49A 4 M20 Z
AWS A5.18-2005	: ER70S-G

Description

- Slag generation is reduced compared to conventional products, resulting in fine dispersion
- By replacing the Si component with other components, the glassy slags are extremely reduced
- Reduction of slag removal work and prevention of corrosion resistance degradation due to slag peel off after painting

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Mix Ar + 5–20% CO_2 (15 – 25 l/min)

Typical chemical composition of wire (%)

C	Si	Mn	P	S	Cu
0.06-0.15	<0.25	1.40-1.85	<0.025	<0.035	<0.40

Typical mechanical properties of all-weld metal

	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Impact Value (J) (Joule @ Temp)	Remarks
AWS ER70S-G	Min. 400	Min. 480	Min. 22		
EN ISO 14341-B: 2011 G49 4 M20 Z	Min. 390	490-670	Min.18	27 @ -40 ℃	
Example	523	594	23	132 @ -20 ℃ 88 @ -40 ℃	Ar + 5% CO_2
Example	504	579	24	125 @ -20 ℃ 32 @ -40 ℃	Ar + 10% CO_2
Example	471	559	25	34 @ -20℃	Ar + 20% CO_2

Operating Procedures

Diameter (mm)	Shielding Gas	Current (amps)	Voltage (volts)	Feed Speed (m/min)	Melt-off Rate (kg/Hrs)
0.9	Ar + 10% CO_2	190-280	24-30	9.5-15.5	2.4-4.2
1.2	Ar + 10% CO_2	280-340	27-30	8.5-12.5	4.2-6.2
1.4	Ar + 10% CO_2	300-440	30-34	7.5-12.5	5.1-8.5
1.6	Ar + 10% CO_2	320-440	28-32	5.5-7.5	4.9-6.7

ZH-100

For 690MPa tensile strength steel

KISWEL

Classifications

EN ISO 16834-B:2007	: G 69A 2 U M N3M2
AWS A5.28-05	: ER100S-1
JIS Z 3312	: G 69 A 2 M N3M2

Approvals – M21 (Mix Gas)

Other	: CWB, TUV

Description

- For butt and fillet welding of machinery, heavy equipment and pressure vessels
- Stable weldability on high welding current
- Beautiful weld appearance due to low spatter with mixture gas

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Mix: Ar+2% O_2 (15 – 25 l/min)
- Mix: Ar+20% CO_2 (15 – 25 l/min)

Typical chemical composition of wire (%)

C	Si	Mn	P	S	Ni	Mo
0.05	0.26	1.54	0.008	0.006	2.00	0.35

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	Remarks
	(MPa)	(MPa)	(%)	- 20°C	
AWS A5.28	Min. 610	Min. 690	Min. 16	≥ 68 (@-50°C)	Ar+2% O_2
EN ISO 16834-B	Min. 600	690-890	Min. 14	≥ 47	Mix
Example	700	760	20	70	Mix
Example	720	780	21	130 (@-50°C)	Ar+2% O_2

Operating data

Diameter (mm)		1.2	1.4
Current (Amp)	Flat (PA/1G)	120-350	150-400
	Vertical (PF/3G)	80-180	100-250
	Overhead (PE/4G)	80-180	100-250

KC-90SB3

For 2.25%Cr-1%Mo heat resistant steel

Classifications

EN ISO 21952-B:2007	: G 62 2C1M
AWS A5.28-05	: ER90S-B3
KS D 7120	: YG2CM-G
JIS Z 3317	: G 62-2C1M

Description

- For butt and fillet welding of power stations, heat exchanger and oil refineries such as 2.25%Cr-1%Mo heat-resistant steel
- Excellent property of heat-resistant due to alloying Cr and Mo
- Superior tensile strength and impact values after PWHT
- Beautiful weld appearance due to low spatter with mixture gas

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Mix: Ar+2% O_2 (15 – 25 l/min)

Typical chemical composition of wire (%)

C	Si	Mn	P	S	Ni	Mo
0.05	0.26	1.54	0.008	0.006	2.00	0.35

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	Remarks
	(MPa)	(MPa)	(%)	20°C	
AWS A5.28	Min. 540	Min. 620	Min. 17		PWHT, Ar+2% O2
EN ISO 21952-B	Min. 540	Min. 620	Min. 15		PWHT
Example	570	660	24	80 (@-20°C)	PWHT, Ar+2% O2

Operating data

Diameter (mm)		1.2	1.4
Current (Amp)	Flat (PA/1G)	120-350	150-400
	Vertical (PF/3G)	80-180	100-250
	Overhead (PE/4G)	80-180	100-250

STAINLESS STEEL

- M-307Si
- M-308L
- M-308LSi
- M-309LSi
- M-316L
- M-316LSi
- M-420
- M-430LNb

M-307Si

For austenite stainless steel (18%Cr-8%Ni STS)

Classifications

EN ISO 14343-A:2009 : G 18 8 Mn

Description

- MIG welding of 18%Cr-8%Ni-7%Mn austenite stainless steels
- It is used for dissimilar steel such as austenitic manganese steel to carbon steel forgings

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Ar + 1-3% O_2 (15 – 25 l/min)
- Ar + 1-5% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr
0.07	0.64	6.79	8.91	18.79

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	0 °C	-40 °C
EN ISO 14343	Min. 350	Min. 590	Min. 25		
Example	436	619	42	111	77

M-308L

For austenite stainless steel (Low carbon 18%Cr-8%Ni STS)

KISWEL

Classifications

EN ISO 14343-B:2009	: SS 308L
AWS A5.9-2012	: ER308L
JIS Z 3321:2013	: YS308L
KS D 3696:2006	: STSY308L

Approvals

Other	: TUV

Description

- MIG welding of 18%Cr-8%Ni austenite stainless steels (AISI STS 301, 302, 304)
- Various applications of petrochemical and nuclear power plant apparatus
- WRC 1992 FN 3-8 (Chemical composition of wire)

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Ar + 1-3% O_2 (15 – 25 l/min)
- Ar + 1-5% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr
0.01	0.49	1.75	9.64	19.63

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	0 °C	-196 °C
AWS A5.9		Min. 520	Min. 35		
EN ISO 14343	Min. 320	Min. 510	Min. 30		
Example	331	618	40	102	51

M-308LSi

For austenite stainless steel (Low carbon 18%Cr-8%Ni STS)

Classifications

EN ISO 14343-A:2009	: G 19 9
EN ISO 14343-B:2009	: SS 308L
AWS A5.9-2012	: ER308LSi
JIS Z 3321:2013	: YS308LSi

Approvals

Other	: TUV

Description

- MIG welding of 18%Cr-8%Ni austenite stainless steels (AISI STS 301, 302, 304)
- Various applications of petrochemical and nuclear power plant apparatus

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Ar + 1-3% O_2 (15 – 25 l/min)
- Ar + 1-5% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr
0.01	0.85	1.68	9.89	19.63

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	0 °C	-196 °C
AWS A5.9		Min. 520	Min. 35		
EN ISO 14343	Min. 320	Min. 510	Min. 30		
Example	399	619	43	114	60

M-309LSi

For austenite stainless steel (Low carbon, Dissimilar Steels)

Classifications

EN ISO 14343-B:2009	: SS 309LSi
AWS A5.9-2012	: ER309LSi
JIS Z 3321:2013	: YS309LSi

Approvals

Other	: TUV

Description

- MIG welding of 22%Cr-12%Ni STS and dissimilar steels such as 304L to mild steels or low alloy steels
- Various applications of petrochemical and fiber power plant apparatus

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Ar + 1-3% O_2 (15 – 25 l/min)
- Ar + 1-5% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr
0.01	0.91	1.86	13.62	23.07

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	0 °C	-196 °C
AWS A5.9		Min. 520	Min. 30		
EN ISO 14343	Min. 320	Min. 510	Min. 25		
Example	435	609	39	114	56

M-316L

For austenite stainless steel (Low carbon, 18%Cr-8%Ni STS))

KISWEL

Classifications

EN ISO 14343-B:2009	: SS 316L
AWS A5.9-2012	: ER316L
JIS Z 3321:2013	: YS316L
KS D 3696:2006	: STSY316L

Approvals – M13 (Mix Gas)

BV	: UP
DNV	: NV 316 L
KR	: RY316LG(M1)
Other	: TUV

Description

- MIG welding of 18%Cr-12%Ni-2%Mo austenite stainless steels (AISI STS 316)
- Various applications of petrochemical industrial apparatus
- WRC 1992 FN 3-8 (Chemical composition of wire)

