



CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

Hyundai Welding Co., Ltd.
90-5, Jangheung-dong, Nam-gu, Pohang-si
Gyeongbuk, 790-240, Korea

has been approved by Lloyd's Register Quality Assurance, Coventry, West Midlands, UK, to the following Quality Management System Standard:

ISO/TS 16949:2009

The Quality Management System is applicable to:

**Design and manufacture of solid wires & rods and
flux cored wires.**

This certificate is valid only in association with the certificate schedule bearing the same number on which the locations applicable to this approval are listed.

Approval
Certificate No: SEO 0941752

Original ISO/TS 16949 Approval: 16 February 2004

Current Certificate: 2 February 2010

Certificate Expiry: 1 February 2013


Issued by: Lloyd's Register Quality Assurance Limited



IATF Certificate No: 0096802

This document is subject to the provision on the reverse
71, Fenchurch Street, London EC3M 4BS. Registered Number 1879370
This approval is carried out in accordance with the LRQA assessment and certification procedures and monitored by LRQA
Master Revision 13



CERTIFICATE OF APPROVAL

This is to certify that the Environmental Management System of:

Hyundai Welding Co., Ltd.
Pohang-si, Gyeongbuk & Gochang-gun, Jeonbuk
Korea



has been approved by Lloyd's Register Quality Assurance
to the following Environmental Management System Standard:

ISO 14001:2004

The Environmental Management System is applicable to:

**Design and manufacture of covered electrodes,
solid wires & rods, flux cored wires and
submerged arc wires & fluxes.**

This certificate is valid only in association with the certificate schedule bearing the same
number on which the locations applicable to this approval are listed.

Approval
Certificate No: SEO0032015

Original Approval: 10 February 2004

Current Certificate: 10 February 2010

Certificate Expiry: 9 February 2013

Issued by: LRQA (Korea) Ltd. for and on behalf of
Lloyd's Register Quality Assurance Limited



001

This document is subject to the provision on the reverse

17th Floor, Singsoong Bldg, #25-4, Yeouido-dong, Yeongdeungpo-gu, Seoul, 150-010, Korea

This approval is carried out in accordance with the LRQA assessment and certification procedures and monitored by LRQA.

The use of the UKAS Accreditation Mark indicates Accreditation in respect of those activities covered by the Accreditation Certificate Number 001
Marking System 1.1

 **HYUNDAI**
W E L D I N G

CONSUMABLES



Warning for Safety in Welding

 WARNING	• Be sure to follow the safety practices stated in the following in order to protect welders, operators and accompanied workers from a serious accident resulting in injury or death.
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- Be sure to follow the safety practices stated in the following when you use welding consumables.
- Be sure to follow the safety practices stated in the instruction manual when you use welding equipment.

 WARNING	• Electric shock can kill.
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- Do not touch live electrical parts.(A covered electrode held with an electrode holder and a wire in welding are electrically live.)
- Wear dry, insulated gloves. Do not wear teared and wet gloves.
- Use an electric shock preventing device(open-circuit-voltage-reducing device)when welders or operators work in confined or high-level spaces. Use also a lifeline when a welder or an operator conducts welding at a high-level area.
- Follow the safety practices stated in the instruction of the welding machine before you use.
Do not use a welding machine case or cover of which is removed. Welding cables must be a size adequate for the capacity expected. Welding cables must be maintained, and a damaged cable must be repaired or replaced one.

 CAUTION	• Fumes and gases generated in welding can be dangerous to your health. • Welding in confined spaces can be dangerous for suffocation because of oxygen deficient atmospheres.
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- Keep your head out of the source of gases to prevent from directly breathing high density fumes or gases.
- Use local exhaust ventilation, or wear respirators in order to prevent you from breathing fumes and toxic gases which cause toxication, poor health and suffocation by oxygen deficient atmospheres.
- Use general ventilation for welding in the workshop. Particularly in welding in confined spaces, be sure to use adequate ventilation, or wear respirators at 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 with special attention in welding plated and coated steel.
- Use respirators, eye safety glasses and safety leather gloves when handling welding fluxes in order to prevent you from the flux dust.

 CAUTION	• Arc rays can injure eyes and burn skin.
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- Wear hand shields with an adequate grade of shade in welding and supervising the welding work.
- Select the correct grade shade for filter lenses and filter and filter plates suitable for exact welding work by referring to the standard of JIS T8141.

- Wear protectors suitable for preventing contact with arc rays, such as safety leather gloves for welding, long sleeve shirts, foot covers, leather aprons, etc.
- Use, as needed shade curtains for welding by surrounding the welding areas in order to prevent accompanied workers from the arc rays.

	• The tips of the welding wires and filler wires can injure eyes, face, etc.
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- Do not lose your hold on the wire when taking off the tip of the wire.
- Do not point the welding torch towards your face when checking the wire feeding condition.

	• Falling down and dropping welding consumables can injure you.
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- Wear safety shoes, and pay your attention not to drop welding consumables on your body when you carry and handle them. Keep your posture correct not to cause a crick in your back while handling them.
- Pile up welding consumables so that falling down and dropping cannot take place while storing and carrying them.

	• Fire and explosion can take place.
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- Never weld in areas adjacent to highly inflammable materials. Remove consumables so that spatter cannot ignite them. If combustibles cannot be removed, cover them with a noninflammable 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 finished.
- When welding ceiling, floors, walls, etc, remove combustibles at the other side of them.
- Any part of welding wire, with exception of wire extended at the tip of the torch, must be free from touching on the electrical circuit of the base metal side.
- Fasten the cable joints and seal them in a insulation tape. The cable for the base metal side should be connected closer to the part of welding.
- Be ready to cope with a possible accident by equipping fire-extinguishing equipment adjacent to the welding areas.

	• Flying spatters and slags can injure eyes and cause burn skins. • High temperature heat in welding can cause burn skins.
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- Wear safety glasses, safety leather gloves for welding, long sleeve shirts, foot covers, leather aprons, etc.
- Do not touch weldments while hot.

HYUNDAI Welding Co.,Ltd. does not accept responsibility for errors or information which is found to be misleading. Suggestions for, or descriptions of, the end use or application of products, or methods of working are for information only and HYUNDAI Welding Co.,Ltd. accepts no liability in respect thereof. Prior to using products supplied or manufactured by HYUNDAI Welding Co.,Ltd., the purchaser should ensure that the prouducts are suitable for the work being welded.

YOUR WELDING PARTNER!

INDEX BY PRODUCTS

SMAW [Stick Electrodes] 15

SMAW

SAW [Wire/Flux Combination] 93

SAW

GMAW [Solid Wire & Stainless MIG Wire] 129

GMAW

GTAW [TIG Rod] 159

GTAW

FCAW [Flux Cored Wire] 179

FCAW

Non-ferrous metal Welding Consumables 267

NON-FERROUS

APPENDIX 285

APPENDIX

SMAW [Stick Electrodes]

Mild steels

Product	AWS	JIS	EN	Page
S-4301.I	A5.1/ASME SFA5.1 E6019	Z3211 E4319	ISO 2560-A - E35 2 RA 1 2	17
S-4303.V	-	Z3211 E4303	ISO 2560-A - E38 2 RA 1 2	18
S-4303.T	-	Z3211 E4303	ISO 2560-A - E38 0 RA 1 2	19
S-6010.D	A5.1/ASME SFA5.1 E6010	Z3211 E4310	ISO 2560-A - E38 3 C 2 5	20
S-6011.D	A5.1/ASME SFA5.1 E6011	Z3211 E4311	ISO 2560-A - E38 3 C 1 5	21
S-6013.LF	A5.1/ASME SFA5.1 E6013	Z3211 E4313	ISO 2560-A - E38 0 R 1 2	22
S-6013.V	A5.1/ASME SFA5.1 E6013	Z3211 E4313	ISO 2560-A - E38 0 RC 1 1	23
S-6027.LF	A5.1/ASME SFA5.1 E6027	Z3211 E4327	ISO 2560-A - E38 3 R 1 4	24
S-7014.F	A5.1/ASME SFA5.1 E7014	-	ISO 2560-A - E42 0 R 1 2	25
S-7024.F	A5.1/ASME SFA5.1 E7024	Z3211 E4924	ISO 2560-A - E42 0 RR 7 4	26
S-7016.O	A5.1/ASME SFA5.1 E7016	Z3211 E4316	ISO 2560-A - E42 2 B 1 2	27
S-7016.M	A5.1/ASME SFA5.1 E7016	Z3211 E4316	ISO 2560-A - E42 2 B 1 2	28

High tensile steels

Product	AWS	JIS	EN	Page
S-7016.H	A5.1/ASME SFA5.1 E7016	Z3211 E4916	ISO 2560-A - E42 3 B 1 2	29
S-7016.LF	A5.1/ASME SFA5.1 E7016	Z3211 E4916	ISO 2560-A - E42 3 B 1 2	30
S-7016.G	A5.1/ASME SFA5.1 E7016	Z3211 E4916	ISO 2560-A - E42 3 B 1 2	31
S-7018.G	A5.1/ASME SFA5.1 E7018	Z3211 E4918	ISO 2560-A - E42 3 B 3 2	32
S-7018.GH	A5.1/ASME SFA5.1 E7018	Z3211 E4918	ISO 2560-A - E42 3 B 3 2 H5	33
S-7028.F	A5.1/ASME SFA5.1 E7028	Z3211 E4928	ISO 2560-A - E42 2 B 7 4	34
S-7048.V	A5.1/ASME SFA5.1 E7048	Z3211 E4948	ISO 2560-A - E42 3 B 3 5	35
S-8016.G	A5.5/ASME SFA5.5 E8016-G	Z3211 E5516	ISO 2560-A - E46 3 1Ni B 1 2	36
S-8018.G	A5.5/ASME SFA5.5 E8018-G	Z3211 E5518	ISO 2560-A - E46 2 1Ni B 3 2	37
S-9016.G	A5.5/ASME SFA5.5 E9016-G	Z3211 E5716	ISO 2560-A - E50 2 B 1 2	38
S-10016.G	A5.5/ASME SFA5.5 E10016-G	Z3211 E6916-N4CM1 U	757 - E55 0 B 1 2	39
S-11016.G	A5.5/ASME SFA5.5 E11016-G	-	757 - E62 2 Mn2NiMo B 1 2	40
S-9018.M	A5.5/ASME SFA5.5 E9018-M	-	757 - E50 4 B 4 2	41
S-11018.M	A5.5/ASME SFA5.5 E11018-M	-	757 - E62 4 B 4 2	42

Weather proof steels

Product	AWS	JIS	EN	Page
S-7018.W	A5.5/ASME SFA5.5 E7018-W1	Z3214 DA5026G	ISO 2560-A - E42 2 B 3 2	43
S-8018.W	A5.5/ASME SFA5.5 E8018-W2	Z3214 DA5826W	ISO 2560-A - E50 2 B 3 2	44

Low-temperature service steels

Product	AWS	JIS	EN	Page
S-7018.1	A5.1/ASME SFA5.1 E7018-1	Z3211 E4918	ISO 2560-A - E42 4 B 3 2	45
S-7018.1H	A5.1/ASME SFA5.1 E7018-1	Z3211 E4918	ISO 2560-A - E46 4 B 3 2 H5	46
S-7016.LS	A5.5/ASME SFA5.5 E7016-G	Z3211 E4916-N1 AP L	ISO 2560-A - E46 6 1Ni B 1 2	47
S-8016.C1	A5.5/ASME SFA5.5 E8016-C1	Z3211 E5516-N5 AP L	ISO 2560-A - E46 5 2Ni B 1 2	48
S-8016.C2	A5.5/ASME SFA5.5 E8016-C2	Z3211 E5516-N7 AP L	ISO 2560-A - E46 6 3Ni B 1 2	49
S-8016.C3	A5.5/ASME SFA5.5 E8016-C3	Z3211 E5516-N2	ISO 2560-A - E46 4 1Ni B 1 2	50
S-8018.C1	A5.5/ASME SFA5.5 E8018-C1	Z3211 E5518-N5 AP L	ISO 2560-A - E46 5 1Ni B 3 2	51
S-8018.C3	A5.5/ASME SFA5.5 E8018-C3	Z3211 E5518-N2	ISO 2560-A - E46 4 1Ni B 3 2	52

Heat-resistant, Low alloy steels

Product	AWS	JIS	EN	Page
S-7010.A1	A5.5/ASME SFA5.5 E7010-A1	-	ISO 2560-A - E42 0 Mo C 1 5	53
S-7016.A1	A5.5/ASME SFA5.5 E7016-A1	Z3223 DT1216	1599 - E Mo B 1 2	54
S-7018.A1	A5.5/ASME SFA5.5 E7018-A1	-	1599 - E Mo B 3 2	55
S-8016.B1	A5.5/ASME SFA5.5 E8016-B1	-	1599 - E CrMo0.5 B 1 2	56
S-8016.B2	A5.5/ASME SFA5.5 E8016-B2	Z3223 DT2316	1599 - E CrMo1 B 1 2	57
S-8018.B2	A5.5/ASME SFA5.5 E8018-B2	Z3223 DT2318	1599 - E CrMo1 B 3 2	58
S-9016.B3	A5.5/ASME SFA5.5 E9016-B3	Z3223 DT2416	1599 - E CrMo2 B 1 2	59
S-9018.B3	A5.5/ASME SFA5.5 E9018-B3	Z3223 DT2418	1599 - E CrMo2 B 3 2	60
S-8016.B5	A5.5/ASME SFA5.5 E8016-B5	-	1599 - E CrMo5 B 1 2	61

Hardfacing applications

Product	AWS	JIS	EN	Page
S-240A.R	-	Z3251 DF2A-250-R	-	62
S-350A.R	-	Z3251 DF2A-350-R	-	63
S-260A.B	-	Z3251 DF2A-300-B	-	64
S-350B.B	-	Z3251 DF2A-400-B	-	65
S-450B.B	-	Z3251 DF2A-450-B	-	66
S-500B.B	-	Z3251 DF2B-500-B	-	67
S-600B.B	-	Z3251 DF2B-600-B	-	68
S-700B.B	-	Z3251 DF3C-600-B	-	69
S-711	-	Z3251 DFCrA-600-BR	-	70
S-13MN.B	-	Z3251 DFMA-250-B	-	71

Stainless steels

Product	AWS	JIS	EN	Page
S-308.16N	A5.4/ASME SFA5.4 E308-16	Z3221 ES308-16	1600 - E 19 9 R	72
S-308L.16N[17]	A5.4/ASME SFA5.4 E308L-16	Z3221 ES308L-16	1600 - E 19 9 L R	73
	A5.4/ASME SFA5.4 E308L-17	Z3221 ES308L-17	1600 - E 19 9 L R	
S-308Mo.16	A5.4/ASME SFA5.4 E308Mo-16	Z3221 ES308Mo-16	1600 - E 20 10 3	74
S-308LT.16	A5.4/ASME SFA5.4 E308L-16	Z3221 ES308L-16	1600 - E 19 9 L R	75
S-309.16N	A5.4/ASME SFA5.4 E309-16	Z3221 ES309-16	1600 - E 23 12 R	76
S-309L.16[17]	A5.4/ASME SFA5.4 E309L-16	Z3221 ES309L-16	1600 - E 23 12 L R	77
	A5.4/ASME SFA5.4 E309L-17	Z3221 ES309L-17	1600 - E 19 9 L R	
S-309Mo.16	A5.4/ASME SFA5.4 E309Mo-16	Z3221 ES309Mo-16	1600 - E 23 12 2 R	78
S-309MoL.16	A5.4/ASME SFA5.4 E309MoL-16	Z3221 ES309Lmo-16	1600 - E 23 12 2 L R	79
S-310.15	A5.4/ASME SFA5.4 E310-15	Z3221 ES310-15	1600 - E 25 20 B	80
S-310.16	A5.4/ASME SFA5.4 E310-16	Z3221 ES310-16	1600 - E 25 20 R	81
S-312.16	A5.4/ASME SFA5.4 E312-16	Z3221 ES312-16	1600 - E 29 9 R	82
S-316.16N	A5.4/ASME SFA5.4 E316-16	Z3221 ES316-16	1600 - E 19 12 3 R	83
S-316L.16N[17]	A5.4/ASME SFA5.4 E316L-16	Z3221 ES316L-16	1600 - E 19 12 3 L R	84
	A5.4/ASME SFA5.4 E316L-17	Z3221 ES316L-17	1600 - E 19 12 3 L R	
S-316LT.16	A5.4/ASME SFA5.4 E316L-16	Z3221 ES316L-16	1600 - E 19 12 3 L R	85
S-317L.16	A5.4/ASME SFA5.4 E317L-16	Z3221 ES317L-16	-	86
S-347.16	A5.4/ASME SFA5.4 E347-16	Z3221 ES347-16	1600 - E 19 9 Nb R	87
S-2209.16	A5.4/ASME SFA5.4 E2209-16	Z3221 ES2209-16	1600 - E 22 9 3 N L	88

Cast iron

Product	AWS	JIS	EN	Page
S-NCI	A5.15/ASME SFA5.15 ENi-CI	Z3252 DFCNi	ISO 1071 - E C Ni-CI 1	89
S-NFC	A5.15/ASME SFA5.15 ENiFe-CI	Z3252 DFCNiFe	ISO 1071 - E C NiFe-CI 1	90
S-FCF	A5.15/ASME SFA5.15 ESr	Z3252 DFCFe	ISO 1071 - E Z 1	91

SAW [Wire/Flux Combination]