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Ar + 1-3% O_2 (15 – 25 l/min)
- Ar + 1-5% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr	Mo
0.02	0.51	1.61	11.81	18.78	2.49

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	0 °C	-196 °C
AWS A5.9		Min. 490	Min. 30		
EN ISO 14343	Min. 320	Min. 510	Min. 25		
Example	394	556	41	113	62

M-316LSi

For austenite stainless steel (Low carbon, 18%Cr-8%Ni STS))

KISWEL

Classifications

EN ISO 14343-B:2009	: G 19 12 3 L Si
EN ISO 14343-B:2009	: SS 316LSi
JIS Z 3321:2013	: YS316LSi
AWS A5.9-2012	: ER316LSi

Approvals – I1 (100% Ar)

Other	: TUV

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Ar + 1-3% O_2 (15 – 25 l/min)
- Ar + 1-5% CO_2 (15 – 25 l/min)

Description

- MIG welding of 18%Cr-12%Ni-2%Mo austenite stainless steels (AISI STS 316, 316L)
- Various applications of chemical plant, fiber and paper industrial apparatuses

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr	Mo
0.01	0.87	1.55	11.57	18.58	2.54

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	0 °C	-196 °C
AWS A5.9		Min. 490	Min. 30		
EN ISO 14343	Min. 320	Min. 510	Min. 25		
Example	432	613	37	127	57

M-420

For martensite stainless steel (12%Cr STS)

Classifications

EN ISO 14343-B:2009	: SS 420
AWS A5.9-2012	: ER420
JIS Z 3321:2013	: YS420

Description

- MIG welding of 12%Cr martensite stainless steels (AISI 420)
- It is used for surfacing of sealing faces of valves for gas, water and steam piping system at service temperature up to 450°C

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Ar + 1-3% O_2 (15 – 25 l/min)
- Ar + 1-5% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr
0.33	0.39	0.40	0.16	12.56

Typical mechanical properties of all-weld metal

	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Remark
EN ISO 14343	Min. 250	Min. 450	Min. 15	PWHT
Example	310	510	20	

*PWHT: Heat to 840-870°C for 2 hours. Furnace cooling down to 600°C, then air cooling

M-430LNb

For ferrite stainless steel (16%Cr-Nb STS)

Classifications

EN ISO 14343-A:2009	: G 18 L Nb
JIS Z 3321:2013	: YS430LNb

Description

- TIG welding of 16% Cr-Nb ferrite stainless steels (AISI 405, 410L, 429, 430, 444)
- It is used for front pipe and manifold of automobile exhaust systems

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- Ar + 1-3% O_2 (15 – 25 l/min)
- Ar + 1-5% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr	Nb+Ta
0.02	0.4	0.39	0.25	18.01	0.5

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	High Temp T.S.	High Temp EL.
	(MPa)	(MPa)	(%)	(MPa, 850°C)	(%, 850°C)
EN ISO 14343	Min. 220	Min. 410	Min. 15		
Example	437	547	15	48	45

NICKEL ALLOYS

- KW-M82
- KW-M625

Nickel alloy for MIG Consumables

KW-M82

Inconel 600,601.690 / Incoloy 800,800HT

Classifications

EN ISO 18274:2005	: S Ni 6082 (NiCr20Mn3Nb)
AWS A5.14-07	: ERNiCr-3
KS D 7045:2005	: YNiCr-3
JIS Z 3334:2011	: S Ni 6082 (NiCr20Mn3Nb)

Approvals – I1 (100% Ar)

ABS	: ERNiCr-3

Description

- MIG consumable for Inconel 600, Incoloy 800(HT)- (ASTM B163, B166, B167 or UNS N06082)
- It can be used for dissimilar welding of Inconel 600 with steel or stainless steel
- The weld metal has high strength and good corrosion resistance at elevated temperatures

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- 100% Ar

Typical chemical composition of wire (%)

C	Si	Mn	Cr	Ni	Fe	Nb + Ta
0.02	0.11	3.09	20.32	71.90	1.04	2.44

Typical mechanical properties of all-weld metal

	Tensile Strength (MPa)	Elongation (%)	
AWS A5.14	550	-	
Example	640	36	

Nickel alloy for MIG Consumables

KW- M625

Inconel 625 / Incoloy 825

Classifications

EN ISO 18274:2005	: SNi6625 (NiCr22Mo9Nb)
AWS A5.14-2011	: ERNiCrMo-3
KS B 18274:2014	: SNi6625(NiCr22Mo9Nb)
JIS Z 3334:2011	: SNi6625(NiCr22Mo9Nb)

Approvals – I1 (100% Ar)

ABS	: ERNiCrMo-3
DNV	: -MS

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- 100% Ar

Description

- MIG consumable for Inconel 625, Incoloy 825
- It can be used for surfacing of 9% Ni steels or dissimilar welding of Inconel to stainless steels
- The weld metal has high strength and good corrosion resistance at broad temperature

Typical chemical composition of wire (%)

C	Si	Mn	Cr	Ni	Mo	Nb
0.01	0.08	0.03	22.24	63.80	8.67	3.36

Typical mechanical properties of all-weld metal

	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)
AWS A5.14		550	-
Example	491	758	54

ALUMINIUM

- ML4043
- ML4047
- ML5183
- ML5356

ML4043

For aluminium

Classifications

EN ISO 18273	: S Al 4043 (AlSi5 (A))
AWS A5.10	: ER 4043
Material No.	: 3.2245

Approvals

Other	: DB, TUV

Description

- This alloy is particularly used to prevent solidification cracks in connection with high dilution and clamp conditions
- Anodizing gives dark grey colours and is not recommended
- The weld pool is very fluid
- The chemical analysis meets the specification of 4043 and 4043A

Application fields

Automotive, constructions, heat exchangers, AlSi alloys up to 7% Si, AlMgSi0,5, AlMgSi0,8, AlMgSi1, AlZnMg, AlCuMg

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- 100% Ar

Typical chemical composition of all-weld metal (%)

Si	Fe	Cu	Mn	Mg	Zn	Ti	Be	Al	Other total	Other each
4.5-6	<0.60	<0.30	<0.05	<0.05	<0.10	<0.20	<0.0003	Remainder	<0.15	<0.05

Typical mechanical properties of all-weld metal

Tensile Strength (MPa)	Elongation (%)
Min. 130	Min. 5

Package

Diameter (mm)	0.8, 1, 1.2, 1.6, 2, 2.4
Spool (kg)	6, 7, 18, 40
More diameters and packing upon request	

ML4047

For aluminium

Classifications

EN ISO 18273	: S Al 4047 (AlSi2 (A))
AWS A5.10	: ER 4047
Material No.	: 3.2585

Approvals

Other	: DB

Description

- Aluminium wires and rods for welding and brazing
- Good mechanical characteristics: its excellent corrosion resistance and low melting point ensure a very low number of deformations in the parent metal
- This material is generally used for brazing aluminium sheets, for extrusions and castings (after anodizing the welding will be a different colour)
- The chemical analysis meets the specification of 4047 and 4047A

Application fields

Automotive, constructions, heat exchangers, G-AlSi10Mg, G-AlSi11, GAlSi12(Cu), G-AlSi7Mg, G-AlSi6Cu4, AlMgSi0,8, AlMgSi1

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- 100% Ar

Typical chemical composition of all-weld metal (%)

Si	Fe	Cu	Mn	Mg	Zn	Ti	Al	Other total	Other each
11-13	<0.80	<0.30	<0.15	<0.05	<0.20	<0.20	Remainder	<0.15	<0.05

Typical mechanical properties of all-weld metal

Tensile Strength (MPa)	Elongation (%)
Min. 130	Min. 5

Package

Diameter (mm)	0.8, 1, 1.2, 1.6, 2, 2.4
Spool (kg)	6, 7, 18, 40
More diameters and packing upon request	

ML5183

For aluminium

Classifications

EN ISO 18273	: S Al 5183 (AlMg4,5Mn0.7)
AWS A5.10	: ER 5183
Material No.	: 3.3548

Approvals – I1 (100% Ar)

ABS	: ER5183
BV	: ER5183
DNV	: ER5183
LR	: ER5183
KR	: ER5183
Other	: TUV

Description

- Welding wires and rods to be used when very high seawater corrosion resistance is needed

Application fields

Applications in the construction of ships, offshore, cryogenic plants, railway and in the automotive industry. Materials to be welded:
AlMg4,5Mn, AlMg5, AlMg2Mn0,8, AlZnMg1, AlZnMgCu0,5, AlMgSi0,5, AlMgSi1, G-AlMg10, G-AlMg5, ,G-AlMg3Si, G-AlMg5Si

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- 100% Ar

Typical chemical composition of all-weld metal (%)

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be	Al	Other total	Other each
<0.4	<0.4	<0.10	0.5 - 1	4.3 – 5.2	0.05 – 0.25	<0.25	<0.15	<0.0003	Remainder	<0.15	<0.05

Typical mechanical properties of all-weld metal

Tensile Strength (MPa)	Elongation (%)
Min. 275	Min. 17

Package

Diameter (mm)	0.8, 1, 1.2, 1.6, 2, 2.4
Spool (kg)	6, 7, 18, 40
More diameters and packing upon request	

ML5356

For aluminium

Classifications

EN ISO 18273	: S Al 5356 (AlMg5MnCr)
AWS A5.10	: ER 5356
Material No.	: 3.3556

Approvals – I1 (100% Ar)

ABS	: ER5356
BV	: ER5356
DNV	: ER5356
Other	: DB, TUV

Description

- The weld metal is sea water resistant
- Suitable for anodizing when matching colours are required

Application fields

Applications in the construction of ships, offshore, railway and in the automotive industry.

Materials to be welded: AlMg5, AlMg3, AlZnMg1, AlZnMgCu0,5, AlMgSi0,7, AlMg1SiCu, G-AlMg10, G-AlMg3Si, G-AlMg5Si

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- 100% Ar

Typical chemical composition of all-weld metal (%)

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be	Al	Other total	Other each
<0.25	<0.4	<0.10	0.05-0.2	4.5-5.5	0.05-0.2	<0.10	<0.06-0.2	<0.0003	Remainder	<0.15	<0.05

Typical mechanical properties of all-weld metal

Tensile Strength (MPa)	Elongation (%)
Min. 240	Min. 17

Package

Diameter (mm)	0.8, 1, 1.2, 1.6, 2, 2.4
Spool (kg)	6, 7, 18, 40
More diameters and packing upon request	

COPPER ALLOYS

- AMPCO-TRODE® 10
- AMPCO-TRODE® 40
- AMPCO-TRODE® 46
- SIL-TRODE®

AMPCO-TRODE® 10

Aluminium-Bronze

Classifications	
AWS A5.7	: ER CuAl-A2
ASME SFA 5.7	: ER CuAl-A2
MIL-E-23765/3A	: MIL-CuAl-A2

**Note: A weld test is required on each Heat/lot of material to conform to MIL-E23765/3A*

Approvals	
ABS Certified	: ERCuAl-A2

Description

- AMPCO-TRODE® 10 aluminum bronze is the most versatile welding electrode in AMPCO's family of alloys.
- AMPCO-TRODE® 10 contains an additive to inhibit inter- granular stress corrosion cracking. This is particularly important when welding C61300 and C61400 base metal
- AMPCO-TRODE® 10 will weld and join many ferrous and nonferrous metals and combinations of dissimilar metals. These metals include the more weld-able grades of cast iron, high and low carbon steels, copper, bronzes and copper-nickel alloys
- Applications for AMPCO-TRODE® 10 include building up bearing surfaces, joining and fabricating copper alloys, overlaying for resistance to corrosion and erosion and general maintenance and repair welding

Typical Applications

Cast iron, malleable iron, cast iron to steel, cast iron to bronze, steel to bronze, aluminium bronze, silicon bronze, manganese bronze, cupro-, nickel, tool steel, copper to steel, bearings, bushings, pump housings, condenser boxes, hydraulic pistons, brake drums, tractor gear housings idler pulleys, pickling hooks, paper mill rolls, motor bases, tin plate mill rolls, impellers, valve seats, gears, mixer arms, press rams, ship propellers, lance heads, turbine runners adjusting and spindles.

Limiting chemical composition of all-weld metal (%)

Cu*	Al	Fe	Si	Other
Rem.	8.5-11.0	0.50-1.50	0.1 max	0.5 max

*Including silver

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (3000 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	241	545	28	28	140

Sizes available

Diameter	(mm)	0.9	1.2	1.6
Spool size	(kg)	0.68 & 13.6	0.68 & 13.6	13.6

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

AMPCO-TRODE® 40

Manganese-Nickel-Aluminium-Bronze

Classifications

AWS A5.7	: ER CuMnNiAl
ASME SFA 5.7	: ER CuMnNiAl

Approvals

ABS Certified	: ERCuMnNiAl

Description

- AMPCO-TRODE® 40 manganese-nickel-aluminium bronze is for welding cast ship propellers conforming to MIL-B-21230, Alloy 2 for high resistance to corrosion, erosion and cavitation
- AMPCO-TRODE® 40 also exhibits good ability to join dissimilar metals
- Typical applications include ship propellers, marine components, welding cast iron, joining dissimilar metals

Typical Applications

Ship propellers, marine components, welding cast iron and joining dissimilar metals.

Limiting chemical composition of all-weld metal (%)

Cu*	Al	Fe	Ni	Mn	Si	Other
Rem.	7.0-8.50	2.0-4.0	1.5-3.0	11.0-14.0	1.50 max	0.5 max

*Including silver

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (3000 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	462	759	27	37	217

Sizes available

Diameter	(mm)	1.2	1.6
Spool size	(kg)	13.6	13.6

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

MIG Consumables

AMPCO-TRODE® 46

Nickel-Aluminium-Bronze

Classifications

AWS A5.7	: E CuNiAl
ASME SFA 5.7	: ER CuNiAl
MIL-E-23765/3A	: MIL-CuNiAl

**Note: A weld test is required on each Heat/lot of material to conform to MIL-E23765/3A*

Approvals

ABS Certified	: ERCuNiAl

Description

- AMPCO-TRODE® 46 nickel-aluminium bronze was developed for the welding of cast and wrought nickel-aluminium bronze
- AMPCO-TRODE® 46 is also recommended for weld repairing NiBral boat propellers
- Typical applications include ship fittings, power plant valves, intake screens, welding AMPCO® 45, oil recovery pumps, propeller gear housings, marine propulsion systems, ship propellers, piping systems and welding AMPCO® 483

Typical Applications

Ship fittings, ship propellers, power plant valves, piping systems, intake screens, welding AMPCO® 483, welding AMPCO® 45, marine propulsion systems, propeller gear housings and oil recovery pumps.

Limiting chemical composition of all-weld metal (%)

Cu*	Al	Fe	Ni	Mn	Si	Other
Rem.	8.50-9.50	3.0-5.0	4.0-5.50	0.60-3.50	0.10 max	0.50 max

*Including silver

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (3000 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	407	718	23	22	196

Sizes available

Diameter	(mm)	0.9	1.2	1.6
Spool size	(kg)	0.68 & 13.6	0.68 & 13.6	13.6

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

SIL-TRODE®

Silicon -Bronze

Classifications

AWS A5.7 : ER CuSi-A

Description

- A silicon bronze welding alloy (UNS C65600) for the inert gas welding of copper-silicon, copper zinc, copper to copper and mild steel used extensively in the welding of galvanized steel. The silicon content of 2.8-4% increases the tensile strength, hardness and work hardening rates
- Silicon bronze also provides good corrosion resistance and has good weldability
- With gas metal-arc welding, the weld metal should be deposited in stringer beads, maintaining a small molten pool to avoid overheating the hot short silicon bronze base metal. Use argon gas for shielding and relatively high welding travel speeds.
- Preheat slightly to remove moisture.
- Interpass temperature should not exceed 66 °C

Limiting chemical composition of all-weld metal (%)

Cu*	Si	Zinc	Tin	Mn	Fe	Al	Pb	Other
Rem.	2.8-4.0	1.0 max.	1.0 max.	1.5 max.	0.50 max	0.01 max.	0.02 max.	0.05 max.