Product	AWS	JIS	EN	Page
S-777MX x H-14	A5.17/ASME SFA5.17 F7AZ-EH14	Z3183 S502-H	760 - S A AR 1	95
S-777MXT x H-14 (A-2)	A5.17/ASME SFA5.17 F7A0-EH14 A5.23/ASME SFA5.23 F8PZ-EA2-A2	Z3183 S501-H -	760 - S A AR 1	96
S-777MXT x B-2 (B-3)	A5.23/ASME SFA5.23 F8PZ-EB2-B2 A5.23/ASME SFA5.23 F8PZ-EB3-B3	-	760 - S A AR 1	97
S-777MXH x H-14	A5.17/ASME SFA5.17 F7A(P)2-EH14	Z3183 S502-H	760 - S A AB 1	98
S-777MXH x A-3	A5.23/ASME SFA5.23 F8A4-EA3-G	Z3183 S584-H	760 - S A AB 1	99
S-727 x L-8 (L-12)	A5.17/ASME SFA5.17 F7A2-EL8(EL12)	Z3183 S502-H	760 - S A AB 1	100
S-707 x L-8	A5.17/ASME SFA5.17 F7A4-EL8	Z3183 S502-H	760 - S A AB 1	101
S-737 x H-14	A5.17/ASME SFA5.17 F7A(P)4-EH14	Z3183 S502-H	760 - S A AB 1	102
S-717 x M-12K	A5.17/ASME SFA5.17 F7A(P)6-EM12K	Z3183 S502-H	760 - S A AB 1	103
S-707T x H-14	A5.17/ASME SFA5.17 F7A(P)6-EH14	Z3183 S502-H	760 - S A AB 1	104
S-707TP x H-14	A5.17/ASME SFA5.17 F7A(P)6-EH14	Z3183 S502-H	760 - S A AB 1	105
S-787TB x H-14	A5.17/ASME SFA5.17 F7A(P)8-EH14	Z3183 S502-H	760 - S A FB 1	106
Superflux 55ULT x H-14	A5.17/ASME SFA5.17 F7A(P)8-EH14	Z3183 S502-H	760 - S A FB 1	107
Superflux 787 x H-12K	A5.17/ASME SFA5.17 F7A(P)8-EH12K	Z3183 S502-H	-	108
Superflux 787 x H-14 (H-14L)	A5.17/ASME SFA5.17 F7A(P)8-EH14 A5.23/ASME SFA5.23 F7A8-EG-G	Z3183 S502-H	-	109
S-787TT x H-12K (H-14)	A5.17/ASME SFA5.17 F7A(P)8-EH12K	-	-	110
Superflux 55LP x H-14(A-3)	A5.17/ASME SFA5.17 F7A(P)8-EH14 A5.23/ASME SFA5.23 F8A6-EA3-A3	Z3183 S502-H Z3183 S584-H	-	111
Superflux 800T x M-12K (A-2)	A5.17/ASME SFA5.17 F7A8-EM12K A5.23/ASME SFA5.23 F8A4-EA2-A3	-	760 - S A FB 1	112
Superflux 600 x H-14 (A-3)	A5.17/ASME SFA5.17 F7A(P)6-EH14 A5.23/ASME SFA5.23 F8A(P)4-EA3-G	Z3183 S502-H Z3183 S584-H	-	113
S-800MX x A-G (A-3)	A5.23/ASME SFA5.23 F8A0-EG-G A5.23/ASME SFA5.23 F8AZ-EA3-G	Z3183 S502-H Z3183 S582-H	760 - S A AR 1	114
S-800P x M-12K (H-14)	A5.17/ASME SFA5.17 F7A2-EM12K A5.17/ASME SFA5.17 F7A(P)6-EH14	Z3183 S502-H Z3183 S502-H	-	115
S-800CM x B-2	A5.23/ASME SFA5.23 F8P2-EB2-B2	-	760 - S A FB 1	116
S-800P x A-G (A-3)	A5.23/ASME SFA5.23 F8A4-EG-G A5.23/ASME SFA5.23 F8A4(P2)-EA3-G	Z3183 S582-H Z3183 S584-H	-	117
S-800SP x M-12K (A-2)	A5.17/ASME SFA5.17 F7A4-EM12K A5.23/ASME SFA5.23 F8A2-EA2-G	Z3183 S502-H Z3183 S582-H	760 - S A AB 1	118
S-900SP x M-12K (A-2)	A5.17/ASME SFA5.17 F7A4-EM12K A5.23/ASME SFA5.23 F9A2-EA2-G	Z3183 S502-H Z3183 S582-H	760 - S A CS 1 760 - S A CS 1	119
S-460Y x H-14	A5.23/ASME SFA5.23 F8A8-EH14-G	Z3183 S584-H	760 - S A FB 1	120
S-705EF x H-14	-	-	-	121
S-705HF x H-14	-	-	-	122
Superflux 70H x L-8	A5.17/ASME SFA5.17 F7A(P)0-EL8	Z3183 S502-H	-	123

Stainless steel

Product	AWS	JIS	EN	Page
Superflux300S x YS-308(L)	-	Z3324 FSS-B1/YS308(L)	-	124
Superflux300S x YS-309(L)	-	Z3324 FSS-B1/YS309(L)	-	125
Superflux300S x YS-316(L)	-	Z3324 FSS-B1/YS316(L)	-	126
Superflux209 x YS-2209	-	-	-	127

GMAW [Solid Wire & Stainless MIG Wire]

Mild steel & 490MPa high tensile steels

Product	AWS	JIS	EN	Page
SM-70	A5.18/ASME SFA5.18 ER70S-6	Z3312 YGW12	ISO 14341-A G 42 2 C G3Si1	131
SM-70EN	A5.18/ASME SFA5.18 ER70S-6	Z3312 YGW12	ISO 14341-A G 42 3 M G3Si1 ISO 14341-A G 42 2 C G4Si1 ISO 14341-A G 46 4 M G4Si1	132
SM-70G	A5.18/ASME SFA5.18 ER70S-G	Z3312 YGW11	-	133
SM-70S	A5.18/ASME SFA5.18 ER70S-3	Z3312 YGW16	-	134
SM-70GS	A5.18/ASME SFA5.18 ER70S-G	Z3312 YGW15	-	135

High tensile steels

Product	AWS	JIS	EN	Page
SM-55H	-	Z3312 YGW18	-	136
SM-80G	A5.28/ASME SFA5.28 ER80S-G	Z3312 YGW21	-	137
SM-80CM/ST-80CM	A5.28/ASME SFA5.28 ER90S-G	Z3316 YGT1CM	-	138
SM-100	A5.28/ASME SFA5.28 ER100S-G	-	-	139
SM-110	A5.28/ASME SFA5.28 ER110S-G	-	-	140

MIG Wire for Stainless steels

Product	AWS	JIS	EN	Page
SM-307Si	-	-	12072 G 18 8 Mn	141
SM-308	A5.9/ASME SFA5.9 ER308	Z3321 YS308	-	142
SM-308L	A5.9/ASME SFA5.9 ER308L	Z3321 YS308L	ISO 14343-A-G 19 9 L	143
SM-308LSi	A5.9/ASME SFA5.9 ER308LSi	-	-	144
SM-309	A5.9/ASME SFA5.9 ER309	Z3321 YS309	-	145
SM-309L	A5.9/ASME SFA5.9 ER309L	Z3321 YS309L	ISO 14343-A-G 23 12 L	146
SM-309LSi	A5.9/ASME SFA5.9 ER309LSi	-	-	147
SM-309MoL	A5.9/ASME SFA5.9 ER309LMo	-	-	148
SM-310	A5.9/ASME SFA5.9 ER310	Z3321 YS310	12072 G 25 20	149
SM-312	A5.9/ASME SFA5.9 ER312	Z3321 YS312	-	150
SM-316	A5.9/ASME SFA5.9 ER316	Z3321 YS316	-	151
SM-316L	A5.9/ASME SFA5.9 ER316L	Z3321 YS316L	ISO 14343-A-G 19 12 3 L	152
SM-316LSi	A5.9/ASME SFA5.9 ER316LSi	-	-	153
SM-347	A5.9/ASME SFA5.9 ER347	Z3321 YS347	-	154
SM-2209	A5.9/ASME SFA5.9 ER2209	-	-	155
SM-410	A5.9/ASME SFA5.9 ER410	Z3321 YS410	-	156
SM-430LNb	-	Z3321 YS430LNb	ISO 14343-A-G-18LNb	157

GTAW [TIG Rod]

Mild steel & 490MPa high tensile steels

Product	AWS	JIS	EN	Page
ST-50G	A5.18/ASME SFA5.18 ER70S-G	Z3316 YGT50	1668 - W3Si1	161
ST-50.6	A5.18/ASME SFA5.18 ER70S-6	Z3316 YGT50	1668 - W3Si1	162
ST-50.3	A5.18/ASME SFA5.18 ER70S-3	-	1668 - W2Si	163
ST-1N	A5.28/ASME SFA5.28 ER80S-Ni1	-	-	164

Stainless steels

Product	AWS	JIS	EN	Page
ST-308	A5.9/ASME SFA5.9 ER308	Z3321 YS308	-	165
ST-308L	A5.9/ASME SFA5.9 ER308L	Z3321 YS308L	ISO 14343-A-W 19 9 L	166
ST-309	A5.9/ASME SFA5.9 ER309	Z3321 YS309	-	167
ST-309L	A5.9/ASME SFA5.9 ER309L	Z3321 YS309L	ISO 14343-A-W 23 12 L	168
ST-309MoL	A5.9/ASME SFA5.9 ER309LMo	-	-	169
ST-310	A5.9/ASME SFA5.9 ER310	Z3321 YS310	-	170
ST-312	A5.9/ASME SFA5.9 ER312	Z3321 YS312	-	171
ST-316	A5.9/ASME SFA5.9 ER316	Z3321 YS316	-	172
ST-316L	A5.9/ASME SFA5.9 ER316L	Z3321 YS316L	ISO 14343-A-W 19 12 3 L	173
ST-347	A5.9/ASME SFA5.9 ER347	Z3321 YS347	-	174
ST-2209	A5.9/ASME SFA5.9 ER2209	-	-	175
SMT-2594	A5.9/ASME SFA5.9 ER2594	-	-	176
SMT-904L	A5.9/ASME SFA5.9 ER385	-	ISO 14343-A-G(W) 20 25 5 L	177
ST-410	A5.9/ASME SFA5.9 ER410	Z3321 YS410	-	178

FCAW [Flux Cored Wire]

Mild steel & 490MPa high tensile steels

Product	AWS	JIS	EN	Page
SF-71	A5.20 E71T-1C	Z3313 T49J 0 T1-1 C A-U H10	ISO 17632-A-T 42 0 P C 1	181
SF-71LF	A5.20 E71T-1C	Z3313 T49J 0 T1-1 C A-U H10	-	182
Supercored 71	A5.20 E71T-1C	Z3313 T49 2 T1-1 C A H10	ISO 17632-A-T 42 2 P C 1	183
SC-71LH	A5.20 E71T-9C	Z3313 T49 3 T1-1 C A-U H5	ISO 17632-A-T 42 2 P C 1 H5	184
Supercored 71H	A5.20 E71T-1C/ -9C/-9C-J	Z3313 T49 4 T1-1 C A H5	ISO 17632-A-T 42 4 P C 1 H5	185
Supercored 71MAG	A5.20 E71T-1M/-9M	Z3313 T49 3 T1-1 M A-U H10	ISO 17632-A-T 42 3 P M 1	186
SC-71LHM Cored	A5.20 E71T-1M/-9M	Z3313 T49 3 T1-1 M A-U H5	ISO 17632-A-T 46 3 P M 1 H5	187
SF-71MC	A5.20 E71T-1C/-1M/ -9C/-9M/-12C/-12M	-	ISO 17632-A-T 46 3 P M 1 ISO 17632-A-T 46 2 P C 1	188
SF-70MX	A5.20 E70T-1C	Z3313 T49J 0 T15-0 C A-U H10	ISO 17632-A-T 42 0 R C 3	189
SC-70H Cored	A5.20 E70T-1C/-9C	Z3313 T49 3 T15-0 C A H10	ISO 17632-A-T 42 2 P C 3	190
Supercored 70MXH	A5.20 E70T-1C	Z3313 T49 2 T15-0 C A-U H5	ISO 17632-A-T 42 2 R C 3 H5	191
SC-70T Cored	A5.18 E70C-3C/-6M	Z3313 T49 2 T15-1 C A Z3313 T49 3 T15-1 M A	ISO 17632-A-T 42 2 M C 1 ISO 17632-A-T 46 2 M M 1 H5	192
SC-70Z Cored	A5.18 E70C-G	-	ISO 17632-A-T 46 2 M M/C 3	193
Supercored 70NS	A5.18 E70C-6M	Z3313 T49 3 T15-0 M A H5	ISO 17632-A-T 42 3 M M 3 H5	194
Supercored 70B	A5.20 E71T-5M-J	Z3313 T49 4 T5-1 M A-U H5	ISO 17632-A-T 42 4 B M 3 H5	195
Supercored 70SB	A5.20 E71T-5C	Z3313 T49 3 T5-1 C A-U H5	ISO 17632-A-T 42 3 B C 2 H5	196
SC-EG2 Cored	A5.26 EG70T-2C	Z3319 YFEG-22C	-	197
SC-EG3	-	-	-	198

High tensile steels

Product	AWS	JIS	EN	Page
SC-55 Cored	A5.29 E81T1-GC	Z3313 T55 2 T1-1 C A-U H10	-	199
SC-55F Cored	A5.29 E81T1-GC	Z3313 T55 2 T15-0 C A-N1-U H10	-	200
Supercored 81	A5.29 E81T1-Ni1C	Z3313 T55 3 T1-1 C A-N2-U H10	ISO 17632-A-T 46 2 1Ni P C 1	201
SF-80MX	A5.29 E80T1-G	Z3313 T55 2 T15-0 C A-N2 H10	ISO 17632-A-T 46 2 1Ni R C 3	202
SC-80M	A5.28 E80C-G	-	ISO 17632-A-T 46 4 M M 3 H5	203
SC-90M	A5.28 E90C-G	-	ISO 18276-A-T 55 ZZ M M 1 H5	204
SC-91P	A5.29 E91T1-GM	-	-	205
SC-91K2 Cored	A5.29 E91T1-K2C	Z3313 T57 4 T1-1 C A-N3 H10	ISO 17632-A-T 50 4 1.5Ni P C 1	206
Supercored 110	A5.29 E111T1-GC	-	-	207
SC-110M Cored	A5.28 E110C-G	-	ISO 18276-A-T 69 4 Mn2NiMo M M 3	208

Weather proof steels

Product	AWS	JIS	EN	Page
SF-70W	-	Z3320 YFA-50W	-	209
SF-80W	A5.29 E81T1-W2C	Z3320 YFA-58W	-	210

Low-temperature service steels

Product	AWS	JIS	EN	Page
SC-71SR	A5.20 E71T-1C/-9C/ -9C-J/-12C/-12C-J	Z3313 T49 4 T1-1 C AP H5	ISO 17632-A-T 42 4 P C 1	211
SC-71MSR	A5.20 E71T-12M-J	-	ISO 17632-A-T 46 4 P M 1 H5	212
SC-70ML	A5.18 E70C-6M	Z3313 T49 4 T15-1 M A-U H5	ISO 17632-A-T 46 4 M M 2 H5	213
SC-80MR	A5.28 E80C-G	-	ISO 17632-A-T 46 6 1.5Ni M M 2 H5	214
Supercored 81MAG	A5.29 E81T1-Ni1M	-	ISO 17632-A-T 46 6 1Ni P M 2 H5	215
Supercored 81-K2	A5.29 E81T1-K2C	Z3313 T55 6 T1-1 C A-N3-U H5	ISO 17632-A-T 46 6 1.5Ni P C 1 H5	216
SC-460	A5.29 E81T1-K2C	Z3313 T55 6 T1-1 C A-N3 H5	ISO 17632-A-T 46 6 1.5Ni P C 1 H5	217
Supercored 81-K2MAG	A5.29 E81T1-K2M	Z3313 T55 6 T1-1 M A-N3 H5	ISO 17632-A-T 46 6 1.5Ni P M 2 H5	218
SC-80K2	A5.29 E80T1-K2C	Z3313 T55 6 T15-0 C A-N3 H5	ISO 17632-A-T 46 6 1.5Ni R C 3 H5	219

Heat-resistant, Low alloy steels

Product	AWS	JIS	EN	Page
SC-81B2	A5.29 E81T1-B2C	-	ISO 12071-T CrMo1 P C 2	220
SC-91B3	A5.29 E91T1-B3C	-	ISO 12071-T CrMo2 P C 2	221
SC-80D2	A5.28 E80C-G	-	ISO 17632-A-T 46 0 MnMo M M 3	222
Supercored 1CM	A5.28 E80C-G	-	ISO 12071-T CrMo1 M M 3	223

Self-shielded

Product	AWS	JIS	EN	Page
Supershield 11	A5.20 E71T-11	Z3313 T49 T14-1 N A	ISO 17632-A-T 42 Z Z Z N 1	224
Supershield 71GS	A5.20 E71T-GS	Z3313 T49 T14-1 N S	ISO 17632-A-T 42 Z Z V N 1	225
Supershield 4	A5.20 E70T-4	-	ISO 17632-A-T 42 Z Z W N 3	226

Stainless steels

Product	AWS	JIS	EN	Page
SW-307NS Cored	-	-	ISO 17633-A-T 18 8 Mn M M	227
SW-308L Cored	A5.22 E308LT1-1/-4	Z3323 TS308L-FB1	ISO 17633-A-T 19 9 L P M/C 2	228
SW-308LT	A5.22 E308LT1-1/-4	Z3323 TS308L-FB1	ISO 17633-A-T 19 9 L P M/C 2	229
SW-309L Cored	A5.22 E309LT1-1/-4	Z3323 TS309L-FB1	ISO 17633-A-T 23 12 L P M/C 2	230
SW-309LNS Cored	A5.9 EC309L	Z3323 TS309L-MA0	ISO 17633-A-T 23 12 L M M	231
SW-309MoL Cored	A5.22 E309LMoT1-1/-4	Z3323 TS309LMo-FB1	ISO 17633-A-T 23 12 2 L P M/C 2	232
SW-316L Cored	A5.22 E316LT1-1/-4	Z3323 TS316L-FB1	ISO 17633-A-T 19 12 3 L P M/C 2	233
SW-316LT	A5.22 E316LT1-1/-4	Z3323 TS316L-FB1	ISO 17633-A-T 19 12 3 L P M/C 2	234
SW-317L Cored	A5.22 E317LT1-1/-4	Z3323 TS317L-FB1	-	235
SW-347 Cored	A5.22 E347T1-1/-4	Z3323 TS347-FB1	ISO 17633-A-T 19 9 Nb P M/C 2	236
SW-410NiMo Cored	A5.22/E410NiMoT1-1/-4	Z3323 TS410NiMo-FB1	ISO 17633-A-T 13 4 P M/C 2	237
SW-2209 Cored	A5.22 E2209T1-1/-4	Z3323 TS2209-FB1	ISO 17633-A-T 22 9 3 N L M/C 2	238
Supercored 308L	A5.22 E308LTO-1/-4	Z3323 TS308L-FB0	ISO 17633-A-T 19 9 L R M/C 3	239
Supercored 309L	A5.22 E309LTO-1/-4	Z3323 TS309L-FB0	ISO 17633-A-T 23 12 L R M/C 3	240
Supercored 309MoL	A5.22 E309LMoTO-1/-4	Z3323 TS309LMo-FB0	ISO 17633-A-T 23 12 2 L R M/C 3	241
Supercored 316L	A5.22 E316LTO-1/-4	Z3323 TS316L-FB0	ISO 17633-A-T 19 12 3 L R M/C 3	242
SF-409Ti	A5.9 EC409	Z3323 TS409-MAO	-	243
SF-430	A5.9 EC430	Z3323 TS430-MAO	-	244
SF-430Nb	-	Z3323 TS430Nb-MAO	ISO 12072 G Z 17 L Nb	245
SF-436	-	-	-	246
SC-439Ti Cored	-	-	-	247