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (500 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	-	350	40	80	350

Sizes available

Diameter	(mm)	1.6	2.4	3.2
Length	(mm)	914	914	914
Tube size	(kg)	4.5	4.5	4.5

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

TIG RODS (GTAW)

- Unalloyed, Fine Grained and Low Alloyed Steel
- Stainless Steel
- Nickel Alloys
- Aluminium
- Copper Alloys

UNALLOYED, FINE GRAINED & LOW ALLOYED STEEL

- **T-50**
- **T-80SB2**

T-50

For mild steels and 490MPa tensile strength steel

Classifications	
EN ISO 636-A:2017	: W 46 3 3Si1
EN ISO 636-B:2017	: W 49A 3U W6
AWS A5.18:2005	: ER70S-6
KS D 7140:2005	: YGT50
JIS Z 3316:2011	: W 49 A 3U 6

Approvals – I1 (100% Ar)	
ABS	: 2Y
BV	: 4Y
DNV	: IV YM
LR	: 4YMH15
KR	: 4YSG(I)
RS	: 4Y

Description

- For mild steel and 490MPa tensile strength steel welding of structural steels, machineries and vehicles
- Excellent mechanical and toughness properties in low temperature conditions
- It's generally used in root pass welding of pipes in all positions
- Proper tungsten electrode extension from the tip of torch is 4-6mm in general

Operating data	
Dia. (mm)	2.4 – 3.2
Current (Amp.)	200 - 300

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of rod (%)

C	Si	Mn	P	S
0.07	0.82	1.52	0.012	0.015

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	Remarks
	(MPa)	(MPa)	(%)	-30 °C	
AWS A5.18	Min. 400	Min. 480	Min. 22	≥ 27	Ar
EN 636-A	Min. 460	530-680	Min. 20	≥ 47	Ar
Example	490	580	30	130	Ar

T-80SB2

For 1.25%Cr-0.5%Mo heat-resistant steel

KISWEL

Classifications	
EN ISO 21952-B:2012	: W 55 I1 1CM
AWS A5.28:2005	: ER80S-B2
KS D 7140:2005	: YGT1CM
JIS Z 3317:2011	: W 55-1CM

Description

- For butt and fillet welding of power plant, heat exchanger and oil refineries such as 125%Cr-05%Mo heat-resistant steel
- Excellent mechanical and toughness properties after PWHT
- Proper tungsten electrode extension from the tip of torch is 4-6mm in general
- Preheat at 100 °C – 200 °C and PWHT at 620 °C – 720 °C is necessary according to the plate thickness, type of steel, shape of base metals or under high restriction

Operating data	
Dia. (mm)	2.4 – 3.2
Current (Amp.)	200 - 300

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of rod (%)

C	Si	Mn	P	S	Cr	Mo
0.09	0.54	0.51	0.015	0.006	1.26	0.45

Typical mechanical properties of all-weld metal

	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Impact Value (J) 0 °C	Remarks
AWS A5.28	Min. 470	Min. 550	Min. 19	-	PWHT, Ar
EN ISO 21952-B	Min. 470	Min. 550	Min. 17	-	PWHT
Example	500	590	26	80	PWHT, Ar

*PWHT: 620 °C x 1Hr

STAINLESS STEEL

- T-308L
- T-309L
- T-312
- T-316L
- T-2209
- T-2594

T-308L

For austenite stainless steel (Low carbon, 18%Cr-8%Ni STS)

KISWEL

Classifications

EN ISO 14343-A:2009	: W 19 9 L
EN ISO 14343-B:2009	: SS 308L
AWS A5.9-2012	: ER308L
KS D 3696:2006	: STSY308L
JIS Z 3321:2013	: YS308L

Approvals – I1 (100% Ar)

ABS	: ER308L
BV	: T-308L
DNV	: NV 308 L
LR	: 304Lm
KR	: RY308LG(I)
RS	: A-5
Other	: TUV

Description

- TIG welding of 18%Cr-8%Ni austenite stainless steels (AISI STS 301, 302, 304)
- Various applications of petrochemical and nuclear power plant apparatus
- WRC 1992 FN 3-8 (Chemical composition of wire)

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr
0.02	0.38	1.90	9.77	19.79

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	0 °C	-196 °C
AWS A5.9		Min. 520	Min. 35		
EN ISO 14343	Min. 320	Min. 510	Min. 30		
Example	390	580	44	160	80

T-309L

For austenite stainless steel (Low carbon, Dissimilar steels)

Classifications

EN ISO 14343-B:2009	: SS 309L
AWS A5.9-2012	: ER309L
JIS Z 3321:2013	: YS309L
KS D 3696:2006	: STSY309L

Approvals – I1 (100% Ar)

BV	: T-309L
DNV	: NV 309L
LR	: SS/CMn m
KR	: RY309LG(I)
RS	: A-9sp

Description

- TIG welding of 22%Cr-12%Ni STS and dissimilar steels such as 304L to mild steels or low alloy steels
- Various applications of petrochemical and fiber industrial apparatus

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr
0.01	0.45	1.64	13.78	23.09

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	0 °C	-196 °C
AWS A5.9		Min. 520	Min. 30		
EN ISO 14343	Min. 320	Min. 510	Min. 25		
Example	445	568	42	130	52

T-312

For austenite stainless steel (Dissimilar steels)

Classifications

EN ISO 14343-B:2009	: SS 312
AWS A5.9-2012	: ER312
KS D 3696:2006	: STSY312
JIS Z 3321:2013	: YS312

Description

- TIG welding of 29%Cr-9%Ni STS and dissimilar steels such as 304L to mild steels or low alloy steels
- Various applications to high, low carbon steel and clad welding

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr
0.11	0.41	1.81	8.92	30.63

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation
	(MPa)	(MPa)	(%)
AWS A5.9		Min. 660	Min. 22
EN ISO 14343	Min. 450	Min. 650	Min. 15
Example	480	790	25

T-316L

For austenite stainless steel (Dissimilar steels)

Classifications	
EN ISO 14343-A:2009	: W 19 12 3 L
EN ISO 14343-B:2009	: SS 316L
AWS A5.9-2012	: ER316L
KS D 3696:2006	: STSY316L
JIS Z 3321:2008	: Y316L

Approvals – I1 (100% Ar)	
ABS	: ER316L
BV	: T-316L
DNV	: NV 316L
LR	: 316Lm
KR	: RY316LG(I)
NK	: KY316L
RS	: A-5
Other	: TUV

Description

- TIG welding of 18%Cr-12%Ni-2%Mo austenite stainless steels (AISI STS 316, 316L)
- Various applications of petrochemical plant, fiber and paper industrial apparatus
- WRC 1992 FN 3-8 (Chemical composition of wire)

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr	Mo
0.02	0.40	1.73	11.71	18.15	2.22

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	0 °C	-196 °C
AWS A5.9		Min. 490	Min. 30		
EN ISO 14343	Min. 320	Min. 510	Min. 25		
Example	430	560	40	150	45

T-2209

For austenite stainless steel (Low carbon, 22%Cr-9%Ni-Mo STS)

KISWEL

Classifications	
EN ISO 14343-A:2009	: W 22 9 3 N L
EN ISO 14343-B:2009	: SS 2209
AWS A5.9-2012	: ER2209
JIS Z 3321:2008	: YS2209

Approvals – I1 (100% Ar)	
ABS	: ER2209
BV	: 2205
DNV	: ER2209
LR	: S31803 m
KR	: RY 31803
NK	: KY2209
RS	: AF-8dup

Description

- TIG welding of 22%Cr-9%Ni-3%Mo duplex stainless steels (UNS S31893, STS 329J1,329J2L)
- Various applications of petrochemical offshore structure and distilling apparatuses

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr	Mo
0.01	0.40	1.67	8.7	22.70	3.10

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	-10 °C	-50 °C
AWS A5.9		Min. 690	Min. 20		
EN ISO 14343	Min. 450	Min. 550	Min. 20		
Example	769	855	32	183	160

T-2594

For super duplex stainless steel (25%Cr-9%Ni-4%Mo STS)

Classifications	
EN ISO 14343-A:2009	: W 25 9 4 N L
EN ISO 14343-B:2009	: SS 2594
AWS A5.9-2012	: ER2594

Approvals – I1 (100% Ar)	
ABS	: ER2594
BV	: T-2594
DNV	: ER2594
LR	: S32750 m

Description

- TIG welding of 25%Cr-9%Ni-4%Mo duplex stainless steels (UNS S32750, STS 32760, S31260)
- Various applications of petrochemical offshore structure and distilling apparatuses

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr	Mo	PREN
0.02	0.42	0.66	9.18	25.06	3.88	41

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	-20 °C	-50 °C
AWS A5.9		Min. 760	Min. 15		
EN ISO 14343	Min. 550	Min. 620	Min. 30		
Example	640	800	32	220	200

NICKEL ALLOYS

- KW-T82
- KW-T625

KW-T82

For Inconel 600,601,690 / Incoloy 800, 800HT

Classifications

EN ISO 18274:2005	: SNi6082 (NiCr20Mn3Nb)
AWS A5.14-2011	: ERNiCr-3
KS B 18274:2014	: SNi6082 (NiCr20Mn3Nb)
JIS Z 3334:2011	: SNi6082 (NiCr20Mn3Nb)

Approvals – I1 (100% Ar)

ABS	: ERNiCr-3

Description

- TIG consumable for Inconel 600, Incoloy 800(HT) (ASTM B 163, B166, B167 or UNS NO6082)
- It can be used for dissimilar welding Inconel 600 with steels or stainless steels
- The weld metal has high strength and good corrosion resistance at elevated temperature

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr	Fe	Nb + Ta
0.02	0.11	3.09	71.9	20.32	1.04	2.44

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	-20 °C	-50 °C
AWS A5.9		Min. 760	Min. 15		
Example	640	800	32	220	200

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation
	(MPa)	(MPa)	(%)
AWS A5.14		Min. 550	
Example		640	36

KW-T625

For Inconel 625 / Incoloy 825

Classifications

EN ISO 18274:2005	: SNi6625 (NiCr22Mo9Nb)
AWS A5.14-2011	: ERNiCrMo-3
KS B 18274:2014	: SNi6625 (NiCr22Mo9Nb)
JIS Z 3334:2011	: SNi6625 (NiCr22Mo9Nb)

Approvals – I1 (100% Ar)

ABS	: ERNiCrMo-3
BV	: N90
DNV	: ER625
LR	: BF 9Nim
KR	: ERNiCrMo-3
NK	: KSWL91G (I)

Description

- TIG consumable for Inconel 625, Incoloy 825
- It can be used for surfacing of 9% Ni steels and dissimilar welding of Inconel 625 to stainless steel.
- The weld metal has high strength and good corrosion resistance at broad temperature

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Ni	Cr	Mo	Nb
0.01	0.08	0.03	63.80	22.24	8.67	3.36

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation	Impact Value (J)	
	(MPa)	(MPa)	(%)	-20 °C	-50 °C
AWS A5.9		Min. 760	Min. 15		
Example	640	800	32	220	200

Typical mechanical properties of all-weld metal

	Yield Strength	Tensile Strength	Elongation
	(MPa)	(MPa)	(%)
AWS A5.14		760	
Example	506	773	54

ALUMINIUM

- ML4043
- ML4047
- ML5183
- ML5356

ML4043

For aluminium

Classifications	
EN ISO 18273	: S Al 4043 (AlSi5 (A))
AWS A5.10	: ER 4043
Material No.	: 3.2245

Approvals	
Other	: DB, TUV

Description

- This alloy is particularly used to prevent solidification cracks in connection with high dilution and clamp conditions
- Anodizing gives dark grey colours and is not recommended
- The weld pool is very fluid
- The chemical analysis meets the specification of 4043 and 4043A

Application fields

Automotive, constructions, heat exchangers, AlSi alloys up to 7% Si, AlMgSi0,5, AlMgSi0,8, AlMgSi1, AlZnMg, AlCuMg

Polarity

- DCEP (DC-)

Typical chemical composition of all-weld metal (%)

Si	Fe	Cu	Mn	Mg	Zn	Ti	Be	Al	Other total	Other each
4.5-6	<0.60	<0.30	<0.05	<0.05	<0.10	<0.20	<0.0003	Remainder	<0.15	<0.05

Typical mechanical properties of all-weld metal

Tensile Strength (MPa)	Elongation (%)
Min. 130	Min. 5

Package

Diameter (mm)	1.6, 2, 2.4, 3.2, 4
Rod (kg)	5, 10
More diameters and packing upon request	

ML4047

For aluminium

Classifications	
EN ISO 18273	: S Al 4047 (AlSi2 (A))
AWS A5.10	: ER 4047
Material No.	: 3.2585

Approvals	
Other	: DB

Description

- Aluminium wires and rods for welding and brazing
- Good mechanical characteristics: its excellent corrosion resistance and low melting point ensure a very low number of deformations in the parent metal
- This material is generally used for brazing aluminium sheets, for extrusions and castings (after anodizing the welding will be a different colour)
- The chemical analysis meets the specification of 4047 and 4047A

Application fields

Automotive, constructions, heat exchangers, G-AlSi10Mg, G-AlSi11, GAlSi12(Cu), G-AlSi7Mg, G-AlSi6Cu4, AlMgSi0,8, AlMgSi1

Polarity

- DCEP (DC-)

Typical chemical composition of all-weld metal (%)

Si	Fe	Cu	Mn	Mg	Zn	Ti	Al	Other total	Other each
11-13	<0.80	<0.30	<0.15	<0.05	<0.20	<0.20	Remainder	<0.15	<0.05

Typical mechanical properties of all-weld metal

Tensile Strength (MPa)	Elongation (%)
Min. 130	Min. 5

Package

Diameter (mm)	1.6, 2, 2.4, 3.2, 4
Rod (kg)	5, 10
More diameters and packing upon request	

ML5183

For aluminium

Classifications	
EN ISO 18273	: S Al 5183 (AlMg4,5Mn0.7)
AWS A5.10	: ER 5183
Material No.	: 3.3548

Approvals – I1 (100% Ar)	
ABS	: ER5183
BV	: ER5183
DNV	: ER5183
LR	: ER5183
KR	: ER5183
Other	: TUV

Description

- Welding wires and rods to be used when very high seawater corrosion resistance is needed

Application fields

Applications in the construction of ships, offshore, cryogenic plants, railway and in the automotive industry. Materials to be welded:
AlMg4,5Mn, AlMg5, AlMg2Mn0,8, AlZnMg1, AlZnMgCu0,5, AlMgSi0,5, AlMgSi1, G-AlMg10, G-AlMg5, ,G-AlMg3Si, G-AlMg5Si

Polarity

- DCEP (DC-)

Description

- Welding wires and rods to be used when very high seawater corrosion resistance is needed

Typical chemical composition of all-weld metal (%)

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be	Al	Other total	Other each
<0.4	<0.4	<0.10	0.5 - 1	4.3 – 5.2	0.05 – 0.25	<0.25	<0.15	<0.0003	Remainder	<0.15	<0.05

Typical mechanical properties of all-weld metal

Tensile Strength (MPa)	Elongation (%)
Min. 275	Min. 17

Package

Diameter (mm)	1.6, 2, 2.4, 3.2, 4
Rod (kg)	5, 10
More diameters and packing upon request	

TIG Consumables

ML5356

For aluminium

Classifications	
EN ISO 18273	: S Al 5356 (AlMg5MnCr)
AWS A5.10	: ER 5356
Material No.	: 3.3556

Approvals – I1 (100% Ar)	
ABS	: ER5356
BV	: ER5356
DNV	: ER5356
Other	: DB, TUV

Description

- The weld metal is sea water resistant
- Suitable for anodizing when matching colours are required

Application fields

Applications in the construction of ships, offshore, railway and in the automotive industry.

Materials to be welded: AlMg5, AlMg3, AlZnMg1, AlZnMgCu0,5, AlMgSi0,7, AlMg1SiCu, G-AlMg10, G-AlMg3Si, G-AlMg5Si

Polarity

- DCEP (DC-)

Typical chemical composition of all-weld metal (%)

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Be	Al	Other total	Other each
<0.25	<0.4	<0.10	0.05-0.2	4.5-5.5	0.05-0.2	<0.10	<0.06-0.2	<0.0003	Remainder	<0.15	<0.05

Typical mechanical properties of all-weld metal

Tensile Strength (MPa)	Elongation (%)
Min. 240	Min. 17

Package	
Diameter (mm)	1.6, 2, 2.4, 3.2, 4
Rod (kg)	5, 10
More diameters and packing upon request	

COPPER ALLOYS

- KISWEL KW-TCuNi
- AMPCO-TRODE® 10
- AMPCO-TRODE® 40
- AMPCO-TRODE® 46
- SIL-TRODE®

KW-TCuNi

Monel 450, Cupronickel

Classifications	
EN ISO 14640:2005	: W Cu 7158 (CuNi30)
AWS A5.7-07	: ERCuNi
KS D 7044:2004	: YCuNi-3
JIS Z 3341:2055	: YCuNi-3

Approvals – I1 (100% Ar)	
ABS	: ERCuNi
DNV	: CuNi30Mn1FeTi

Description

- TIG consumable for 70%Cu-30%Ni Cupronickel and copper alloys
- It can be used for surfacing steels and dissimilar welding of copper alloys with steel

Polarity & shielding gas

- DCEN (DC-)
- Ar: 100% Ar (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