INDEX BY PRODUCTS

Hardfacing application

Product	AWS	JIS	EN	Page
SC-42H	-	-	-	248
SC-250H	-	YF2A-C-250	-	249
SC-350H	-	YF2A-C-350	-	250
SC-450H	-	YF2A-C-450	-	251
SC-600H	-	YF3B-C-600	-	252
SC-700H	-	YF3B-C-700	-	253
Supershield AP-O	-	-	-	254
Supershield 16Mn-O	-	-	-	254
Supershield 307-O	-	-	-	255
Supershield 309L-O	-	-	-	255
SC-BU Cored	-	-	-	256
Supershield 430-O	-	-	-	256
Supershield 410NiMo-O	-	-	-	257
SC-410NiMoS	-	-	-	257
SC-414S	-	-	-	258
SC-420S	-	-	-	258
SC-420SG	-	-	-	259
SC-423S	-	-	-	259
SC-430S	-	-	-	260
SC-30S	-	-	-	260
SC-45S	-	-	-	261
SC-48S	-	-	-	261
SC-55S	-	-	-	262
SC-A4S	A5.23 F8P2 EC A4-A4	-	-	262
Supershield CrC	-	-	-	263
Supershield CrCW	-	-	-	263
Supershield CrCH	-	-	-	264
Supershield CrCNb	-	-	-	264
Supershield CrCB	-	-	-	265

Non-ferrous metal Welding Consumables

Nickel Based Alloys

Product	AWS	JIS	EN	Page
SR-182	A5.11/ASME SFA5.11 ENiCrFe-3	JIS Z3224 DNiCrFe-3	-	269
SR-625	A5.11/ASME SFA5.11 ENiCrMo-3	JIS Z3224 DNiCrMo-3	ISO 14172 Ni6625	270
Superflux300 x SA-625	Inconel	-	-	271
SMT-625	A5.14/ASME SFA5.14 ERNiCrMo-3	Z3334 YNiCrMo-3	-	272
SMT-08	A5.14/ASME SFA5.14 ERNiMo-8	Z3331 YGT9Ni-2	ISO 18274 Ni 1008 (NiMo19WCr)	273
SM-455 / ST-455	A5.14/ASME SFA5.14 ERNiCrMo-7	Z3334 YNiCrMo-7	-	274
SMT-22	A5.9/ASME SFA5.9 ERNiCrMo-10	-	ISO 18274 SNI6602	275
SM-82 / ST-82	A5.14/ASME SFA5.14 ERNiCr-3	Z3334 YNiCr-3	-	276
SM-276 / ST-276	A5.14/ASME SFA5.14 ERNiCrMo-4	Z3334 YNiCrMo-4	-	277
SM-400 / ST-400	A5.14/ASME SFA5.14 ERNiCu-7	Z3334 YNiCu-7	-	278
SM-718	A5.14/ASME SFA5.14 ERNiFeCr-2	-	-	279
SM-60 / ST-60	A5.14/ASME SFA5.14 ERNi-1	Z3334 YNi-1	-	280
Superflux300 X SA-82	-	-	-	281

Copper Based Alloys

Product	AWS	JIS	EN	Page
SMT-7030	A5.7/ASME SFA5.7 ERCuNi	Z3341 YCuNi-3	-	282
SM-9010 / ST-9010	-	Z3341 YCuNi-1	-	283

SMAW STICK ELECTRODES



Applications

S-4301. I is an ilmenite type electrode for carbon steels.

Welding of such parts, where the highest reliability is required, such as strength members of ship hulls, high pressure vessels and buildings.

Characteristics on Usage

S-4301. I is designed for general purpose.

As crack resistibility, pitting resistibility and X-ray performance are excellent among ilmenite type electrodes, it also can be used for welding structural steels of heavy section 25mm(1inch) in thickness.

Notes on Usage

- ① Pay attention not to exceed the range of proper currents in case of welding structures which require weld metal of high X-ray soundness.

Welding Position



1G 2F 3G 4G

Current

AC or DC ±

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.05	0.10	0.37	0.021	0.014

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
382 (55,500)	437 (63,500)	31.2	0 (32) -20 (-4)	88 (65) 56 (42)

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	4.5 (11/64)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	400 (16)	450 (18)
F	50~85	80~130	120~180	145~200	170~250	240~310
V-up, OH	45~70	60~110	110~150	120~180	130~200	-

Applications

S-4303.V can be used for general purpose of welding carbon steel such as shipbuilding, rolling stock, buildings, bridges, light gauge shapes and vessels.

Characteristics on Usage

S-4303.V is a lime titania type electrode, whose usability is excellent in all position welding. It deposits smooth and flat weld metal of fine ripple mark with easy manipulation of the electrode, particularly in vertical up and overhead positions. Mechanical properties of all-weld metal are excellent next to that of low hydrogen type electrodes.

Notes on Usage

- ① Dry the electrodes at 70~100°C (158~212°F) for 30~60 minutes before use.
- ② As arc-restriking properties are not so good, it is suitable for intermittent welding.

Welding Position



1G 2F 3G 4G

Current

AC or DC ±

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.15	0.47	0.021	0.012

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
422 (61,300)	454 (65,900)	30.8	0 (32) -20 (-4)	124 (92) 81 (60)

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F,V-down	65~100	100~140	140~190	200~260	250~330
V-up, OH	50~90	80~130	110~170	140~210	-

Applications

S-4303.T can be used for highly efficient welding in all positions such as vehicles, machinery, buildings and bridges.

Characteristics on Usage

S-4303.T is a lime-titania type electrode used for welding in all positions. Iron powder contained in the coating ensures both good restriking properties and high welding efficiency.

It is suitable for tack welding and intermittent welding.

Mechanical properties of all-weld metal are also good, especially, impact values of all weld metal are better than those of ilmenite type electrodes.

Notes on Usage

- ① Dry the electrodes at 70~100°C(158~212°F) for 30~60 minutes before use.
- ② Pay attention not to exceed the recommended range of currents.

Welding Position



1G 2F 3G 4G

Current

AC or DC ±

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.16	0.48	0.019	0.014

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
436 (63,300)	489 (71,000)	28.9	0 (32)	98 (73)

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6(3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	65~100	100~140	140~190	200~250	250~330
V-up, OH	50~90	80~130	110~170	140~210	-

Applications

S-6010.D can be used for welding of pipes, storage tanks, pressure vessels, cast steel repairs, machines and heavy construction works.

Characteristics on Usage

S-6010.D is a high cellulose type electrode for welding in all positions including vertical-down using DC(+).

S-6010.D exhibits deep penetration and fast freezing.

Notes on Usage

- ① Pay attention not to use currents exceeding the recommended currents.
- ② As this electrode is prone to absorb moisture, store it with care.

Welding Position



Current

DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.10	0.17	0.42	0.015	0.017

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
447 (64,900)	517 (75,000)	32.3	-30 (-22)	62 (46)

Approval

KR, ABS, LR, BV, DNV, GL, NK, CWB

Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	350 (14)	350 (14)	350 (14)
F,V-down	50~75	70~110	110~155	155~200
V-up	40~70	55~105	90~140	120~180

Applications

S-6011.D can be used for welding of thin steel sheets and pipes.

Characteristics on Usage

With good weldability in poor groove, up and vertical downward welding can be performed easily, it is suitable for all position welding of pipes.

Notes on Usage

- ① Pay attention not to use currents exceeding the recommended currents.
- ② As this electrode is prone to absorb moisture, store it with care.

Welding Position



5G Up/Down

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.11	0.16	0.51	0.015	0.012

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
468 (68,000)	558 (81,000)	29.7	-30 (-22)	51 (38)

Approval

KR, ABS, LR, BV, DNV, GL, NK

Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	350 (14)	350 (14)	350 (14)
F,V-down	50~75	70~110	110~155	155~200
V-up	35~70	55~105	90~140	120~180

Applications

S-6013.LF can be used for welding of machinery, vehicles and light structural steels, and surface dressing of heavy steel structures.

Characteristics on Usage

S-6013.LF is a low fume, high titania type electrode. Fume generation is about 20% less than conventional high titania type electrodes and whose usability is excellent in all position welding. S-6013.LF is suitable for welding of light structural steels because of its stable arc, shallow penetration and smooth welding bead.

Notes on Usage

- ① Dry the electrodes at 70~100°C(158~212°F) for 30~60 minutes before use.
- ② Pay attention not to exceed the range of proper currents.

Welding Position



1G 2F 3G 4G

Current

AC or DC ±

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.05	0.23	0.35	0.022	0.017

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
439 (63,700)	488 (70,900)	26.8	0 (32)	67 (50)

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16) 450 (18)	400 (16) 450 (18)	450(18)
F	50~95	80~130	120~180	160~230	220~300
V-up, OH	45~90	60~120	100~160	120~200	-

Applications

S-6013.V can be used for welding of steel sheet structures in ships, railway vehicles, and cars, surface dressing of heavy steel structures. Filling up welding of cast steel.

Characteristics on Usage

S-6013.V is a Rutile-Cellulose type electrode, remarkably improved in workability.

This electrode is suitable for welding of small thin pipes.

It is also suitable for vertical-down welding.

Notes on Usage

- ① In case of vertical downward welding, manipulate the electrode, keeping its tip in contact with base metal as shown in the sketch.
- ② Dry the electrodes at 70~100°C (158~212°F) for 30~60 minutes before use.

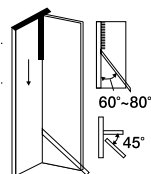
Welding Position



1G 2F 3G(3D)

Current

AC or DC ±



Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.09	0.32	0.48	0.017	0.012

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
460 (66,700)	550 (79,800)	27.5	0 (32)	65 (48)

Approval

KR, ABS, LR, NK, CWB

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)
F,V-down	60~100	100~140	140~190	190~240

Applications

S-6027.LF is a low fume type electrode for highly efficient fillet welding, horizontal and flat fillet welding of ships, buildings, bridges.

Characteristics on Usage

S-6027.LF is an iron powder oxide type electrode. Fume generation is about 30~50% less than conventional electrodes.

S-6027.LF has an excellent usability when used for manual welding, Gravity and auto-contact welding. Resistance to undercuts is good even in case of welding zinc-rich-painted plate or joint having gap.

Notes on Usage

- ① In case of manual welding, operate by contact welding.
- ② In case of gravity welding, the optimum speed ratio is 1.2~1.5.
- ③ Dry the electrodes at 70~100°C(158~212°F) for 30~60 minutes before use.

Welding Position



1G 2F

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.07	0.32	0.76	0.023	0.013

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
448 (65,100)	499 (72,500)	32.0	-30 (-22)	47 (35)

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Packing

Packet 10 kg (22 lbs)
Carton 10 kg (22 lbs) × 2 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	4.0 (5/32)	4.5 (11/64)	5.0 (3/16)	5.5 (7/32)	6.0 (15/64)	6.4 (1/4)	7.0 (9/32)
Length mm(in)	550 (22)	550 (22) 700 (28)	700 (28)	700 (28)	700 (28)	700 (28)	700 (28)
F	140~180	170~210	180~230	210~250	240~290	260~310	280~330
GW	150~180	160~200	180~240	210~260	230~290	250~310	280~330

Applications

This electrode is suitable for all types of carbon steel fabrications, particularly in horizontal fillet welding of sheet metal and ornamental iron work.

Characteristics on Usage

S-7014.F is an iron powder electrode for high speed all position welding. As the contact welding can be performed with this electrode, manipulation of electrodes is easy in horizontal fillet or in the groove.

Notes on Usage

- ① Dry the electrodes at 70~100°C (158~212°F) for 30~60 minutes before use.
- ② Pay attention not to exceed the range of proper currents.

Welding Position



1G 2F 3G 4G

Current

AC or DC ±

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.07	0.30	0.66	0.022	0.015

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
449 (65,200)	510 (74,100)	30.9	0 (32)	83 (61)

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	400 (16)	400 (16)	400 (16)	450 (18)
F	95~140	140~200	180~250	240~310

Applications

S-7024.F can be used for welding of flat and horizontal fillet welding of internal structures, inside hulls, building, machine construction.

Characteristics on Usage

S-7024.F is a representative powder titania type electrode widely used for flat and horizontal fillet welding. This is an excellent electrode with extremely high efficiency.

Notes on Usage

- ① The optimum speed ratio is 1~1.5%.
- ② Usability degrades when moistened. In case of absorbing moisture, it must be dried.
[70~100°C(158~212°F), 30~60minutes]

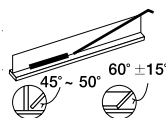
Welding Position



1G 2F

Current

AC or DC ±



Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.08	0.42	0.82	0.022	0.014

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
495 (71,900)	569 (82,600)	27.8	0 (32)	48 (36)

Approval

ABS, LR, DNV, NK

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	3.2 (1/8)	4.0 (5/32)	4.5 (11/64)	5.0 (3/16)	6.0 (15/64)
F	100~150	140~200	450 (18)	450 (18)	450 (18)
			700 (28)	700 (28)	700 (28)
			180~230	200~250	260~300

Applications

S-7016.O can be used for one side welding of pipe and general butt joints of carbon steel and high tensile steel.

Characteristics on Usage

S-7016.O is a single coated electrode for one side welding. Its usability is extremely good in all positions.

Notes on Usage

- ① Dry the electrodes at 300~350°C(572~662°F) for 60 minutes before use.
- ② Stop the arc after moving the crater to the side wall of the groove.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.05	0.53	0.93	0.017	0.010

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
511 (74,200)	597 (86,700)	31.2	-20 (-4)	157 (116)

Approval

KR, ABS, LR, DNV, NK

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	350 (14)	400 (16)	400 (16)	400 (16)
F	60~90	90~130	130~190	180~240
FV-up, OH	50~80	80~120	110~180	150~210
OSW	30~65	60~110	90~150	130~180

Applications

S-7016.M can be used for welding of heavy duty structures and high tensile steel and low alloy steel and pressure vessels.

Characteristics on Usage

S-7016.M deposits sound weld metal for heavy duty structures, restraint members, high sulphur steel and medium carbon steel. Its mechanical properties and crack resistibility of deposit are excellent.

Notes on Usage

- ① Dry the electrodes at 300~350°C(572~662°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow hole at the arc starting.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.08	0.64	1.18	0.018	0.009

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
539 (78,300)	617 (89,600)	26.5	-20 (-4)	73 (54)

Approval

KR, ABS, NK

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~85	90~140	140~190	190~250	250~320
V-up, OH	50~80	80~130	110~170	160~210	-

Applications

S-7016.H can be used for welding of high tensile steel, such as bridges, buildings, shipbuilding, high pressure vessels and rolling stock.

Characteristics on Usage

- Soft stable arc.
- Good fluidity and removability of slag.
- Smooth appearance.
- Good mechanical properties.
- No undercut formation.
- Excellent crack resistance and X-ray performance.

Notes on Usage

- ① Dry the electrodes at 300~350°C(572~662°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow hole at the arc starting.
- ③ Use wind screen against strong wind.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.08	0.62	1.22	0.017	0.011

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
560 (81,300)	620 (90,700)	28.5	-30 (-22)	80 (59)

Approval

KR, ABS, LR, BV, DNV, GL, NK, MRS

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~85	90~130	130~180	180~240	250~310
V-up, OH	50~80	80~120	110~170	150~200	-

Applications

S-7016.LF can be used for welding of high tensile steel of ships, such as bridges, buildings and pressure vessels.

Characteristics on Usage

S-7016.LF is a low hydrogen type electrode. Fume generation is about 20~30% less than conventional electrode. S-7016.LF is effective for the use in insufficient ventilation.

X-ray performance and mechanical properties of all-weld metal are good.

Good crack resistance due to less hydrogen content.

Notes on Usage

- ① Dry the electrodes at 300~350°C(572~662°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow hole at the arc starting.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.08	0.62	1.29	0.016	0.011

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
550 (79,900)	605 (87,800)	29.0	-30 (-22)	75 (56)

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~85	90~130	130~180	180~240	250~310
V-up, OH	50~80	80~130	110~170	150~200	-

Applications

S-7016.G can be used for welding of high tensile steel of ships, buildings, bridges and pressure vessels.

Characteristics on Usage

It deposits weld metal of extremely good mechanical properties.

Its usability is good in all position welding and weld metal of good appearance can be obtained assuredly.

Notes on Usage

- ① Dry the electrodes at 300~350°C(572~662°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow hole at the arc starting.
- ③ Use wind screen against strong wind.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.08	0.66	1.40	0.017	0.011

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
560 (81,300)	641 (93,100)	30.4	-30 (-22)	68 (50)

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~180	180~240	250~310
V-up, OH	50~80	85~120	110~170	150~200	-

Applications

S-7018.G can be used for highly efficient-welding of 490MPa(73,000lbs/in²) class high tensile steel, such as bridges, buildings, rolling stock and machines.

Characteristics on Usage

S-7018.G is an iron powder low hydrogen type electrode of high efficiency used for welding 490MPa(73,000lbs/in²) class high tensile steel.

Notes on Usage

- ① Dry the electrodes at 300~350°C(572~662°F) for 60 minutes before use.
- ② Keep the arc as short as possible.
- ③ Use wind screen against strong wind.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.50	1.20	0.017	0.011

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
504 (73,200)	572 (83,100)	29.8	-30 (-22)	111 (82)

Approval

KR, ABS, LR, BV, DNV, GL, NK, CWB

Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450(18)
	-	400 (16)	450 (18)	450 (18)	
F	60~90	90~140	130~190	180~240	250~300
V-up, OH	50~80	80~120	120~170	150~200	-

Applications

S-7018.GH can be used for highly efficient-welding of 490MPa (73,000lbs/in²) class high tensile steel, such as bridges, buildings, rolling stock and machines.

Characteristics on Usage

S-7018.GH is an iron powder very low hydrogen type electrode of high efficiency used for welding 490N/mm² (73,000lbs/in²) class high tensile steel. (HDM < 5ml/100g)

Notes on Usage

- ① Dry the electrodes at 300~350°C (572~662°F) for 60 minutes before use.
- ② Keep the arc as short as possible.
- ③ Use wind screen against strong wind.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.07	0.42	1.21	0.018	0.006

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
488 (70,800)	566 (82,100)	27.4	-30 (-22)	126 (93)

Approval

CWB

I Packing

Packet	5 kg (11 lbs)
Carton	5 kg (11 lbs) × 4 : 20kg(44 lbs)
Vacuum Pack	1.5 kg
Carton	1.5 kg × 10 : 15kg

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450(18)
	-	400 (16)	450 (18)	450 (18)	
F	60~90	90~140	130~190	180~240	250~300
V-up, OH	50~80	80~120	120~170	150~200	-

Applications

S-7028.F can be used for highly efficient-welding of flat and horizontal fillet such as welding of high tensile steel of ships, bridges and building.