C	Si	Mn	Cu	Ni	Ti
0.01	0.08	0.79	Rem.	30.71	0.30

Typical mechanical properties of all-weld metal

	Tensile Strength (MPa)	Elongation(%)
AWS A5.7	345	-
Example	345	30

AMPCO-TRODE® 10

Aluminium-Bronze

Classifications

AWS A5.7	: ER CuAl-A2
ASME SFA 5.7	: ER CuAl-A2
MIL-E-23765/3A	: MIL-CuAl-A2

**Note: A weld test is required on each Heat/lot of material to conform to MIL-E23765/3A*

Approvals

ABS Certified	: ERCuAl-A2

Description

- AMPCO-TRODE® 10 aluminum bronze is the most versatile welding electrode in AMPCO's family of alloys.
- AMPCO-TRODE® 10 contains an additive to inhibit inter- granular stress corrosion cracking. This is particularly important when welding C61300 and C61400 base metal
- AMPCO-TRODE® 10 will weld and join many ferrous and nonferrous metals and combinations of dissimilar metals. These metals include the more weld-able grades of cast iron, high and low carbon steels, copper, bronzes and copper-nickel alloys
- Applications for AMPCO-TRODE® 10 include building up bearing surfaces, joining and fabricating copper alloys, overlaying for resistance to corrosion and erosion and general maintenance and repair welding

Typical Applications

Cast iron, malleable iron, cast iron to steel, cast iron to bronze, steel to bronze, aluminium bronze, silicon bronze, manganese bronze, cupro-, nickel, tool steel, copper to steel, bearings, bushings, pump housings, condenser boxes, hydraulic pistons, brake drums, tractor gear housings idler pulleys, pickling hooks, paper mill rolls, motor bases, tin plate mill rolls, impellers, valve seats, gears, mixer arms, press rams, ship propellers, lance heads, turbine runners adjusting and spindles.

Limiting chemical composition of all-weld metal (%)

Cu*	Al	Fe	Si	Other
Rem.	8.5-11.0	0.50-1.50	0.1 max	0.5 max

*Including silver

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (3000 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	241	545	28	28	140

Sizes available

Diameter	(mm)	1.6	2.4	3.2
Length	(mm)	914	914	914
Tube size	(kg)	4.5	4.5	4.5

Typical Applications

Cast iron, malleable iron, cast iron to steel, cast iron to bronze, steel to bronze, aluminium bronze, silicon bronze, manganese bronze, cupro-, nickel, tool steel, copper to steel, bearings, bushings, pump housings, condenser boxes, hydraulic pistons, brake drums, tractor gear housings idler pulleys, pickling hooks, paper mill rolls, motor bases, tin plate mill rolls, impellers, valve seats, gears, mixer arms, press rams, ship propellers, lance heads, turbine runners adjusting and spindles.

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

AMPCO-TRODE® 40

Manganese-Nickel-Aluminium-Bronze

Classifications

AWS A5.7	: ER CuMnNiAl
ASME SFA 5.7	: ER CuMnNiAl

Approvals

ABS Certified	: ERCuMnNiAl

Description

- AMPCO-TRODE® 40 manganese-nickel-aluminium bronze is for welding cast ship propellers conforming to MIL-B-21230, Alloy 2 for high resistance to corrosion, erosion and cavitation
- AMPCO-TRODE® 40 also exhibits good ability to join dissimilar metals
- Typical applications include ship propellers, marine components, welding cast iron, joining dissimilar metals

Typical Applications

Ship propellers, marine components, welding cast iron and joining dissimilar metals.

Limiting chemical composition of all-weld metal (%)

Cu*	Al	Fe	Ni	Mn	Si	Other
Rem.	7.0-8.50	2.0-4.0	1.5-3.0	11.0-14.0	1.50 max	0.5 max

*Including silver

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (3000 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	462	759	27	37	217

Sizes available

Diameter	(mm)	1.6	2.4
Length	(mm)	914	914
Tube size	(kg)	4.5	4.5

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

AMPCO-TRODE® 46

Nickel-Aluminium-Bronze

Classifications

AWS A5.7	: E CuNiAl
ASME SFA 5.7	: ER CuNiAl
MIL-E-23765/3A	: MIL-CuNiAl

**Note: A weld test is required on each Heat/lot of material to conform to MIL-E23765/3A*

Approvals

ABS Certified	: ERCuNiAl

Description

- AMPCO-TRODE® 46 nickel-aluminium bronze was developed for the welding of cast and wrought nickel-aluminium bronze
- AMPCO-TRODE® 46 is also recommended for weld repairing NiBral boat propellers
- Typical applications include ship fittings, power plant valves, intake screens, welding AMPCO® 45, oil recovery pumps, propeller gear housings, marine propulsion systems, ship propellers, piping systems and welding AMPCO® 483

Typical Applications

Ship fittings, ship propellers, power plant valves, piping systems, intake screens, welding AMPCO® 483, welding AMPCO® 45, marine propulsion systems, propeller gear housings and oil recovery pumps.

Limiting chemical composition of all-weld metal (%)

Cu*	Al	Fe	Ni	Mn	Si	Other
Rem.	8.50-9.50	3.0-5.0	4.0-5.50	0.60-3.50	0.10 max	0.50 max

*Including silver

Mechanical properties (nominal all-weld metal values)

	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (3000 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	407	718	23	22	196

Sizes available

Diameter	(mm)	1.6	2.4	3.2
Length	(mm)	914	914	914
Tube size	(kg)	4.5	4.5	4.5

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.

SIL-TRODE®

Silicon-Bronze

Classifications

AWS A5.7 : ER CuSi-A

Description

- A silicon bronze welding alloy (UNS C65600) for the inert gas welding of copper-silicon, copper zinc, copper to copper and mild steel used extensively in the welding of galvanized steel. The silicon content of 2.8-4% increases the tensile strength, hardness and work hardening rates
- Silicon bronze also provides good corrosion resistance and has good weldability
- With gas metal-arc welding, the weld metal should be deposited in stringer beads, maintaining a small molten pool to avoid overheating the hot short silicon bronze base metal. Use argon gas for shielding and relatively high welding travel speeds.
- Preheat slightly to remove moisture.
- Interpass temperature should not exceed 66 °C

Limiting chemical composition of all-weld metal (%)

Cu*	Si	Zinc	Tin	Mn	Fe	Al	Pb	Other
Rem.	2.8-4.0	1.0 max.	1.0 max.	1.5 max.	0.50 max	0.01 max.	0.02 max.	0.05 max.

Mechanical properties (nominal all-weld metal values)

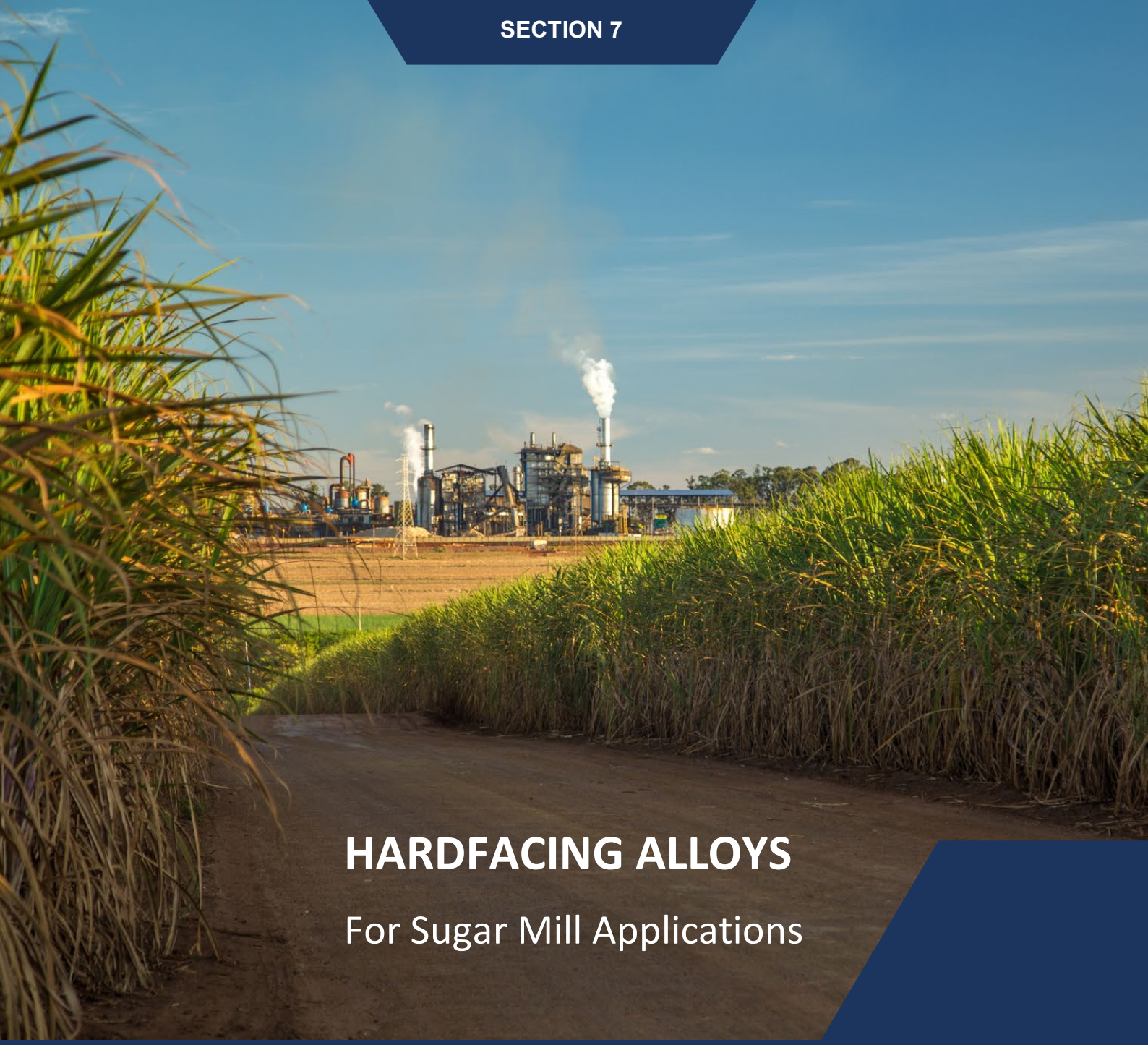
	Yield Strength	Tensile Strength	Elongation	Area Reduction	BHN (500 kg)
	(MPa)	(MPa)	(% in 51mm)	%	6.4 mm deposit
Example	-	350	40	80	350