Characteristics on Usage

S-7028.F is a heavy iron powder type electrode.

This electrode is intended for applications requiring the characteristics of the high deposition rate associated with iron-powder coating.

Notes on Usage

- ① Dry the electrodes at 350~400°C (662~752°F) for 60 minutes before use.
- ② Remove rust, water and oil from the surface to be welded before welding.

Welding Position



1G 2F

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.07	0.29	1.08	0.027	0.015

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
478 (69,400)	546 (79,300)	32.0	-20 (-4)	63 (47)

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Packing

Packet 10 kg (22 lbs)
Carton 10 kg (22 lbs) × 2 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	4.0 (5/32)	4.5 (11/64)	5.0 (3/16)	5.5 (7/32)	6.0 (15/64)	6.4 (1/4)	7.0 (9/32)
Length mm(in)	550 (22)	550 (22) 700 (28)	700 (28)	700 (28)	700 (28)	700 (28)	700 (28)
F	150~220	170~220	190~250	220~280	260~320	270~340	330~360

Applications

S-7048.V can be used for vertical downward welding of high tensile steel. Such as vertical downward welding of ships, buildings and bridges.

Characteristics on Usage

S-7048.V is specifically designed for vertical downward welding. Slag is self peeling. Crack resistibility of weld metal is good.

Notes on Usage

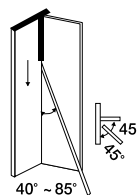
- ① Dry the electrodes at 300~350°C(572~662°F) for 60 minutes before use.
- ② Remove rust, water, oil and paint from the surface to be welded.
- ③ Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow hole at the arc starting.

Welding Position



1G 2F 3D

Current



Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.54	1.05	0.011	0.009

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
473 (68,700)	564 (81,900)	30.8	-30 (-22)	68 (50)

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	3.2 (1/8)	4.0 (5/32)	4.5 (11/64)	5.0 (3/16)
Length mm(in)	400 (16)	450 (18)	450 (18)	450 (18)
F, V-down	100~160	140~210	180~240	220~270

Applications

S-8016.G can be used for welding of high tensile steel, such as buildings, bridges and shipbuilding.

Characteristics on Usage

- Extremely soft stable arc.
- Smooth bead appearance.
- No undercut formation.
- Faster deposit rate hence, more economical .
- Good crack resistance of weld metal.
- Good mechanical properties and X-ray performance.

Notes on Usage

- ① Dry the electrodes at 350~400 °C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow hole at the arc starting.
- ③ Use wind screen against strong wind.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.08	0.34	1.44	0.011	0.009	0.94

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
519 (75,400)	613 (89,000)	28.8	-20 (-4)	160 (119)
			-30 (-22)	141 (104)

Approval

ABS

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~180	180~240	250~310
V-up, OH	50~80	85~120	110~170	150~200	-

Applications

S-8018.G can be used for welding of high tensile of shipbuilding, buildings, bridges and pressure vessels.

Characteristics on Usage

S-8018.G is an iron powder-low hydrogen type electrode for all position welding.

As its deposition rate is extremely high, working hours can be shortened.

The mechanical properties and crack resistibility of the all-weld metal are also good.

Notes on Usage

- ① Dry the electrodes at 350~400 °C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small plate prepared for this particular purpose because arc striking on the base metal is in danger of initiating cracking.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.07	0.61	1.29	0.016	0.012	0.83

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
542 (78,700)	622 (90,300)	30.2	0 (32) -20 (-4)	147 (109) 103 (76)

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	60~90	90~140	130~190	180~240	250~300
V-up, OH	50~80	80~120	120~170	150~200	-

Applications

S-9016.G can be used for welding of high tensile steel such as pressure vessels, bridges, rolling stock, and machines using steel plates of high tensile steel.

Characteristics on Usage

- Good workability in all positions.
- Stable arc.
- Excellent mechanical properties and X-ray performance.

Notes on Usage

- ① Dry the electrodes at 350~400 °C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose because arc striking on the base metal is in danger of initiating cracking.
- ③ Keep the arc as short as possible.
- ④ Preheat at 60~80°C(140~176°F) before use. The temperature to be applied varies in accordance with plate thickness and steel kind.
- ⑤ If each pass welds becomes thicker than acceptable level by high amperage of low speed ratio manipulation, the impact values and yield points will decrease.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Mo
0.06	0.52	1.09	0.016	0.010	0.56	0.23

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
570 (82,800)	655 (95,100)	27.2	0 (32) -20 (-4)	125 (93) 78 (58)

Approval

ABS

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~180	180~240	250~310
V-up, OH	50~80	85~120	110~170	150~200	-

Applications

S-10016.G can be used for welding of high tensile steel, such as pressure vessels, penstock and bridges.

Characteristics on Usage

- Its workability and X-ray properties are superb in all positions.
- Good toughness of all-weld metal.
- Extremely low hydrogen contents and good crack resistibility.

Notes on Usage

- ① Dry the electrodes at 350~450°C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose.
- ③ Preheat at 100~150°C(212~302°F). The temperature varies in accordance with plate thickness and kind of steel.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Mo
0.07	0.69	1.41	0.013	0.012	1.49	0.12

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
710 (103,130)	762 (110,680)	24.0	0 (32)	110 (81)

Approval

ABS

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~180	170~240	250~310
V-up, OH	50~80	85~120	110~170	150~200	-

Applications

S-11016.G can be used for welding of high tensile steel, such as pressure vessels, penstock and bridges.

Characteristics on Usage

- ① Good X-ray performance.
- ② High crack resistance and good mechanical properties. Extremely reliable for welding of 780MPa(116,000lbs/in²) class high tensile steel.

Notes on Usage

- ① Dry the electrodes at 350~450°C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose.
- ③ Preheat at 150~200°C(302~392°F). The temperature varies in accordance with plate thickness and kind of steel.
- ④ If each pass welds becomes thicker than acceptable level by high amperage or low speed ratio application, the impact values and yield points will decrease.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo
0.07	0.45	1.56	0.017	0.013	0.20	2.25	0.40

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
760 (110,300)	790 (114,600)	24.0	-20 (-4)	130 (96)

Approval

ABS

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	60~90	90~130	130~180	180~240	250~310
V-up, OH	50~80	85~120	110~170	150~200	-

Applications

S-9018.M can be used for welding of high tensile weather proof steel used in pressure vessels, bridges, rolling stocks, machines.

Characteristics on Usage

S-9018.M is an iron powder low hydrogen type electrode which provides good workability in all positions.

The weld metal has a good crack resistibility because of less hydrogen contents.

X-ray performance and usability are good.

Notes on Usage

- ① Dry the electrodes at 350~450°C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small plate prepared for this particular purpose because arc striking on base metal is in danger of initiating cracking.
- ③ Preheat at 80~100°C(172~212°F). The temperature to be applied varies in accordance with plate thickness and kind of steel.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Mo
0.05	0.46	1.21	0.017	0.011	1.47	0.22

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
585 (85,000)	646 (93,800)	27.6	-50 (-58)	89 (66)

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	70~100	90~140	130~190	180~240	250~300
V-up, OH	60~80	80~120	120~170	150~200	-

Applications

S-11018.M can be used for welding of low alloyed high strength steels such as HY-80, HY-90 and HY-100.

Characteristics on Usage

S-11018.M is a low alloy, low hydrogen iron powder type electrode displaying fast, efficient metal transfer. The all-weld metal has a good X-ray performance and excellent tensile strength and impact properties.

Deposition rates are higher than E11016-G electrode types.

Notes on Usage

- ① Dry the electrodes at 350~450°C(662~752°F) for 60 minutes before use.
- ② Preheat at 200~300°C(392~572°F).
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo
0.07	0.48	1.62	0.023	0.012	2.04	0.21	0.35

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
722 (104,900)	796 (115,600)	21.6	-50 (-58)	50 (37)

Approval

ABS

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	150~200	-

Applications

S-7018.W can be used for welding of carbon and high tensile weather proof steel.

Characteristics on Usage

S-7018.W is an iron powder, low hydrogen type electrode for all position welding. It shows high resistibility to the atmospheric corrosion, since its all weld metal contains Cu, Ni, Cr. Crack resistibility and mechanical properties are good.

Notes on Usage

- ① Dry the electrodes at 350~440°C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose because arc striking on the base metal is in danger of initiating cracking.
- ③ Preheat at 80~100°C(176~212°F) before use. The temperature to be applied varies in accordance with plate thickness and steel kind.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Cr	Cu
0.05	0.56	0.62	0.015	0.013	0.23	0.24	0.37

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
505 (73,300)	573 (83,200)	31.3	-20 (-4)	100 (74)

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	60~90	90~140	130~190	180~240	250~300
V-up, OH	50~80	80~120	120~170	150~200	-

Applications

S-8018.W can be used for welding of high tensile weather proof steel.

Characteristics on Usage

S-8018.W is an iron powder, low hydrogen type electrode for all position welding.

It shows high resistibility to the atmospheric corrosion, since its all weld metal contains Cu, Ni, Cr.

Crack resistibility and mechanical properties are good.

Notes on Usage

- ① Dry the electrodes at 350~400°C (662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose because arc striking on the base metal is in danger of initiating cracking.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Cr	Cu
0.06	0.54	0.95	0.014	0.011	0.57	0.56	0.38

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
604 (87,700)	648 (94,100)	27.4	-20 (-4)	117 (87)

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	60~90	90~140	130~190	180~240	250~300
V-up, OH	50~80	80~120	120~170	150~200	-

Applications

S-7018.1 can be used for welding of high tensile steel, such as bridges, rolling stock and low temperature used for steel structures.

Characteristics on Usage

S-7018.1 is an iron powder low hydrogen type electrode of high efficiency used for welding of high tensile steel. Its usability is good with direct current applications as well as alternation current applications and easy to weld in all position.

Notes on Usage

- ① Dry the electrodes at 350~400°C(622~752°F) for 60 minutes before use.
- ② Keep the arc as short as possible, and avoid large width of weaving.
- ③ Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow hole at the arc starting.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.25	1.25	0.017	0.012

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
480 (69,700)	550 (79,800)	30.2	-45 (-49)	94 (70)

Approval

ABS, LR, DNV, GL, CWB, RINA

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	400 (16)	450 (18)	450 (18)	450 (18)
F	60~90	90~140	130~190	180~240	250~300
V-up, OH	50~80	80~120	120~170	150~200	-

Applications

S-7018.1H can be used for welding of high tensile steel, such as bridges, buildings, rolling stock and low temperature used for steel structure.

Characteristics on Usage

S-7018.1H is an iron powder low hydrogen type electrode. Its coating contains much iron powder, which increasing working efficiency. Its usability is good with direct current applications and very low hydrogen electrode. (HDM < 5ml/100g)

Notes on Usage

- ① Dry the electrodes at 350~400°C (662~752°F) for 60 minutes before use.
- ② Keep the arc as short as possible, and avoid large width of weaving.
- ③ Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow hole at the arc starting.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.25	1.35	0.014	0.005

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
493 (71,500)	566 (82,100)	30.8	-45 (-49)	152 (112)

Approval

ABS, BV, DNV, GL, LR, CWB

Packing

Packet	5 kg (11 lbs)
Carton	5 kg (11 lbs) × 4 : 20kg(44 lbs)
Vacuum Pack	1.5 kg
Carton	1.5 kg × 10 : 15kg

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	400 (16)	450 (18)	450 (18)	450 (18)
F	60~90	90~140	130~190	180~240	250~300
V-up, OH	50~80	80~120	120~170	150~200	-

Applications

S-7016.LS can be used for welding of high tensile steel for low temperature. Such as off-shore structures, LPG storage tanks, etc.

Characteristics on Usage

S-7016.LS is an extra low hydrogen type electrode for all position welding of aluminum-killed steel and TMCP steel used at low temperature.

All-weld metal is 0.9%Ni type and better notch toughness and CTOD properties at low temperature. X-ray performance and usability are good.

Notes on Usage

- ① Dry the electrodes at 300~350 °C(572~662°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blow hole at the arc starting.
- ③ Pay attention not to exceed proper heat-input because excessive heat-input causes deterioration of impact values of all-weld metal.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.06	0.30	0.98	0.013	0.008	0.80

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
538 (78,100)	589 (85,500)	30.0	-45 (-49) -60 (-76)	95 (70) 73 (54)

Approval

KR, ABS, LR, BV, DNV

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~85	90~130	130~180	180~240	250~310
V-up, OH	50~80	80~115	110~170	150~200	-

Applications

S-8016.C1 is designed for welding of 2.5%Ni steel used in machinery for low temperature.

Characteristics on Usage

S-8016.C1 is a low hydrogen, all position electrode depositing weld metal comprising 2.5%Ni. The deposit is extremely dense and the good mechanical properties make this electrode particularly suitable for weldments to withstand impact as sub-normal temperatures [lowest-60°C(-75°F)].

Notes on Usage

- ① Dry the electrodes at 350~400 °C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose because arc striking on the base metal is prone to initiating cracking.
- ③ Keep the arc as short as possible.
- ④ Preheat at 80~100°C(176~212°F). The temperature varies in accordance with the plate thickness and possible.
- ⑤ If each welded pass becomes thicker than acceptable level by high amperage or low speed ratio manipulation, the impact values and yield points will decrease.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.06	0.52	1.03	0.012	0.006	2.38

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	Heat Treatment
515 (74,800)	592 (86,000)	32.0	-60 (-76)	116 (86)	605 (1121°F) × 1hr. S.R

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

S-8016.C2 is designed for welding of 3.5%Ni steel(ASTM A203 Gr. D,E) used for pressure vessels, storage tanks.

Characteristics on Usage

S-8016.C2 is an all position, low hydrogen type electrode for 3.5% Ni steel to be used at low temperature [-60 ~ -75°C(-75 ~ 103°F)]. Good toughness of all-weld metal at low temperature.

Notes on Usage

- ① Dry the electrodes at 350~400 °C(662~752°F) for 60 minutes before use.
- ② Preheat at 100~150°C(212~302°F). Preheat temperature varies in accordance with the plate thickness and steel kind.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.06	0.50	0.90	0.011	0.006	3.20

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	Heat Treatment
530 (77,000)	630 (91,000)	30.0	-75 (-103)	60 (44)	605 (1121°F) × 1hr. S.R

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

S-8016.C3 can be used for welding of high tensile steel and 1% Ni steel used in machinery, pressure vessels, storage tanks for low temperature.

Characteristics on Usage

- S-8016.C3 is a low hydrogen type electrode for all position welding.
- Good notch toughness of all-weld metal at low temperature.
- X-ray performance and usability are good.

Notes on Usage

- ① Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blowhole at the arc starting.
- ③ Pay attention not to exceed proper heat-input because excessive heat-input causes deterioration of impact values of all weld metal.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.06	0.54	1.12	0.015	0.006	0.96

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
540 (78,400)	620 (90,000)	26.0	-40 (-40)	80 (59)

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

S-8018.C1 can be used for welding of 2.5%Ni and 3.5%Ni steel used in machinery for low temperature.

Characteristics on Usage

S-8018.C1 is an iron powder low hydrogen type electrode. Its coating contains much iron powder, which increasing working efficiency. The deposit is extremely dense and the good mechanical properties make this electrode particularly suitable for weldments to withstand impact at subnormal temperatures.

Notes on Usage

- ① Dry the electrodes at 350~400 °C(662~752°F) for 60 minutes before use.
- ② Preheat at 80~100°C(176~212°F).
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.08	0.66	0.70	0.011	0.009	2.40

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	Heat Treatment
518 (75,200)	593 (86,100)	30.2	-60 (-76)	78 (58)	605°C(1121°F) X 1hr. S.R

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	400 (16)	400 (16)	450 (18)
F	90~130	130~180	190~240	250~300
V-up, OH	80~120	120~170	-	-

Applications

S-8018.C3 can be used for welding of high tensile steel and 1%Ni steel used in machinery, pressure vessels, storage tanks for low temperature.

Characteristics on Usage

- S-8018.C3 is an iron powder low hydrogen type electrode for all position welding.
- Good toughness of weld metal at low temperature.
- As its deposition rate is extremely high, working hours can be shortened.
- X-ray performance and usability are good.

Notes on Usage

- ① Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.
- ② Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose, because arc striking on the base metal is in danger of initiating cracking.
- ③ Preheat at 80~100°C(176~212°F) before use. The temperature to be applied varies in accordance with plate thickness and steel kind.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.07	0.59	1.00	0.020	0.009	0.94

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
540 (78,400)	619 (89,900)	30.8	-40 (-40)	76 (56)

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

S-7010.A1 can be used for welding of 0.5%Mo steel pipe, high pressure boilers, drums, thin steel plate for buildings and oil pipes.

Characteristics on Usage

S-7010.A1 is a high cellulose type electrode which contains 0.5%Mo in its coating.
X-ray performance and mechanical properties are extremely good.

Notes on Usage

- ① Preheat at 100~200°C(212~392°F) and postheat at 620~680°C(1148~1256°F).
- ② Dry the electrodes at 70~100°C(158~212°F) for 30~60 minutes before use.

Welding Position

5G Up/Down

Current

DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Mo
0.09	0.12	0.32	0.015	0.015	0.61

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Heat Treatment
503 (73,000)	548 (79,600)	27.8	620°C(1148°F) × 1hr. S.R

Approval

ABS, LR

Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	350 (14)	350 (14)	350 (14)
F	55~80	80~120	120~160	160~210
V-up,OH	50~70	70~110	110~150	-

Applications

S-7016.A1 can be used for welding of 0.5%Mo steel used for high temperature and high pressure boilers, chemical industries, oil refining industries and turbine casting.

Other general low alloy steel and high tensile steel.

Characteristics on Usage

S-7016.A1 is a low hydrogen type electrode. It is suitable for welding 0.5%Mo steel used at high temperature and high pressure.

Notes on Usage

- ① Preheat at 100~200°C (212~392°F) and postheat at 620~680°C (1148~1256°F).
- ② Dry the electrodes at 350~400°C (662~752°F) for 60 minutes before use.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Mo
0.07	0.50	0.80	0.012	0.008	0.60

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	Heat Treatment
560 (81,000)	650 (94,000)	28.0	620°C(1148°F) × 1hr. S.R

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

S-7018.A1 can be used for welding of 0.5%Mo heat resistant steel used for high temperature and high pressure boilers, chemical industries, oil refining industries and turbine casting. Other general low alloy steel and high tensile steel.

Characteristics on Usage

S-7018.A1 is an iron powder low hydrogen type electrode. Its coating contains much iron powder, which increasing working efficiency.

Notes on Usage

- ① Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.
- ② Preheat at 100~200°C(212~392°F) and postheat at 620~680°C(1148~1256°F).
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Mo
0.07	0.77	0.88	0.018	0.010	0.52

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Heat Treatment
477 (69,300)	617 (89,600)	32.8	620°C(1148°F)×1hr. S.R

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs)×4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~185	190~250	250~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

S-8016.B1 can be used for welding of 0.5%Cr-0.5%Mo steel used for high temperature and high pressure boilers, chemical equipment and oil refining plants.

Characteristics on Usage

S-8016.B1 is a low hydrogen type electrode which is suitable for welding 0.5%Cr-0.5%Mo steel used at high temperature. The crack resistibility of all-weld metal is excellent.

Notes on Usage

- ① Preheat at 150~250°C(302~482°F) and postheat at 628~680°C(1162~1256°F).
- ② Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.05	0.57	0.85	0.012	0.005	0.51	0.51

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Heat Treatment
505 (73,300)	589 (85,500)	31.0	690°C(1274°F)×1hr. S.R

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs)×4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	-	-

S-8016.B2

TYPE : Basic

AWS A5.5 / ASME SFA5.5 E8016-B2

JIS Z3223 DT2316

EN 1599 - E CrMo1 B 1 2

SMW

Applications

S-8016.B2 can be used for welding of 1.25%Cr-0.5%Mo steel for super-heat tubes, steam pipes and heaters of boilers for thermo-electric power plant and equipment of oil refining industries.

Characteristics on Usage

S-8016.B2 is a low hydrogen type electrode and is usable in all positions.

It is suitable for welding 1.25%Cr-0.5%Mo steel pipes and high carbon Cr-Mo steel.

Notes on Usage

- ① Preheat at 150~300°C(302~752°F) and postheat at 670~730°C(1238~1346°F).
- ② Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.07	0.51	0.66	0.012	0.008	1.22	0.54

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Heat Treatment
537 (78,000)	622 (90,300)	29.8	690°C(1274°F)×1hr. S.R

Approval

ABS

I Packing

Packet 5 kg (11 lbs)

Carton 5 kg (11 lbs)×4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	240~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

S-8018.B2 can be used for welding of 1.25%Cr-0.5%Mo heat resistant steel used for steam pipes of boilers for electric power plant and marine use, equipment for oil refining industries and high temperature synthetic chemical industries. Most commonly used in steam power plants, central power stations and ships, chemical plants and refineries.

Characteristics on Usage

S-8018.B2 is an iron powder low hydrogen type electrode. Its coating contains much iron powder, which increasing working efficiency. Owing to this high working efficiency, it is mostly suitable for welding thick steam pipes and repair welding of cast steel.

Notes on Usage

- ① Preheat at 150~300°C(302~572°F) and postheat at 670~730°C(1238~1346°F).
- ② Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.08	0.32	0.75	0.012	0.005	1.20	0.50

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Heat Treatment
563 (82,000)	641 (93,000)	27.6	690°C(1274°F)×1hr. S.R

Approval

ABS

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs)×4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	240~300
V-up, OH	50~80	80~120	120~170	-	-

S-9016.B3

TYPE : Basic

AWS A5.5 / ASME SFA5.5 E9016-B3

JIS Z3223 DT2416

EN 1599 - E CrMo2 B 1 2

SMAW

Applications

S-9016.B3 can be used for welding of 2.25%Cr-1%Mo steel used for super heat tubes and steam pipes of boilers for electric power plant and marine use, equipment for oil refining industries and high temperature synthetic chemical industries.

Characteristics on Usage

S-9016.B3 is a low hydrogen type electrode suitable for all position welding.

Notes on Usage

- ① Preheat at 200~350°C(392~662°F) and postheat at 680~730°C(1256~1346°F).
- ② Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.07	0.57	0.82	0.022	0.012	2.32	1.07

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Heat Treatment
554 (80,500)	663 (96,300)	25.6	690°C(1274°F)×1hr. S.R

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs)×4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

S-9018.B3 can be used for welding of 2.25%Cr-1%Mo steel suitable for main steam pipes of boilers for electric power plant and marine use, equipment for oil refining industries and high temperature synthetic industries. Welding of 2.25%Cr-1%Mo steel casting.

Characteristics on Usage

S-9018.B3 is an iron powder low hydrogen type electrode. Its coating contains much iron powder, which increasing working efficiency. Owing to this high working efficiency, it is mostly suitable for welding thick main pipes and steel casting.

Notes on Usage

- ① Preheat at 200~350°C(392~662°F) and postheat at 680~730°C(1256~1346°F).
- ② Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.08	0.64	0.83	0.020	0.011	2.11	1.0

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Heat Treatment
570 (82,800)	677 (98,300)	24.2	690°C(1274°F)×1hr. S.R

Approval

KR,ABS,LR,DNV

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs)×4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

S-8016.B5 can be used for welding of 0.5%Cr-1%Mo steel used for high temperature and high pressure boilers, chemical equipment and oil refining plants.

Characteristics on Usage

S-8016.B5 is a low hydrogen type electrode which is suitable for welding 0.5%Cr-1%Mo steel used at high temperature. The crack resistibility of all-weld is excellent.

Notes on Usage

- ① Preheat at 150~250°C(302~482°F) and postheat at 620~680°C(1148~1256°F).
- ② Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.10	0.48	0.59	0.019	0.009	0.51	1.0

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Heat Treatment
555 (80,600)	663 (96,300)	27.8	690°C(1274°F)×1hr. S.R

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs)×4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~130	130~190	190~240	250~300
V-up, OH	50~80	80~120	120~170	-	-

Applications

Hardfacing of rollers, gears, crane wheels and abrasive parts of various machines.

Characteristics on Usage

Very stable arc. Good covering property and excellent removability of slag.

Beautiful bead finish and low spatter loss.

Loss abrasive resistance, medium impact resistance and fairly good cutting property.

Notes on Usage

- ① Hardfacing large size cast steel and forging, low alloy steel and high carbon steel requires preheating at 150°C(302°F) and more than that.
- ② The groove repairing is prone to slag inclusion. Adjust the holding angle of the electrodes.
- ③ Dry the electrodes at 70~100°C(158~212°F) for 60 minutes before use.

Welding Position



1G 2F 3G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr
0.10	0.37	0.49	0.017	0.009	0.89

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp. °C(°F)	Postheat	Heat Treatment.	Hardness(HB)
150 (302)	-	-	240
-	-	650°C(1202°F) Tempering	200
-	-	900°C(1652°F), O.Q	330

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	50~85	80~130	130~180	180~240	210~280
V-up	40~70	70~120	120~160	-	-

Applications

For intermetallic light abrasion hardfacing of keys clutch lugs.

Characteristics on Usage

S-350A.R is a titania type electrode which has a good workability and deposits machinable all-weld metal. Slag removability and weld metal appearance are good.

Machining can be done with high-speed steel cutter.

Quenching can be done after machining. Suitable for intermetallic abrasion.

Notes on Usage

- ① In case of hardfacing on large size cast steel, low alloy steel and high carbon steel, preheat at 150°C(302°F) and more than that.
- ② The groove repairing is prone to slag inclusion. Adjust the holding angle of the electrodes.
- ③ Dry the electrodes at 70~100°C(158~212°F) for 60 minutes before use.

Welding Position

Current



1G 2F 3G

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr
0.10	0.50	1.00	0.010	0.007	2.40

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp. °C(°F)	Postheat	Heat Treatment.	Hardness(HB)
150 (302)	-	-	370
-	-	650°C(1202°F)	280
-	-	850°C(1562°F), O.Q	430

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~140	140~190	190~240	220~300
V-up	50~80	80~130	110~160	-	-

Applications

For intermetallic light abrasion, hardfacing and repairing of worn parts such as shafts, gears, wheels, etc.

Characteristics on Usage

Stable arc. Beautiful bead appearance. Good flow and easy removal of the slag.
High abrasion resistance and impact resistance.

Notes on Usage

- ① Preheating is unnecessary, in general, in case of multi-layer welding of low alloy steel and high carbon steel, preheat at about 150°C(302°F).
- ② Adopt back step method or strike arc on a small steel plate prepared for this particular purpose for preventing blow hole at the arc starting.
- ③ Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position



1G 2F 3G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr
0.15	0.68	2.15	0.015	0.007	0.05

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp. °C(°F)	Postheat	Heat Treatment.	Hardness(HB)
150 (302)	-	-	260
-	-	650°C(1202°F) Tempering	240
-	-	900°C(1652°F), O.Q	380

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~140	140~190	190~240	220~300
V-up	50~80	80~130	110~170	-	-

Applications

For intermetallic abrasion, hardfacing of fans, upper rollers and sprockets.

Characteristics on Usage

Machining is possible, in general. Hardness increases by quenching after machining.
It is suitable for intermetallic abrasion and moderate impact abrasion.

Notes on Usage

- ① Preheating is unnecessary, in general, large weldments of hardening property should be preheated.
- ② In case of high cooling speed, preheat or postheat to prevent difficulty of machining caused by hardening.
- ③ Pay attention to blow hole at the arc starting.
- ④ Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position

Current



1G 2F 3G

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr
0.26	0.82	1.44	0.015	0.009	1.88

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp. °C(°F)	Postheat	Heat Treatment.	Hardness(HB)
150 (302)	-	-	390
-	-	650°C(1202°F) Tempering	280
-	-	850°C(1562°F), O.Q	470

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~140	140~190	190~240	220~300
V-up	50~80	80~130	110~170	-	-

Applications

For intermetallic abrasion and light soil abrasion. Hardfacing of idlers, rollers, bulldozer blades, sprockets, caterpillar links, crushers, dipper teeth and conveyors.

Characteristics on Usage

The deposited metal of S-450B.B has the mixed metal structure of austenite and martensite and it has a high grade of hardness and machining is a little bit difficult.

Notes on Usage

- ① Preheat at 150°C(302°F) and more than that in general.
- ② In case of multi-layer build-up welding, under-lay with low hydrogen type carbon steel electrodes.
- ③ Pay attention to blow hole at the arc starting.
- ④ Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position



1G 2F 3G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.30	1.06	0.56	0.019	0.010	1.64	0.63

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp.°C(°F)	Postheat	Heat Treatment.	Hardness(HB)
150 (302)	-	-	420
300 (572)	-	-	380
-	-	650°C(1202°F) 6hr.F.C	410
-	-	625°C(1157°F) 6hr.F.C	330

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~140	140~190	190~240	220~300
V-up	50~80	80~130	110~170	-	-

Applications

For intermetallic abrasion and light soil abrasion. Hardfacing of idlers and truck links.

Characteristics on Usage

S-500B.B is an electrode designed for putting prime importance on hardness, but not neglecting toughness. Machining is difficult. The welds become passably mild with gradual cooling after welding. It is suitable for heavy duty intermetallic abrasion and light impact abrasion.

Notes on Usage

- ① Preheat at 150°C(302°F) and more than that in general.
- ② In case of multi-layer build-up welding or welding base metal of hardening property, underlay with low hydrogen type carbon steel electrodes.
- ③ Pay attention to blow hole at the arc starting.
- ④ Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position**Current**

1G 2F

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.41	0.75	1.73	0.018	0.007	1.60	0.86

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp.°C(°F)	Postheat	Heat Treatment.	Hardness(HB)
150 (302)	-	-	520
300 (572)	-	-	480

Approval**I Packing**

Packet 5 kg (11 lbs)
 Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~140	140~190	190~240	220~300

Applications

For intermetallic heavy abrasion and soil abrasion. Hardfacing of lower rollers and bucket edges.

Characteristics on Usage

S-600B.B is an electrode depositing all-weld metal of typical martensite structure.

It is suitable for soil abrasion. The weld softens with the heat.

Notes on Usage

- ① Preheat at 150°C(302°F) or more than that in general.
- ② In case of multi-layer build-up welding or welding base metal of hardening property, underlay with low hydrogen type carbon steel electrodes.
- ③ Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position



1G 2F

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.52	1.10	1.61	0.022	0.009	3.90	1.34

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp. °C(°F)	Postheat	Heat Treatment.	Hardness(HB)
150 (302)	-	-	540
300 (572)	-	-	500
600 (1112)	-	-	450

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~140	140~190	190~240	220~300

Applications

For soil abrasion. Hardfacing of cutting knives and casings.

Characteristics on Usage

S-700B.B is an electrode depositing weld metal of martensite which is harder than that of S-600B.B. This electrode, all-weld metal of very hard martensite structure containing small quantity of austenite structure. Machining is impossible "as welded". It is mostly suitable for soil abrasion.

Notes on Usage

- ① Preheat at 150°C(302°F) or more than that in general.
- ② Postheat at about 600°C(1112°F), if possible.
- ③ In case of multi-layer build-up welding or welding base metal of hardening property, underlay with low hydrogen type carbon steel electrodes.
- ④ Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position

Current



1G 2F

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.56	1.26	1.67	0.029	0.011	4.06	1.84

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp.°C(°F)	Postheat	Heat Treatment.	Hardness(HB)
150 (302)	-	-	610
300 (572)	-	-	580

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350 (14)	350 (14)	400 (16)	400 (16)	450 (18)
F	55~90	90~140	140~190	190~240	220~300

Applications

Mills to crush clinker in cement industry, screws of crushing grains in oil industry.

Characteristics on Usage

S-711 is highly resistant to abrasion without impacts. S-711 is an electrode depositing weld metal of austenite structure which is harder than that of S-700B.B.

- This electrode deposits weld metal of austenite structure containing Cr-Carbide.
- Machining is impossible 'as-welded'.

Notes on Usage

- ① Preheat at 150°C(302°F) or more than that in general.
- ② Weave during welding in the width of approx. 50mm.
- ③ Avoid excessive dilution.
- ④ Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position



1G 2F

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr
3.47	0.90	1.11	0.018	0.014	33.8

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp.°C(°F)	Hardness (HB)
≥300 (572)	610

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	400 (16)	400 (16)	400 (16)
F	110~160	160~200	200~260

Applications

For impact scraping abrasion. Crusher hammers, crusher jaws, crusher rolls and conveyor buckets.

Characteristics on Usage

Good covering property and removability of the slag. Low spatter loss.

Beautiful bead appearance.

Very high impact resistance. Good resistance to abrasion. Cutting property is impossible.

Notes on Usage

- ① Cool the weld metal with water during welding.
- ② Austenite type stainless steel electrodes should be used for under-laying on the base metal other than 13% Mn steel.
- ③ When the base metal of 13% Mn steel is hardened, cut-off the hardened zone before welding.
- ④ Dry the electrodes at 350~400°C(662~752°F) for 60 minutes before use.

Welding Position**Current**

1G 2F

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.38	0.06	14.5	0.030	0.003	1.16	1.57

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp. °C(°F)	Postheat	Heat Treatment.	Hardness(HB)
R.T	-	-	220
	-	After work hardening	480

Approval**I Packing**

Packet 5 kg (11 lbs)
 Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)	6.0 (15/64)
Length mm(in)	350(14)	400 (16)	400 (16)	450 (18)
F	90~150	140~190	190~240	220~300

Applications

Welding of 18%Cr-8%Ni steel.

Characteristics on Usage

S-308.16N is a lime-titania type electrode for 18%Cr-8%Ni steel with good usability. It is quite efficient because its burn-off rate and deposition rate are high because comparatively high amperage can be used.

Notes on Usage

- ① Keep the arc as short as possible.
- ② Remove dirt such as oil and dust from the groove.
- ③ Dry the electrodes at 350°C(662°F) for 60 minutes before use.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni
0.03	0.66	0.87	0.026	0.014	19.2	10.2

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
562 (81,600)	47.8

Approval

KR, ABS, DNV

Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~145	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

S-308L.16N[17]

TYPE : Rutile, Rutile-acid

AWS A5.4 / ASME SFA5.4 E308L-16
JIS Z3221 ES308L-16 | EN 1600 - E 19 9 L R
AWS A5.4 / ASME SFA5.4 E308L-17
JIS Z3221 ES308L-17 | EN 1600 - E 19 9 L R

SMAW

Applications

Welding of extra-low carbon 18%Cr-8%Ni steel.

Characteristics on Usage

S-308L.16N is a lime-titania type electrode for extra-low carbon 18%Cr-8%Ni steel with good usability. It is quite efficient because its burn-off rate and deposition rate are high because comparatively high amperage can be used.

S-308L.17 has a high moisture resistance and good porosity resistibility.

Notes on Usage

- ① It is mostly effective to proceed with welding, keeping the arc as short as possible in flat position.
- ② Remove dirts such as oil and dust from the groove.
- ③ Dry the electrodes at 350°C(662°F) for 60 minutes before use.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

Product Name	C	Si	Mn	P	S	Cr	Ni
S-308L.16N	0.02	0.67	0.87	0.030	0.018	19.2	10.0
S-308L.17	0.02	0.63	0.98	0.028	0.017	19.0	9.9

Typical Mechanical Properties of All-Weld Metal

Product Name	TS MPa(lbs/in ²)	EL (%)
S-308L.16N	561 (81,500)	44.0
S-308L.17	570 (82,800)	49.0

Approval

KR, ABS, LR, DNV, NK, BV, CWB,
TÜV, CE, DB, CCS (only S-308L.16N)

Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~145	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

S-308Mo.16

TYPE : Rutile

AWS A5.4 / ASME SFA5.4 E308Mo-16

JIS Z3221 ES308Mo-16

EN 1600 - E 20 10 3

Applications

All positional lime-titania type electrode which is extremely suitable for welding molybdenum containing austenite stainless steel.

S-308Mo.16 can be used for welding such type as 316 stainless steel when increased ferrite is desired beyond that attainable with S-316.16N electrode.

Characteristics on Usage

This electrode welds smoothly with low spatter and good slag detachability.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② Keep the arc as short as possible, and avoid large width of weaving.
- ③ Dirt such as oil and dust should be completely removed from groove.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo
0.03	0.65	0.77	0.032	0.017	18.5	9.7	2.3

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
621 (90,200)	42.3

Approval

Packing

Packet	2.5 kg (5.5 lbs)
Carton	2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)
F	50~85	70~140	95~145	135~180
V-up, OH	45~80	65~110	85~135	-

S-308LT.16

TYPE : Rutile

AWS A5.4 / ASME SFA5.4 E308L-16

JIS Z3221 ES308L-16

EN 1600 - E 19 9 L R

SMAW

Applications

Welding of extra-low carbon 18%Cr-8%Ni stainless steel for cryogenic applications.