Sizes available

Diameter	(mm)	1.6	2.4	3.2
Length	(mm)	914	914	914
Tube size	(kg)	4.5	4.5	4.5

Recommended welding parameters

Refer to AMPCO® welding products brochure or website for recommended welding parameters.



HARDFACING ALLOYS

For Sugar Mill Applications

INTRODUCTION TO HARDFACING WELDING

Benefits of Hardfacing

Hardfacing is a low-cost method of depositing wear resistant surface on metal components to extend service life.
Although used primarily to restore worn parts to usable condition, hardfacing is also applied to new components before being placed into service.

- Fewer replacement parts needed
- Operating efficiency is increased by reducing downtime
- Less expensive base metal can be used
- Overall costs are reduced

Consumable Selection

Welding material selection depends upon three major factors:

1. Base Metal: Primarily affects the choice of build-up materials.

1) Manganese steel is used for components subject to high impact loading. Rebuild to size using manganese steel weld deposits.
2) Carbon and alloy steel components are rebuilt to size using low alloy steel weld deposits.

2. Type of Wear: The primary consideration in selecting the final hardfacing layers is the type of wear to be encountered in service.

1) Metal-to-Metal Friction: Wear from steel parts rolling or sliding against each other with little or no lubrication.
2) Severe Impact: Wear from severe pounding which tends to squash, gouge and crack the surface.
Manganese steel deposits, which work harden in service, provide the greatest impact wear resistance.
3) Abrasion plus Impact: Wear from gritty material accompanied by heavy pounding which tends to chip or crack, as well as grind, away the surface.
4) Severe Abrasion: Wear from gritty materials which grind or erode the surface. Severe abrasion is often accompanied by heavy compression or moderate impact. Hard deposits are required to resist abrasion, but they may also need substantial impact resistance.
5) Metal-to-Earth Abrasion: Wear from earth-like materials accompanied by moderate impact (pounding).
6) Corrosion: Chemical attack.

3. Arc Welding Method: The choice of arc welding method depends primarily upon the size and number of components, available positioning equipment and frequency of hardfacing. Available methods are as follows:

1) Manual Welding using stick electrodes requires the least amount of equipment and provides maximum flexibility for welding in remote locations and all positions.
2) Semi-automatic Welding uses wire feeders and self-shielded, flux-cored electrodes increasing deposition rates over manual welding.
3) Automatic Welding requires the greatest amount of initial setup but provides the highest deposition rates for maximum productivity.

HARDFACING ALLOYS FOR SUGAR MILLS

- KM-650 (Covered electrodes)
- KM-700 (Covered electrodes)
- KM-800 (Covered electrodes)
- KM-900 (Covered electrodes)
- K-CCHT (Open-arc flux cored wire)
- K-HCRHT (Open-arc flux cored wire)
- K-700HT (Dual shield flux core wire)
- K-800HT (Dual shield flux core wire)

Covered Electrodes

KM-650

For hardfacing

KISWEL

Classifications

DIN 8555	: E10-UM-60

Description

- Hardfacing of hammers, cutter knives, shovel teeth, cutter for coal, concrete cutters and earth drills
- Excellent heavy soil abrasion resistance
- Covering is high chromium carbide type
- The deposited weld metal has Cr-carbide alloy
- Machining is not possible, grinding only
- Preheat at 200 °C and higher
- Post heat treatment at 600 °C immediately after welding
- Redry the electrode at 70 – 120 °C for 30-60 minutes prior to use

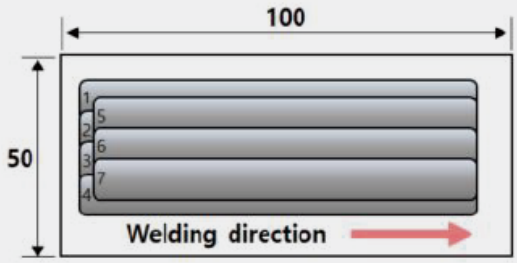
Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo
3.10	0.89	1.90	0.013	0.002	0.01	30.55	0.01

Typical mechanical properties of all-weld metal

Conditions	As-welded	
	Interpass temp. 150 °C	Interpass temp. 200 °C
HV	735	790
HRC	61.7	63.5



Size: 4.0 x 400mm
Current & Amp.: DC (+) 170-185A
Inter-pass Temp.: 135-170ºC
Layer: 3 Layer (9 Pass)

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	3.2	4.0	5.0
Length	(mm)	350	400	400
Amperage	F	120-150	160-200	220-260

KM-650

For hardfacing

Bead appearance (Flat)

“Slag Removal”

Covered Electrodes

KM-700

For hardfacing (HV 700)

Classifications

KS D 7035	: DF2B-700-B
JIS Z 3251	: DF2B-700-B

Description

- Covering is low hydrogen type for hardfacing of cutter knives, dredger and mixer
- The deposited weld metal has martensite structure
- In the case of multilayer weld build-up of base plates for hardening properties, under-laying with low hydrogen type carbon steel electrode is recommended
- Preheat at 150 °C and over in general
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	W
0.48	1.42	1.36	0.015	0.012	0.03	3.65	0.02	0.01

Typical mechanical properties of all-weld metal

Conditions	As-welded		Heat treated
	Interpass temp. 200 °C	Interpass temp. 300 °C	600 °C stress relief
HV	688	690	585
HRC	59.6	59.7	54.4
HS	81	81	73

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	3.2	4.0	5.0	6.0
Length	(mm)	350	400	400	450
Amperage	F	90-130	140-170	190-240	220-300

Covered Electrodes

KM-800

For hardfacing (HV 700)

Classifications

KS D 7035	: DF3C-700-B
JIS Z 3251	: DF3C-700-B

Description

- Covering is low hydrogen type for hardfacing of impellers, pump casings
- The deposited weld metal has an extremely hard martensite structure
- Machining is impossible as welded
- Preheat at 200°C and over
- Postheat treat at about 600 °C immediately after welding
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	W
0.47	1.45	1.51	0.017	0.012	0.03	4.10	0.02	0.01

Typical mechanical properties of all-weld metal

Conditions	As-welded		Heat treated
	Interpass temp. 150°C	Interpass temp. 200°C	600 °C stress relief
HV	723	810	535
HRC	61.1	64.4	51.4
HS	83	89	69

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	3.2	4.0	5.0	6.0
Length	(mm)	350	400	400	450
Amperage	F	90-130	140-170	190-240	220-300

KM-900

For hardfacing (HV 700)

KISWEL

Classifications

KS D 7035	: DFMA-250-B
JIS Z 3251	: DFMA-250-B

Description

- Covering is high titania type for hardfacing of crushers, high manganese rails, buckets, bulldozer parts and build-up of parts subject to serene impact and abrasion
- The deposited weld metal has austenite structure
- Extremely ductile deposited weld metal
- When the base metal of 13% Mn steel is hardened, cut off the hardened zone before welding
- Redry the electrode at 300 – 400 °C for 1 – 2 hours prior to use