Characteristics on Usage

S-308LT.16 is a lime-titania type electrode for cryogenic applications, extra-low carbon 304L austenitic steel with good usability. It is provided with a good usability for all-position welding. It is quite efficient because its burn-off deposition rates are high because comparatively high amperage can be used.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② Keep the arc as short as possible, and avoid large width of weaving.
- ③ Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose for preventing blowholes at the arc starting.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni
0.035	0.77	1.74	0.023	0.012	19.2	9.9

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
576 (83,500)	49.8	-196 (-321)	36 (27)

Approval

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25 - 55	50 - 85	70 - 115	95 - 150	135 - 180
V-up, OH	20 - 50	45 - 80	65 - 110	85 - 135	-

Applications

Welding of 22%Cr-12%Ni steel and heat resistant cast steel Clad steel side welding of 304.

Welding of stainless steel to carbon steel or low alloy steel.

Characteristics on Usage

S-309.16N is a lime-titania type electrode. As weld metal contains ferrite in austenitic structure, its crack resistibility is good. Furthermore, its heat and corrosion resistibility are also good because of much inclusion of alloying elements. Therefore, it is suitable for welding such dissimilar metal as carbon steel to stainless steel, as well as 22%Cr-12%Ni stainless steel.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni
0.03	0.79	1.31	0.025	0.016	23.4	12.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
579 (84,100)	38.6

Approval

KR, ABS, DNV, LR

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

S-309L.16 [17]

TYPE : Rutile, Rutile-acid

AWS A5.4 / ASME SFA5.4 E309L-16
JIS Z3221 ES309L-16 | EN 1600 - E 23 12 L R
AWS A5.4 / ASME SFA5.4 E309L-17
JIS Z3221 ES309L-17 | EN 1600 - E 19 9 L R

SMW

Applications

Welding of 22%Cr-12%Ni steel Welding of dissimilar metals and build-up welding of stainless steel on carbon steel or low alloy steel.

Characteristics on Usage

S-309L.16 is a lime-titania type electrode and its usability is excellent.

As the all-weld metal contains extra low carbon and high content of delta ferrite, its corrosion and heat resistibility are also good.

S-309L.17 has a high moisture resistance and good porosity resistibility.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② In case of clad steel welding, pay attention to the degree of penetration into the base plate.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

Product Name	C	Si	Mn	P	S	Cr	Ni
S-309L.16	0.02	0.76	1.30	0.023	0.019	22.9	12.7
S-309L.17	0.02	0.72	1.38	0.020	0.019	23.1	12.8

Typical Mechanical Properties of All-Weld Metal

Product Name	TS MPa(lbs/in ²)	EL (%)
S-309L. 16	563 (81,800)	43.0
S-309L. 17	570 (82,800)	43.0

Approval

KR, ABS, LR, BV, DNV, NK, GL, CWB
TÜV, CE, DB, CCS (only S-309L.16)

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

S-309Mo.16

TYPE : Rutile

AWS A5.4 / ASME SFA5.4 E309Mo-16

JIS Z3221 ES309Mo-16

EN 1600 - E 23 12 2 R

Applications

Welding of stainless steel to carbon steel and root runs in cladding.

Characteristics on Usage

- S-309Mo.16 is a lime-titania type electrode.
- Corrosion, heat and crack resistibility of the weld metal are superior to those of S-309.16N.
- Suitable for repair welding in dissimilar joint and steels which are difficult to weld.
- The slag removability and welded metal appearance are good.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② Use currents as low as possible to avoid excessive dilution.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo
0.03	0.77	1.21	0.026	0.015	23.3	12.6	2.4

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
662 (96,100)	35.7

Approval

ABS

Packing

Packet 2.5 kg (5.5 lbs)

Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

S-309MoL.16

TYPE : Rutile

AWS A5.4 / ASME SFA5.4 E309LMo-16

JIS Z3221 ES309LMo-16

EN 1600 - E 23 12 2 L R

SMAW

Applications

Welding of extra-low carbon 22%Cr-12%Ni-2.5%Mo stainless steel.

Characteristics on Usage

- S-309MoL.16 is a lime-titania type electrode.
- Corrosion, heat and crack resistibility of the weld metal are superior to those of S-309.16N.
- Suitable for repair welding in dissimilar joint and steels which are difficult to weld.
- The slag removability and welded metal appearance are good.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② Use currents as low as possible to avoid excessive dilution.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo
0.02	0.72	1.41	0.027	0.013	23.3	12.7	2.4

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
690 (99,000)	33.8

Approval

DNV, TÜV, CE, DB

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

Applications

Owing to the high content of alloying elements, durability is maintained in welding of carbon steel where deposited metal is diluted by the base metal. Suitable for welding of 13%Cr or clad part of 18%Cr-8%Ni stainless steel.

Characteristics on Usage

- S-310.15 is a basic type, all-weld metal has fully austenite structure.
- All-weld metal has a good mechanical property, especially excellent toughness.

Notes on Usage

- ① Keep the current as low as possible and the arc length as short as possible.
- ② Dry the electrodes at 350°C(662°F) for 60 minutes before use.

Welding Position



1G 2F 3G 4G

Current

DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni
0.09	0.41	2.31	0.019	0.004	25.6	20.6

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
565 (82,100)	34.8

Approval

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	30~40	60~75	85~115	105~140	-

S-310.16

TYPE : Rutile

AWS A5.4 / ASME SFA5.4 E310-16

JIS Z3221 ES310-16

EN 1600 - E 25 20 R

SMAW

Applications

Welding of 25%Cr-20%Ni stainless steel.

Fabrication and repair of furnace linings, furnace grates, burners.

Characteristics on Usage

S-310.16 is a lime-titania type electrode, all-weld metal has fully austenite structure.

Excellent in heat resistance, corrosion resistance and mechanical properties due to stable of fully austenitic microstructure.

Notes on Usage

① Dry the electrodes at 350°C(662°F) for 60 minutes before use.

② Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni
0.10	0.60	1.90	0.018	0.013	26.5	20.6

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
610 (88,400)	35.0

Approval

I Packing

Packet 2.5 kg (5.5 lbs)

Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	30~55	40~80	70~115	95~150	140~180
V-up, OH	25~50	35~75	65~110	90~145	-

Applications

S-312.16 is a lime-titania type electrode, has an excellent usability and weldability. Chemical composition of all-weld metal is 29%Cr-9%Ni. Owing to the austenite structure containing large contents of ferrite, S-312.16 has a good crack resistibility. Excellent buffer effect against outer stress.

Characteristics on Usage

- Bond welding of dissimilar metals such as stainless steel, carbon steel and low alloy steel.
- Welding of stainless clad steel.
- Under laying of the build-up welding of high alloyed tool steel and hardfacing.

Notes on Usage

- ① Preheat the base metal at over 200°C(392°F) to prevent cracking in welding of high alloyed steel, having good hardenability such as tool steel.
- ② Keep the current as low as possible and length as short as possible.
- ③ Dry the electrodes at 350°C(662°F) for 60 minutes before use.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni
0.11	0.49	1.41	0.021	0.013	29.5	9.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
803 (116,600)	22.0

Approval

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

Applications

Welding of 18%Cr-12%Ni-3%Mo stainless steel, 13%Cr steel, 17%Cr steel and high toughness steel when postheating is not recommended use for welding between dissimilar metal like carbon steel and stainless steel.

Characteristics on Usage

S-316.16N is a lime-titania type electrode provided with a good usability and weldability. As the all-weld metal has an austenite structure including Mo., the corrosion resistance against sulfide acid, phosphoric acid and acetic acid is excellent and heat resistance is also much better than that of 18%Cr-8%Ni stainless steel welds.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo
0.03	0.77	0.90	0.030	0.029	18.7	12.3	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
572 (83,100)	40.8

Approval

KR, ABS, BV, DNV

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

S-316L.16N [17]

TYPE : Rutile, Rutile-acid

AWS A5.4 / ASME SFA5.4 E316L-16
JIS Z3221 ES316L-16 | EN 1600 - E 19 12 3 L R
AWS A5.4 / ASME SFA5.4 E316L-17
JIS Z3221 ES316L-17 | EN 1600 - E 19 12 3 L R

Applications

Welding of extra-low carbon 18%Cr-12%Ni-2%Mo (316L stainless steel).

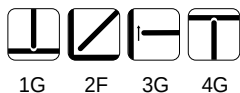
Characteristics on Usage

S-316L.16N is a lime-titania type electrode provided with a good usability and weldability. As the all-weld metal has an austenite structure containing proper quantity of ferrite, crack resistibility is good. It has an excellent resistibility to inter-crystalline corrosion in the as-welded condition since carbon content is less and intergranular corrosion resistibility is superior to that of S-316.16N, and as it contains Mo., resistance to heat is also good. S-316L.17 has a high moisture resistance and good porosity resistibility.

Notes on Usage

- ① Weaving width should be within two and a half times of electrode's diameter.
- ② Remove dirts such as oil and dust from the groove.
- ③ Dry the electrodes at 350°C(662°F) for 60 minutes before use.

Welding Position



Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

Product Name	C	Si	Mn	P	S	Cr	Ni	Mo
S-316L.16N	0.02	0.75	1.10	0.032	0.015	18.5	11.9	2.5
S-316L.17	0.02	0.73	1.33	0.029	0.016	19.4	11.7	2.5

Typical Mechanical Properties of All-Weld Metal

Product Name	TS MPa(lbs/in ²)	EL (%)
S-316L.16N	557 (80,900)	45.2
S-316L.17	560 (81,300)	48.0

Approval

KR, ABS, LR, BV, DNV, NK, CWB
TÜV, CE, DB, CCS (only S-316L.16N)

Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

S-316LT.16

TYPE : Rutile

AWS A5.4 / ASME SFA5.4 E316L-16

JIS Z3221 ES316L-16

EN 1600 - E 19 12 3 L R

SMAW

Applications

Welding of extra-low carbon 18%Cr-12%Ni-2%Mo stainless steel for cryogenic applications.

Characteristics on Usage

S-316LT.16 is a lime-titania type electrode for cryogenic applications, low carbon 316L austenitic steel (18%Cr-8%Ni-2%Mo) with good usability and weldability.

It has an excellent resistibility inter-crystalline corrosion in the as-welded condition since carbon content is less, and as it contains Mo., resistance to heat is also good.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② Keep the current as low as possible and length as short as possible.
- ③ Remove rust, water, oil and paint from the groove.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo
0.035	0.55	1.59	0.021	0.016	18.5	13.5	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
538 (78,000)	34.4	-196 (-321)	40 (30)

Approval

I Packing

Packet 2.5 kg (5.5 lbs)

Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25 - 55	50 - 85	70 - 115	95 - 150	135 - 180
V-up, OH	20 - 50	45 - 80	65 - 110	85 - 135	-

Applications

Welding of 317L stainless steel.

Characteristics on Usage

Lime-titania type, for all-position welding, good usability.

All-weld metal has a low carbon austenite structure composed of 18%Cr-12%Ni-3.5%Mo.

Owing to the large contents of Mo, all-weld metal has a good resistance to corrosion in deoxidizing atmosphere containing nitroxide and sulfide.

Notes on Usage

- ① Keep the current as low as possible and arc length as short as possible.
- ② Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ③ Remove foreign substance such as oil or scale from the groove.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo
0.02	0.63	1.05	0.029	0.018	18.3	12.6	3.2

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
588 (85,400)	38.4

Approval

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

Applications

Welding of 321, 347 stainless steel.

Characteristics on Usage

S-347.16 is a lime-titania type electrode and all-weld metal has an austenite structure.

As the all-weld metal contains small amount of stabilizing element(Nb), its resistance to corrosion is good.

As the all-weld metal has an excellent high temperature strength, it is suitable for welding of boiler and gas turbine.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② Remove rust, water, oil and paint from the surface to be welded.
- ③ Keep the arc as short as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Nb
0.02	0.75	0.82	0.027	0.014	18.5	9.8	0.36

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
603 (87,600)	42.4

Approval

I Packing

Packet 2.5 kg (5.5 lbs)
 Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25~55	50~85	70~115	95~150	135~180
V-up, OH	20~50	45~80	65~110	85~135	-

Applications

Welding of 22%Cr-5%Ni-2%Mo-0.15%N stainless steel (SAF2205, UNS31803).

Characteristics on Usage

S-2209.16 is a lime-titania type electrode, all weld metal has a ferritic/austenitic structure.

It is applicable to welding of duplex stainless steel(STS 329J3L) as used for corrosion resistance applications as an alternative to austenitic stainless steels. Excellent in pitting corrosion resistance and intergranular corrosion as well as stress corrosion cracking resistance.

The slag removability and welded metal appearance are good.

Notes on Usage

- ① Dry the electrodes at 350°C(662°F) for 60 minutes before use.
- ② Keep the current as low as possible and length as short as possible.
- ③ Remove rust, water, oil and paint from the groove.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo	N
0.029	0.78	1.03	0.023	0.012	23.1	9.2	3.1	0.12

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
830 (120,400)	28	-20 (-4)	50 (37)
		-50 (-58)	45 (33)

Typical Mechanical Properties of All-Weld Metal

Ferrite No.	Shaeffler (%)	1992 WRC (FN)	PRE
As welded	68	58	35

PRE = Cr + 3.3 x Mo + 16 x N

Approval

I Packing

Packet 2.5 kg (5.5 lbs)

Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.0 (5/64)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	300 (12)	350 (14)	350 (14)	350 (14)
F	25 - 55	50 - 85	70 - 115	95 - 150	135 - 180
V-up, OH	20 - 50	45 - 80	65 - 110	85 - 135	-

Applications

S-NCI can be used for repairing cast iron and joining of various kinds of cast iron products such as cylinder covers, motor beds, casings and gears. Repairing of meehanite, alloy and malleable cast iron.

Characteristics on Usage

S-NCI is a graphite type coated electrode, depositing nickel weld metal. Hardening of heat affected zone is small and machining of the welds is comparatively easy. Therefore it is suitable for welding alloy cast iron of poor weldability, malleable cast iron and hydraulically pressured parts as well as common cast iron.

Notes on Usage

- ① Chip off base metal completely at the repairing part.
- ② There is a possibility that cracks spreads or makes holes at both ends of repairing part.
- ③ Keep the weld metal length less than 50mm(2 inch) to disperse welding heat. Adopt back stepping stone or symmetry method by turns.
- ④ Hot peen in every pass.
- ⑤ The preheat temperatures vary in accordance with the size, kind and shape of the base metal. 150°C(302°F) is appropriate in general.

Welding Position



1G 2F

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Fe	Ni
1.38	0.79	0.36	0.004	0.003	0.58	98.3

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp. °C(°F)	Hardness (HRB)
-	77.6

Approval

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)
Length mm(in)	300 (12)	350 (14)	350 (14)
F	58~80	80~130	110~160

Applications

Welding of normal grades of cast iron, such as grey, ductile and malleable irons.

Repairing of cast iron housings, blocks, machinery parts, frames.

Characteristics on Usage

S-NFC is a covered electrode with graphite type coating flux and 55%Ni-Fe alloy core rod.

The hardening of the weld metal is less than S-FCF, and crack resistibility is excellent.

Notes on Usage

- ① Use currents as low as possible.
- ② Keep the weld metal length less than 50mm(2 inch) to disperse welding heat.
- ③ The preheat temperatures vary in accordance with the size, kind and shape of the base metal.
100~200°C(212~392°F) is appropriate in general.

Welding Position



1G 2F

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Fe	Ni
1.17	0.80	1.20	0.010	0.003	54.0	Bal

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp.°C(°F)	Hardness (HRB)
-	90

Approval

I Packing

Packet 2.5 kg (5.5 lbs)
Carton 2.5 kg (5.5 lbs) × 4 : 10kg(22 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	3.2 (1/8)	4.0 (5/32)
Length mm(in)	350 (14)	350 (14)
F	80~120	110~150

Applications

S-FCF can be used for welding of cavity filling or repairing all kinds of cast iron manufactures.

Characteristics on Usage

- S-FCF is a graphite type electrode which has a pure iron core rod.
- Stable arc.
- Easy slag removal.
- Beautiful bead appearance.
- Machining is impossible "as welded".

Notes on Usage

- ① The preheat temperatures vary in accordance with shape and size of the base metal.
- ② Preheat at 200~350°C(392~662°F), gradual cooling recommended after welding.
- ③ See notes of S-NCI for other cautions.

Welding Position



1G 2F

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Fe
2.47	0.41	0.45	0.024	0.024	96.6

Typical Mechanical Properties of All-Weld Metal

Preheat & Interpass Temp. °C(°F)	Hardness (HRB)
-	450~510

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	350 (14)	400 (16)	400 (16)
F	60~90	90~130	120~160	150~200

SAW WIRE / FLUX COMBINATION



Applications

Single and multi-layer welding of miniature LPG tanks, spiral pipes, ships, agricultural implements, machinery, boilers, bridges and structural steels.

Characteristics on Usage

Especially insensitive to oil, rust, scale, dirt and primers on the surface to be welded. Slag detachability in narrow groove and resistance to porosity are excellent. Suitable for welding of thin and medium plate in high speed welding. As the consumption of flux is low, it is very economical. Applicable to horizontal and flat fillet welding.

Notes on Usage

- ① Dry the flux at 300~350°C(572~662°F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Remove rust, scales, oil, paint, water, dirt and slag of tack welds from the groove to obtain sound weld metal.
- ④ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Current

AC, DC +

I Basicity Index

0.5

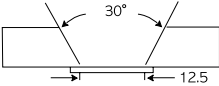
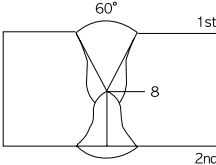
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
H-14	0.08	0.53	0.94	0.021	0.014	SS400	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
H-14	560 (81,000)	620 (90,000)	27	0 (32)	90 (66)	SS400	25
	-	530 (76,900)	-	-	-	SM490	20

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.0	25		1~13	570	30	40	AWS A5.17
H-14	4.8	20			800	36	25	Both
					850	37	45	Single pass

S-777MXT×H-14[A-2]

TYPE : Acid

AWS A5.17/ASME SFA5.17 F7A0-EH14
JIS Z3183 S501-H

AWS A5.23/ASME SFA5.23 F8PZ-EA2-A2

Applications

Butt and flat welding of thin and medium thickness plates, High travel speed welding for miniature LPG tanks.

Longitudinal pipes welding of spiral pipes welding of thin and medium walled pipes.

S-777MXT×A-2 is single or multi-layer welding of various kinds of structure such as 0.5%Mo steels used for pressure vessels and boilers.

Characteristics on Usage

An agglomerated Aluminate-rutile flux suitable for welded joints on 0.5%Mo steel and heat resistant steel. Especially insensitive to oil, rust, scale, and dirt on the surface to be welded.

Slag detachability in narrow groove and resistance to porosity are excellent.

Suitable for welding of thin and medium plate in high speed welding. As the consumption of flux is low, it is very economical. Applicable to horizontal and flat fillet welding.

Notes on Usage

- ① Dry the flux at 300–350°C(572–662°F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.
- ④ Remove rust, scales, oil, paint, water, dirt and slag of tack welds from the groove to obtain sound weld metal.

Approval	I Current	I Basicity Index
	AC, DC +	0.5

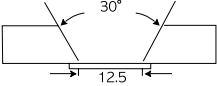
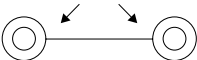
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	BM	Th.(mm)
H-14	0.06	0.60	1.18	0.028	0.015	-	SS400	25
	0.07	0.55	1.05	0.026	0.012	-	SG295	3.2
A-2	0.05	0.68	0.75	0.020	0.010	0.46	-	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	PWHT	CVN-Impact Value J(ft lbs)			Th.(mm)
	MPa(lbs/in ²)	MPa(lbs/in ²)	(%)	condition	R.T	0°C (32° F)	-18°C(0° F)	
H-14	530 (76,900)	570 (82,700)	32	-	-	70 (52)	40 (30)	25
	-	430 (63,400)	-	-	-	-	-	3.2
A-2	580 (84,100)	640 (92,800)	28	620°C × 1hr	-	-	-	25

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14 (A-2)	4.0	25		1~13	570	30	40	AWS A5.17/ A5.23
H-14	2.4	12		1	400	28	200	Fin tube of boiler

S-777MXT×B-2[B-3]

TYPE : Acid

AWS A5.23/ASME SFA 5.23 F8PZ-EB2-B2

AWS A5.23/ASME SFA 5.23 F8PZ-EB3-B3

Applications

S-777MXT×B-2 is single-layer welding of various kinds of structure such as 1.25%Cr-0.5%Mo heat resistant steels used for boilers.

S-777MXT×B-3 is single-layer welding of various kinds of structure such as 2.25%Cr-1.0%Mo high temperature heat resistant steels used for boilers.

Characteristics on Usage

Especially insensitive to oil, rust, scale, and dirt on the surface to be welded. Slag detachability in narrow groove and resistance to porosity are excellent. Suitable for welding of thin and medium plate in high speed welding. As the consumption of flux is low, it is very economical. Applicable to horizontal and flat fillet welding.

Notes on Usage

- ① Dry the flux at 300~350°C(572~662°F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.
- ④ Remove rust, scales, oil, paint, water, dirt and slag of tack welds from the groove to obtain sound weld metal.

Approval

I Current

I Basicity Index

AC, DC +

0.5

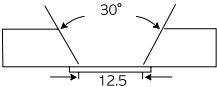
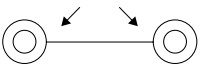
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Cr	Mo	Th.(mm)
B-2	0.06	0.60	0.55	0.022	0.015	1.06	0.44	25
B-3	0.09	0.59	0.53	0.018	0.008	2.08	0.95	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	PWHT condition	Th. (mm)
B-2	560 (81,200)	640 (92,800)	25	690°C × 1hr	25
B-3	570 (82,700)	660 (95,700)	20	690°C × 1hr	25

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
B-2 (B-3)	4.0	25		1~13	570	30	40	AWS A5.23
B-2	2.4	12		1	400	28	200	Fin tube of boiler

SAW

S-777MXH×H-14

TYPE : Neutral

AWS A5.17 / ASME SFA5.17 F7A(P)2-EH14

JIS Z3183 S502-H

EN 760 - S A AB 1 / EN756 - S4

Applications

Butt and flat fillet welding of miniature LPG tanks, ships, vehicles, agricultural implements, machinery, boilers, bridges, structural steels.

Characteristics on Usage

Especially insensitive to oil, rust, scale, dirt and primers on the surface to be welded. Slag detachability in narrow groove and resistance to porosity are excellent. As the consumption of flux is low, it is very economical. Applicable to horizontal and flat fillet welding.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Remove rust, scales, oil, paint, water, dirt and slag of tack welds from the groove to obtain sound weld metal.
- ④ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval	I Current	I Basicity Index
KR, ABS, BV, DNV, GL, LR, NK	AC, DC +	0.9

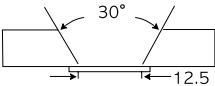
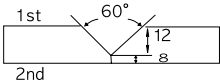
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
H-14	0.07	0.30	1.37	0.028	0.021	SS400	25
	0.12	0.30	1.43	0.024	0.012	SM490	20

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
H-14	520 (75,500)	570 (87,700)	30	-29 (-20)	120 (88)	SS400	25
	-	560 (81,300)	-	0 (32)	70 (52)	SM490	20

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.0	25		1~13	570	30	40	AWS A5.17
H-14	4.8	20		1st 2nd	800 850	34 36	25 25	Both Side Single-pass

Applications

Butt and flat fillet welding of miniature LPG tanks, ships, vehicles, agricultural implements, machinery, boilers, bridges and structural steels.

Characteristics on Usage

Especially insensitive to oil, rust, scale, dirt and primers on the surface to be welded. Slag detachability in narrow groove and resistance to porosity are excellent. As the consumption of flux is low, it is very economical. Applicable to horizontal and flat fillet welding.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Remove rust, scales, oil, paint, water, dirt and slag of tack welds from the groove to obtain sound weld metal.
- ④ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval

I Current

AC, DC +

I Basicity Index

0.9

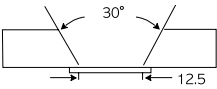
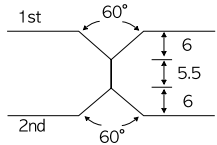
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	BM	Th.(mm)
A-3	0.04	0.28	1.30	0.025	0.015	0.50	SM570	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
A-3	630 (91,500)	660 (95,900)	26	-40 (-40)	40 (30)	SM570	25
	-	640 (93,000)	-	-20 (-4)	70 (52)	API5L x 65	17.5

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
A-3	4.0	25		1~13	570	30	40	AWS A5.23
A-3	L(DC+):4.0 T(AC):4.0	17.5		1st	(L)770 (T)640	32 40	110	Both Side Single-pass (tandem)
				2nd	(L)1050 (T)750	32 42	120	

S-727 × L-8[L-12]

TYPE : Neutral

AWS A5.17 / ASME SFA5.17 F7A2-EL8(EL12)

JIS Z3183 S502-H

EN 760 - S A AB 1 / EN756 - S1

Applications

Single and multi-layer welding of structural steels, H-beams, ships, agricultural implements, boilers, machinery, bridges and general fabrications.

Characteristics on Usage

Insensitive to rust, scales, primers, oil and dirt on the surface to be welded. Resistance to porosity and slag detachability are excellent. Impact value of weld metal is high.

Suitable for fillet welding of thin and medium plate with wide range of welding conditions.

As the consumption of flux is low, it is economical.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② Pay attention to welding voltage. Excessive welding voltage causes deterioration of joint properties.
- ③ Add new flux periodically to prevent the weld defects and bad bead appearance which occurs when continuously reusing the flux.

Approval	I Current	I Basicity Index
KR, ABS, LR, BV, DNV, GL, NK (L-8) ABS, LR (L-12)	AC, DC +	1.1

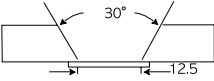
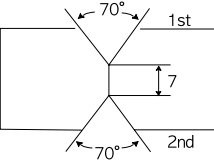
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
L-8	0.08	0.35	1.45	0.030	0.020	SS400	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
L-8	480 (69,400)	560 (81,000)	30	-29 (-20)	50 (30)	SS400	25
	-	550 (79,900)	-	0 (32)	50 (30)	SM490A	28

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
L-8	4.0	25		1~14	570	30	40	AWS A5.17
L-8	4.8	20		1st 2nd	880 970	34 35	28 33	BS SL

Applications

Single-layer and multi-layer welding of shipbuildings.

Characteristics on Usage

As the penetration is deep, it is suitable for welding of thick plate in both side single-layer welding. Impact value (or mechanical properties) of weld metal and crack resistibility are excellent. Also applicable to one-side welding. As the consumption of flux is low, it is economical.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② Pay attention to welding voltage. Excessive welding voltage causes deterioration of joint properties.
- ③ Add new flux periodically to prevent the weld defects and bad bead appearance which occurs when continuously reusing the flux.
- ④ Weld pass should be limited to 3 or 4 passes. (please inquire of the manufactures when welding more than 5 passes)

Approval

KR, ABS, LR, BV, DNV, GL, NK, RINA, MRS

I Current

AC, DC +

I Basicity Index

1.6

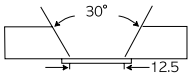
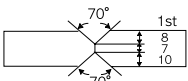
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
L-8	0.07	0.40	1.40	0.028	0.015	SS400	25
L-8	0.08	0.32	1.29	0.015	0.014	AH36	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
L-8	490 (71,000)	560 (81,000)	31	-40 (-40)	70 (52)	SS400	25
	-	570 (82,800)	-	-20 (-4)	40 (30)	AH36	25

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
L-8	4.0	25		1~13	570	30	40	AWS A5.17
L-8	4.8	25		1st 2nd	950 1100	34 37	40 30	BS SL

S-737×H-14

TYPE : Basic

AWS A5.17 / ASME SFA5.17 F7A(P)4-EH14

JIS Z3183 S502-H

EN 760 - S A AB 1 / EN756 - S4

Applications

Horizontal welding of oil storage tanks, ships, bridges, pressure vessels, penstocks, boilers and structural steels.

Characteristics on Usage

Inactive, neutral type bonded flux which is applicable to all kinds of wire. Impact value of weld metal and crack resistibility are good. Slag detachability in the groove and resistance to porosity are good. Usability in horizontal fillet welding and X-ray performance are good.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② Remove rust, scales, oil, paint, water, dirt and slag of tack welds from the groove to obtain sound weld metal.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.
- ④ Preheat at 50~100° C (122~212° F) according to base metal and plate thickness.
Keep interpass temperature at 100~250° C (212~482° F).

Approval	I Current	I Basicity Index
KR, ABS, LR, DNV, GL, MRS	AC, DC +	1.6

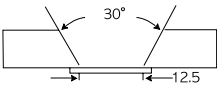
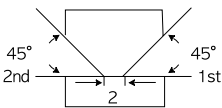
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
H-14	0.08	0.31	1.60	0.025	0.019	SS400	25
H-14	0.07	0.40	1.53	0.020	0.013	SM490	28

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
H-14	510 (74,000)	570 (82,800)	31	-40 (-40)	110 (81)	SS400	25
H-14	-	540 (78,400)	-	-20 (-4)	60 (44)	SM490	28

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.0	25		1~13	570	30	40	AW A5.17
H-14	3.2	28		1	450	28	35	} 1st
				2~4	500	26	50	
				5	450	28	35	} 2nd
				6~8	500	26	50	

Applications

Multi-layer welding of structural steels, offshore structures and thick, windmill, pressure vessels.

Characteristics on Usage

Good weldability for all range of thickness of plate. Excellent impact value and crack-resistibility of welded metal. Inactive type flux is not affected by welding parameter, especially suitable for multi-layer welding of thick plate.

Notes on Usage

- ① Dry the flux at 300~350° c (572~662° F) for 60 minutes before use.
- ② For the first layer in groove, keep the current and speed low in the case of multi-layer welding.

Approval

KR, ABS, LR, BV, DNV, GL, NK, MRS
CWB, TUV, CE-Mark, DB

I Current

AC, DC +

I Basicity Index

1.9

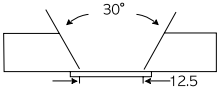
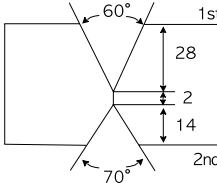
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
M-12K	0.09	0.26	1.40	0.023	0.004	SS400	25
M-12K	0.08	0.54	1.47	0.025	0.018	BS4360-Gr.50D	44

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
M-12K	555 (80,500)	614 (89,100)	29	-51 (-60)	60 (44)	SS400	25
M-12K	510 (74,000)	580 (84,000)	28	-20 (-4)	70 (52)	BS4360-Gr.50D	44

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
M-12K	4.0	25		1~13	570	30	40	AWS A5.17
M-12K	4.0	44		1	500	32	40	} 1st
				2~14	600	36	50	
				15	500	32	40	} 2nd
				16~23	600	36	50	

Applications

Single-layer welding of shipbuildings.

Characteristics on Usage

As the penetration is deep, it is suitable for welding of thick plate in both side single-layer welding. It is suitable for single-pass-on-both-sides welding due to wide range of applicable welding conditions. Good bead appearance and excellent impact value of the weld metal. As the consumption of flux is low, it is very economical.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval	I Current	I Basicity Index
KR, ABS, LR, BV, DNV, GL , NK	AC, DC +	1.5

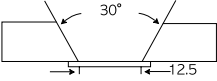
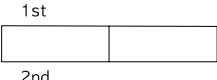
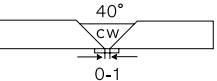
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
	0.10	0.37	1.54	0.020	0.012	SS400	25
H-14	0.14	0.41	1.43	0.018	0.008	EH36	20
	0.11	0.29	1.52	0.018	0.009	DH36	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	Position of fracture	CVN-Impact Value J(ft · lbs)			BM	Th. (mm)
	MPa(lbs/in ²)	MPa(lbs/in ²)	(%)		0°C(32° F)	-20°C(-4° F)	-51°C(-60° F)		
	570 (82,800)	605 (87,900)	28.0	-	-	-	80 (59)	SS400	25
H-14	-	570 (82,800)	-	BM	-	50 (37)	-	EH36	20
	-	580 (84,300)	23.0	-	70 (52)	-	-	DH36	25

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.0	25		1~13	550	30	40	AWS A5.17
H-14	4.8	20		1st	L(DC+) 1100 T(AC) 700	37 42	100	Tandem
				2nd	L(DC+) 1200 T(AC) 700	37 42	100	SL
H-14	4.8	25		1	1150	35	20	FAB OSW (DC+)

Applications

Multi-layer welding of various kinds of structures such as ship building, machinery, pressure vessels.

Characteristics on Usage

Excellent notch toughness at low temperature. Good mechanical properties can be obtained with multi-layer welding using high heat input. It deposits weld metal of good appearance even in low speed welding with high currents.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Add new flux periodically to prevent the weld defects and bad bead appearance which occurs when continuously reusing the flux.

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Current

AC, DC +

I Basicity Index

1.8

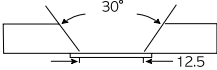
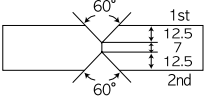
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
H-14	0.09	0.25	1.40	0.020	0.016	SS400	25
	0.11	0.29	1.60	0.022	0.014	EH36	40

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
H-14	510 (74,000)	570 (82,800)	28	-51 (-60)	80 (59)	SS400	25
	550 (76,800)	590 (85,700)	-	-40 (-40)	60 (44)	EH36	40

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.0	25		1~13	570	30	40	AWS A5.17
H-14	4.8	40		1	200	28	20	(FCAW)
				2	280	32	25	(FCAW)
				3	600	32	35	Both
				4~8	700	34	40	Multi-
				9~	800	36	40	pass

S-787TB×H-14

TYPE : Basic

AWS A5.17 / ASME SFA5.17 F7A(P)8-EH14

JIS Z3183 S502-H

EN 760 - S A FB 1 / EN756 - S4

Applications

Single and multi-layer welding of aluminum-killed steel for low temperature service used in offshore structures, chemical vessels, steel pipes, low temperature service equipments and other structures in cold regions.

Characteristics on Usage

Excellent notch toughness at low temperature down to -60° C (-76° F). Suitable for single and multi-layer welding of TMCP steel. Resistance to pockmark and porosity is excellent. Slag detachability in the groove is good.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② In case of multi-layer welding, use welding current and speed as low as possible at the first layer of groove to avoid cracking.
- ③ Add new flux periodically to prevent the weld defects and bad bead appearance which occurs when continuously reusing the flux.

Approval	I Current	I Basicity Index
KR, ABS, LR, BV, DNV, GL, NK	AC, DC +	2.4

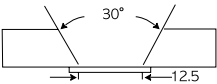
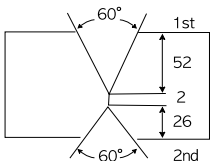
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Ti	B	BM	Th.(mm)
H-14	0.09	0.25	1.53	0.020	0.015	0.020	0.0020	SS400	25
	0.06	0.12	1.12	0.012	0.005	0.021	0.0024	API-2HGr.50	80

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
H-14	580 (84,200)	620 (90,000)	31	-62 (-80)	90 (66)	SS400	25
	470 (68,200)	550 (76,800)	34	-40 (-40)	90 (66)	API-2H Gr.50	80
				-62 (-80)	70 (52)		

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.0	25		1~13	570	30	40	AWS A5.17
H-14	4.0	80		1	220	26	55	(FCAW) 1st
				2	450	28	30	
				3~25	600	34	30	
				26	450	28	30	Back Gouging 2nd
				27~36	600	34	30	

Applications

Multi-layer welding of various kinds of structures such as shipbuildings, offshore structures and pressure vessels.

Characteristics on Usage

It produces the weld metal which has excellent impact value at low temperature down to -60° C and CTOD at temperature down to -10° C. As the hydrogen content of weld metal is extremely low, it shows excellent resistance to crack. Tandem, multi-electrode can be performed. AC power source is recommendable because DC makes inferior quality.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② Suitable welding condition for 1st pass in the groove is 500~550A, 26~30V and 30~40Cpm to prevent hot cracking and obtain good slag removal.
- ③ Preheat at 50~100° C depending on kind of base metal and plate thickness.

Approval

KR, ABS, LR, BV, DNV, GL, NK
TUV, CE-Mark, DB, RINA

I Current

AC, DC +

I Basicity Index

2.5

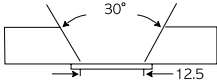
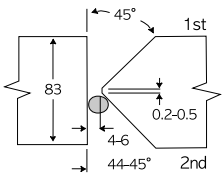
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Ti	B	BM	Th.(mm)
H-14	0.09	0.21	1.34	0.019	0.012	0.018	0.0015	SS400	25
	0.08	0.26	1.40	0.020	0.009	0.020	0.0018	EH36-TM	83

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	Position of fracture	CVN-Impact Value		BM	Th. (mm)
	MPa(lbs/in ²)	MPa(lbs/in ²)	(%)		-40°C(-40°F)	-62°C(-80°F)		
H-14	530 (76,900)	580 (84,000)	30	-	-	120 (88)	SS400	25
	510 (74,000)	570 (82,800)	32	-	150 (110)	110 (81)	EH36-TM	83

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.0	25		1~13	570	30	40	AWS A5.17
H-14	83	4.8		1	220	25	21	(FCAW)
				2	270	30	25	(FCAW)
				3	550	30	35	Both Side Multi-pass
				4~27	650	34	40	
				Back Gouging				
				28	550	30	35	Both Side Multi-pass
				29~51	650	34	40	

Superflux787×H-12K

AWS A5.17/ASME SFA5.17 F7A(P)8-EH12K
JIS Z3183 S502-H

TYPE : High-Basic

Applications

Multi-layer welding of various kinds of structures such as ship buildings, offshore structures, machinery, pressure vessels, large diameter and heavy wall steel pipe.