Welding positions

Typical chemical composition of all-weld metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	W
0.52	0.30	12.10	0.018	0.012	0.02	0.10	0.20	0.01

Typical mechanical properties of all-weld metal

Conditions	As welded Interpass temp. 150°C	Work hardenability
HV	225	510
HRC	16.9	49.8
HS	33	66.5

Sizes available and recommended currents (AC or DC +)

Diameter	(mm)	3.2	4.0	5.0	6.0
Length	(mm)	350	400	400	450
Amperage	F	90-130	140-180	190-240	220-300

Flux Cored Wire (Open-arc)

K-CCHT

For hardfacing

Classifications

DIN 8555	: MF 10-GF-65-G

Description

- Hard facing of sugar cane hammers and knives, crusher roll rebuilding, wear plate manufacturing, large tillage tool repair, coal pulverizer and grinding rings subject to sever abrasive wear
- Moderate to severe impact and wear by earth, sand and abrasives
- The deposit will readily show stress relief cracks

Welding positions

Typical chemical composition of all-weld metal (%)

C	Cr	Mn	Si
4.5	26.5	1.0	0.5

Typical mechanical properties of all-weld metal

DIN	HRC	Layer *	Remark
K-CCHT	58.0	1-3	Not machinable

* This alloy is generally limited to 3 layers.

Recommended Welding Parameters (DCEP, DC+)

	Wire Diameter	Welding Parameters		Shield Gas
	(mm)	Amps	Volts	
K-CCHT	2.0	250 - 275	28 - 34	Open-arc
	2.8	300 - 400	30 - 34	Open-arc
	3.2	350 - 450	36 - 39	Open-arc

Packaging

Dia. (mm)	2.0	2.8	3.2
Spool (kg)	5, 12.5, 15, 20		
Pail Pack / POP (kg)	100 - 300		

Flux Cored Wire (Open-arc)

K-HCRHT

For hardfacing

KISWEL

Classifications

DIN 8555	: MF 10-GF-60-G
EN 14700	: T Fe16

Description

- Hard facing of sugar cane hammers and knives, crusher roll rebuilding, wear plate manufacturing, large tillage tool repair, coal pulverizer and grinding rings subject to sever abrasive wear
- High chromium carbide type
- The deposit will readily show stress relief cracks

Welding positions

Typical chemical composition of all-weld metal (%)

C	Cr	Mn	Si	V
5.3	29.5	2.3	1.0	1.0

Typical mechanical properties of all-weld metal

DIN 8555	57 – 62 HRC	Layer *	Remark
K-CCHT	62.0	1-3	As welded

* This alloy is generally limited to 3 layers.

Diameter: 1.6mm
Amps & Volts: 200-250A / 28-34V
Inter-pass Temp.: Min. 250ºC
Layer: 2 Layer (7 Pass)

Bead appearance (Flat)

Recommended Welding Parameters (DCEP, DC+)

	Wire Diameter	Welding Parameters		Shield Gas
	(mm)	Amps	Volts	
K-CCHT	2.0	250 - 275	28 - 34	Open-arc
	2.8	300 - 400	30 - 34	Open-arc
	3.2	350 - 450	36 - 39	Open-arc

K-HCRHT

For hardfacing

Packaging			
Dia. (mm)	2.0	2.8	3.2
Spool (kg)	5, 12.5, 15, 20		
Coil (kg)	5, 12.5, 15, 20		
Pail Pack / POP (kg)	100 - 300		

Flux Cored Wire

K-700HT

For hardfacing (HV600-800)

Classifications

DIN 8555	: MF 10-GF-60-G
EN 14700	: T Fe16

Description

- Designed for welding metal to metal and underlaying welding of hardfacing
- Typical applications include crane wheels, blower blades, bucket lips and dredge parts
- To minimize cracking, follow recommended preheat and Interpass temperature

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S	Cr	W
CO_2	0.40	3.20	0.60	0.012	0.010	7.0	0.80

Typical mechanical properties of all-weld metal

	HV	HRC	HS	Interpass Temp	Remarks
Example (CO2)	600-800	55-64	74-88	200 °C	As welded

* Note: Composition and hardness depend on dilution. Single layer deposit hardness depends upon base metal and / or build-up material.

Packaging

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	10, 15, 20

Flux Cored Wire

K-800HT

For hardfacing (HV700-850)

Description

- Designed for heavy abrasion resistance with martensitic structure
- Typical applications include augers, bucket lips, conveyor screws, blower blades and dozer blades
- To minimize cracking, should obey the preheat and Interpass temperature

Welding positions

Polarity & shielding gas

- DCEP (DC+)
- CO_2: 100% CO_2 (15 – 25 l/min)

Typical chemical composition of all-weld metal (%)

Shielding Gas	C	Si	Mn	P	S	Cr	W
CO_2	0.44	3.40	0.55	0.013	0.011	7.50	1.00

Typical mechanical properties of all-weld metal

	HV	HRC	HS	Interpass Temp	Remarks
Example (CO2)	700-850	60-65	81-91	200	As welded

* Note: Composition and hardness depend on dilution. Single layer deposit hardness depends upon base metal and / or build-up material.

Packaging

Diameter (mm)	1.2, 1.4, 1.6
Spool (kg)	10, 15, 20

SAFETY IN WELDING

Please pay special attention to the below welding associated health risks and hazards during welding and related operations.

WARNING	**Be sure to follow the safety practices stated below in order to protect welders, operators and accompanied workers from a serious accident resulting in injury or death.**

- Be sure to follow the safety practices stated in the OEM product data sheets when you use welding consumables.
- Be sure to follow the safety practices stated in the OEM instruction manual when you use welding equipment.

WARNING	**Electric shock can cause serious injury or kill.**

- Do not touch live electrical parts (A covered electrode held with an electrode holder and a wire during welding are electrically live).
- Wear dry, insulated gloves. Do not wear torn and wet gloves. Use an electric shock preventing device (open-circuit-voltage-reducing device) when welders or operators work in confined or high-level paces. Also use a fall arrestor when a welder or operator conducts welding at elevated spaces.
- Follow the safety practice stated in the instruction manual of the welding machine before use. Do not use a welding machine case or cover of which has been removed. Welding cables must be of a size adequate for the capacity expected. Welding cables must be maintained, and a damaged cable must be repaired or replaced.

CAUTION	**· Fumes and gases generated in welding can be dangerous to your health.** **· Welding in confined spaces can be dangerous leading to suffocation because of oxygen deficient atmospheres.**

- Keep your head out of the source of fumes or gases to prevent directly breathing high density fumes or gases.
- Use fume extraction equipment, or wear respirators in order to prevent breathing fumes and toxic gases.
- Use good general ventilation for welding in the workshop. Particularly in welding in confined spaces, be sure to use adequate ventilation, or wear respirators in the presence of a trained supervisor.
-Do not weld where operations of degreasing, cleaning, spraying, and painting are present nearby. Welding work close to these operations may cause a generation of harmful gases.
- Use adequate ventilation or respirators when welding plated and coated steel.
- Use respirators, eye safety glasses and safety leather gloves when handling welding fluxes in order to protect you from flux dust.

CAUTION	**Fire and explosion can take place.**

- Never weld areas adjacent to highly flammable materials. Remove combustibles so that spatter cannot ignite them. If combustibles cannot be removed, cover them with a nonflammable material.
- Do not weld a vessel or pipe which contains combustibles or being sealed.
- Do not put a hot weldment close to combustibles right after welding has finished.
- When welding ceilings, floors, walls, etc. remove combustibles from their other sides.
- Any part of welding wire, with exception of wire extended at the tip of the torch, must be free from touching the electrical circuit of the base metal side.
- Fasten the cable joints and cover them with appropriate insulation material. The cable for the base metal side should be connected closer to the part of welding.
- Be ready to respond to a possible accident with appropriate fire-extinguishing equipment adjacent to the welding areas.

CAUTION	**Arc rays can injure eyes and burn skin.**

- Select the correct grade of shade for filter lenses and filter plates suitable for welding work by referring to the standard of JIS T8141.
- Wear protectors suitable for preventing you from the arc rays such as safety leather gloves for welding, long sleeve shirts, foot covers, leather aprons, etc.
- The welding area should be surrounded by appropriate shade curtains in order to prevent adjacent workers and operators from the arc rays.

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