Characteristics on Usage

An agglomerated fluoride-basic flux suitable for welded joints on high-tensile and fine-grained steels.

Tandem, multi-electrode welding can be performed. Because of insensitivity to rust, scale, primer on the surface to be welded, it has excellent X-ray characteristics and slag removal.

Notes on Usage

Dry the flux at 300~350°C(572~662°F) for 60 minutes before use.

Approval	I Current	I Basicity Index
	AC, DC +	3.1

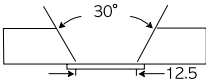
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
H-12K	0.09	0.30	1.50	0.018	0.010	AH36	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	PWHT condition	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th. (mm)
H-12K	540 (78,400)	80 (84,000)	32.0	-	-62 (-80)	168 (124)	AH36	25
	450 (45,300)	520 (75,500)	33.0	620°C × 1hr	-62 (-80)	180 (133)	AH36	25

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-12K	4.0	25		1~13	570	30	40	AWS A5.17

Applications

Multi-layer welding of various kinds of structure such as ship buildings, offshore structures, machinery and pressure vessels.

Characteristics on Usage

High-basic bonded type flux having excellent impact value at temperature below to -60 (-76°F) and good CTOD. Single and multi-electrode welding can be performed. Because of insensitivity to rust, scale, primer on the surface to be welded, it has excellent X-ray characteristics and slag removal.

Notes on Usage

① Dry the flux at 300~350°C (572~662°F) for 60 minutes before use.

Approval

KR, ABS, BV, DNV, GL, LR, NK, CCS (H-14)
ABS (H-14L)

I Current

AC, DC +

I Basicity Index

3.1

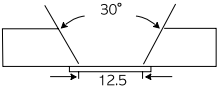
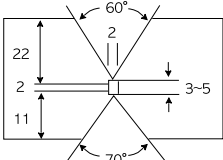
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
H-14	0.10	0.07	1.43	0.018	0.010	SS400	25
	0.06	0.13	1.37	0.016	0.007	SM490	39

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
H-14	470 (68,200)	560 (81,300)	26	-62 (-80)	130 (96)	SS400	25
	-	550 (76,800)	-	-40 (-40)	80 (59)	SM490	39
	-	-	-	-62 (-80)	50 (37)	-	-

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.0	25		1~13	570	30	40	AWS A5.17
H-14	4.0	39		1	500	28	35	} 1st
				2~7	600	32	30	
				8	500	28	35	} 2nd
				9~13	600	32	30	

Back Gouging

S-787TT × H-12K[H-14]

TYPE : Basic

AWS A5.17/ASME SFA5.17 F7A(P)8-EH12K

AWS A5.17/ASME SFA5.17 F7A(P)8-EH14

JIS Z3183 S502-H

Applications

Multi-layer welding of various kinds of structure such as ship buildings, offshore structures, machinery, pressure vessels, large diameter and heavy wall steel pipe.

Characteristics on Usage

It produces the weld metal which has excellent impact value at low temperature service. Single and multi electrode welding can be performed. It has excellent X-ray characteristics and slag removal, because of insensitivity to rust, scale, primer on the surface to be welded.

Notes on Usage

- ① Dry the flux at 300~350°C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval	I Current	I Basicity Index
	AC, DC +	2.4

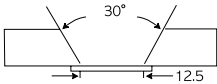
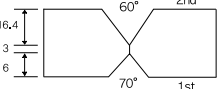
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
H-12K	0.10	0.31	1.33	0.019	0.007	SS400	25
H-12K	0.09	0.28	1.46	0.013	0.016	API 2H Gr.50	25.4
H-14	0.10	0.11	1.41	0.019	0.005	SS400	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	Position of fracture	CVN-Impact Value(J)		BM	Th. (mm)
	MPa(lbs/in ²)	MPa(lbs/in ²)	(%)		-50°C(-58° F)	-62°C(-80° F)		
H-12K	510 (74,000)	590 (85,600)	26	-	-	100 (74)	SS400	25
H-12K	-	560 (81,200)	-	BM	110 (81)	-	API 2H Gr.50	25.4
H-14	521 (75,600)	550 (79,800)	29	-	-	120 (89)	SS400	25

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-12K (H-14)	4.0	25		1~13	570	30	40	AWS A5.17
H-12K	L(DC+):4.0 T(AC) :4.0	25.4		1st	1	(L)580 (T)500	32	Both Side Multi-pass
				2		(L)750 (T)550	32	
				3-4		(L)700 (T)550	32	
							34	

Superflux55LP x H-14[A-3]

TYPE : Basic

AWS A5.17/ASME SFA5.17 F7A(P)8-EH14
JIS Z3183 S502-H

AWS A5.23/ASME SFA5.23 F8A6-EA3-A3
JIS Z3183 S584-H

Applications

Superflux 55LP x H-14 is multi-layer welding of various kinds of structure such as LPG ship buildings, offshore structures and pressure vessels.

Superflux 55LP x A-3 is single-layer welding of LPG ship buildings.

Characteristics on Usage

It produces the weld metal which has excellent impact value at low temperature down to -60°C and CTOD at temperature down to -10°C. As the hydrogen content of weld metal is low, it shows excellent resistance to crack. DC+ power source is recommendable in A-3 wire.

Notes on Usage

- ① Dry the flux at 300~350°C (572~662°F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval

ABS, DNV, BV, LR, GL

I Current

AC, DC +

I Basicity Index

2.5

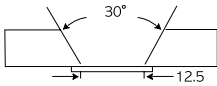
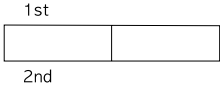
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	BM	Th.(mm)
H-14	0.10	0.15	1.45	0.020	0.005	-	SS400	25
A-3	0.08	0.15	1.40	0.018	0.005	0.48	SM570	25
A-3	0.06	0.25	1.40	0.015	0.006	0.17	FH36	13

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	Position of fracture	CVN-Impact Value(J)			BM	Th.(mm)
	MPa(lbs/in ²)	MPa(lbs/in ²)	(%)		-51°C(-60°F)	-55°C(-67°F)	-62°C(-80°F)		
H-14	495 (71,800)	560 (81,200)	29	-	-	-	150 (110)	SS400	25
A-3	611 (88,600)	660 (95,700)	26	-	90 (66)	-	-	SM570	25
A-3	-	520 (75,500)	-	B.M.	-	110 (81)	-	FH36	13

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14 (A-3)	4.0	25		1~13	570	30	40	AWS A5.17/ A5.23
A-3	4.0	13		1st 2nd	700 700	34 34	40 40	Both Side Single-pass (DC+)

SAW

Superflux800T×M-12K[A-2]

TYPE : Basic

AWS A5.17/ASME SFA5.17 F7A8-EM12K

AWS A5.23/ASME SFA5.23 F8A4-EA2-A3

Applications

Butt and flat welding of windmill tower, hydro plant penstocks and pressure vessels.

Characteristics on Usage

It provides good bead appearance, better slag removal and together high impact value of the weld metal. It is relatively insensitive to rust and dirt on a base metal, and makes better resistance to porkmasks and pits. High impact values in both multi-run and two-run technique.

As the consumption of flux is low, it is very economical.

Notes on Usage

- ① Dry the flux at 300~350°C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval	I Current	I Basicity Index
TUV, CE-Mark, DB(M-12K)	AC, DC +	2.4

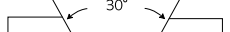
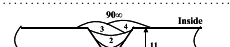
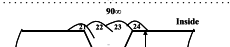
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	BM	Th.(mm)
M-12K	0.09	0.35	1.40	0.023	0.006	-	SM490	25
A-2	0.09	0.24	1.48	0.020	0.006	0.43	SM570	25
M-12K	0.10	0.35	1.40	0.020	0.007	-	S355NL	45

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	Position of fracture	CVN-ImpactValue(J)			BM	Th. (mm)
	MPa(lbs/in ²)	MPa(lbs/in ²)	(%)		-40°C (-40° F)	-50°C (-58° F)	-60°C (-76° F)		
M-12K	530 (76,700)	570 (82,700)	29	-	-	-	100 (74)	SM490	25
A-2	630 (91,400)	660 (95,700)	24	-	70 (52)	-	-	SM570	25
M-12K	-	550 (79,800)	-	BM	-	60 (44)	-	S355NL	45

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks	
M-12K (A-2)	4.0	25		1~13	570	30	40	AWS A5.17/ A5.23	
M-12K	40	18		In 1	550	28	40	Both Side Multi-pass	
				2~4	600	32	40		
				Out 5	650	34	40		
M-12K	4.0	45		In 1	600	30	40	Both Side Multi-pass	
				2~24	600~650	30~32	40~45		
				Sealing : SM-70(1.2mm)					
				25	650	30	40		
				26~27	650	32	35		

Superflux600 x H-14[A-3]

TYPE : Basic

AWS A5.17/ASME SFA5.17 F7A(P)6-EH14
JIS Z3183 S502-H

AWS A5.23/ASME SFA5.23 F8A(P)4-EA3-G
JIS Z3183 S584-H

Applications

Superflux 600 x H-14 is multi-layer welding of various kinds of structure such as HSB500 and SM490 etc.

Superflux 600 x A-3 is multi-layer welding of various kinds of structure such as HSB600 and SM570 etc.

Characteristics on Usage

It provides good bead appearance, better slag removal and together high impact value of the weld metal. It is relatively insensitive to rust and dirt on a base metal, and makes better resistance to porkmarks and pits. High impact values in both multi-run technique. As the consumption of flux is low, it is very economical.

Notes on Usage

- ① Dry the flux at 300~350°C (572~662°F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval

I Current

AC, DC +

I Basicity Index

1.9

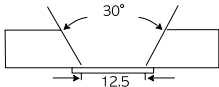
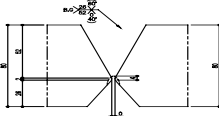
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	BM	Th.(mm)
H-14	0.08	0.20	1.50	0.020	0.006	-	SS400	25
A-3	0.07	0.21	1.45	0.018	0.006	0.45	SM570	25
A-3	0.05	0.28	1.50	0.017	0.003	0.42	HSB600	80

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	Position of fracture	CVN-Impact Value(J)			BM	Th.(mm)
	MPa(lbs/in ²)	MPa(lbs/in ²)	(%)		-20°C(-4°F)	-40°C(-40°F)	-51°C(-60°F)		
H-14	516 (74,800)	558 (80,900)	31	-	-	-	150 (111)	SS400	25
A-3	621 (90,100)	660 (95,700)	27	-	-	120 (89)	-	SM570	25
A-3	-	632 (91,700)	-	B.M.	100 (74)	-	-	HSB600	80

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14 (A-3)	4.0	25		1~13	570	30	40	AWS A5.17/ A5.23
A-3	4.8	80		1 2~18 19~26	500 550~650 500~650	28 28~32 28~32	40 18~40 20~40	Both Side Multi-pass

SAW

S-800MX×A-G[A-3]

TYPE : Acid

AWS A5.23/ASME SFA5.23 F8A0-EG-G
KS (JIS) B0531 (Z3183) S502-H

AWS A5.23/ASME SFA5.23 F8AZ-EA3-G
KS (JIS) B0531 (Z3183) S582-H

Applications

Single and multi-layer welding of bridges, H-beam and structural steels.

Characteristics on Usage

Especially insensitive to oil, rust, scale, dirt and primers on the surface to be welded.

Slag detachability in narrow groove and resistance to porosity are excellent.

Suitable for tandem welding of H-Beam.

As the consumption of flux is low, it is very economical.

Notes on Usage

- ① Dry the flux at 300–350°C(572–662°F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval	I Current	I Basicity Index
	AC, DC +	0.8

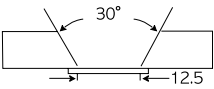
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	BM
A-G	0.09	0.40	1.20	0.025	0.010	-	SM520B
A-3	0.08	0.35	1.15	0.020	0.010	0.45	SM570

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs)		BM
				-5°C(23°F)	-18°C(-10°F)	
A-G	590 (85,600)	630 (91,400)	27	-	120 (89)	SM520B
A-3	650 (94,300)	690 (100,000)	25	80 (59)	-	SM570

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
A-G (A-3)	4.0	25		1~13	570	30	40	AWS A5.23

S-800P × M-12K[H-14]

TYPE : Basic

AWS A5.17/ASME SFA 5.17 F7A2-EM12K
JIS Z3183 S502-H

AWS A5.17/ASME SFA 5.17 F7A(P)6-EH14
JIS Z3183 S502-H

Applications

Butt and flat fillet welding of buildings, bridges and API Line-pipe.(longitudinal)

Characteristics on Usage

S-800P is a basic agglomerated, slightly Si-alloying flux for submerged arc welding, specially for single and multi-pass butt welding of mild, medium and high tensile steels.

It provides good bead appearance, better slag removal and high impact value of the weld metal together. It is relatively insensitive to rust and dirt on a base metal, and makes better resistance to pockmark and pit.

As the consumption of flux is low, it is very economical.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval

I Current

AC, DC +

I Basicity Index

1.9

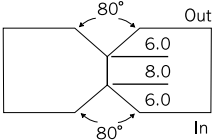
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S
M-12K	0.08	0.47	1.06	0.024	0.012
H-14	0.10	0.29	1.56	0.022	0.011

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	CVN-Impact Value J (ft · lbs)			
	MPa(lbs/in ²)	MPa(lbs/in ²)	(%)	-20°C(-4°F)	-30°C(-22°F)	-40°C(-40°F)	-50°C(-58°F)
M-12K	460 (66,800)	540 (78,400)	32.0	-	80 (59)	-	-
H-14	490 (71,100)	570 (82,800)	30.0	-	120 (88)	-	80 (59)

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
M-12K (H-14)	4.8	20		1st	800	34	40	Both Side Single-pass
				2nd	900	36	35	

S-800CM × B-2

TYPE : high Basic

AWS A5.23/ASME SFA5.23 F8P2-EB2-B2
EN 760 S A FB 1

Applications

S-800CM X B-2 is Single-layer welding of various kinds of structure such as 1.25%Cr-0.5% heat resistant steels used for boilers.

Characteristics on Usage

Especially insensitive to oil, rust, scale, and dirt on the surface to be welded. It produces the weld metal which has excellent impact value at low temperature service.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.
- ④ Preheat the thick plate according to rules if it has heavy restricted stress.

Approval	I Current	I Basicity Index
	DC+	3.2

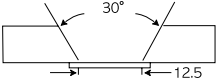
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Cr	Mo	BM	Th.(mm)
B-2	0.08	0.25	0.84	0.017	0.004	1.21	0.45	SM570	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
B-2	610 (88,500)	665 (96,400)	25.6	-29 (-20)	40 (34)	SM570	25

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
B-2	4.0	25		1~13	570	30	40	AWS A5.23

S-800P × A-G[A-3]

TYPE : Basic

AWS A5.23/ASME SFA5.23 F8A4-EG-G

JIS Z3183 S582-H

AWS A5.23/ASME SFA5.23 F8A4-EA3-G, F8P2-EA3-G

JIS Z3183 S584-H

Applications

Butt and flat fillet welding of buildings, bridges and API Line-pipe. (longitudinal)

Characteristics on Usage

S-800P is a basic agglomerated, slightly Si-alloying flux for submerged arc welding, specially for single and multi-pass butt welding of mild, medium and high tensile steels.

It provides good bead appearance, better slag removal and high impact value of the weld metal together.

It is relatively insensitive to rust and dirt on a base metal, and makes better resistance to pockmark and pits. As the consumption of flux is low, it is very economical.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval

I Current

AC, DC +

I Basicity Index

1.9

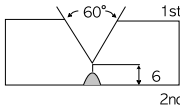
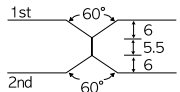
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo
A-G	0.09	0.30	1.57	0.019	0.008	-
A-3	0.08	0.32	1.54	0.022	0.010	0.40

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	CVN-Impact Value		
	MPa(lbs/in ²)	MPa(lbs/in ²)	(%)	-20° C (-4° F)	-30° C (-22° F)	-40° C (-40° F)
A-G	520 (75,500)	610 (88,500)	28.0	160 (118)	-	100 (74)
A-3	630 (91,500)	680 (98,700)	24.0	80 (59)	-	70 (52)

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
A-G	4.8	20		1st 1	600	30	40	Both Side Multi-pass
				2~4	600~650	30~32	30~35	
				Back Gouging				
				2nd 5	650	30	40	
				6	650	32	35	
A-3	L(DC+):4.0 T(AC):4.0	17.5		1st	(L)850 (T)650	34 40	120	Both Side Single-pass (tandem)
				2nd	(L)1000 (T)650	34 40	120	

S-800SP × M-12K[A-2]

TYPE : Basic

AWS A5.17/ASME SFA5.17 F7A4-EM12K
JIS Z3183 S502-H

AWS A5.23/ASME SFA5.23 F8A2-EA2-G
JIS Z3183 S582-H

Applications

Butt and flat fillet welding of buildings, bridges and API Line-pipe (Spiral, Longitudinal)

Characteristics on Usage

It provides good bead appearance, better slag removal and high impact value of the weld metal. It is relatively insensitive to rust and dirt on a base metal and makes better resistance to pockmark and pit.

High impact values in both multi-run and two-run technique.

As the consumption of flux is low, it is very economical.

Notes on Usage

- ① Dry the flux at 300~350°C for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval	I Current	I Basicity Index
	AC, DC +	1.5

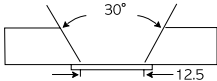
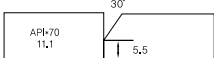
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	BM	Th.(mm)
M-12K	0.07	0.35	1.30	0.020	0.006	-	SS400	25
A-2	0.09	0.27	1.20	0.018	0.007	0.39	SM570	25
A-2	0.08	0.23	1.40	0.013	0.004	0.14	API 5L X65	11.1

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Position of fracture	CVN-Impact Value J(ft · lbs)			BM	Th. (mm)
					-20°C(-4°F)	-30°C(-22°F)	-40°C(-40°F)		
M-12K	505 (73,200)	587 (85,100)	28	-	-	-	70 (52)	SS400	25
A-2	580 (84,100)	654 (94,900)	26	-	-	80 (59)	-	SM570	25
A-2	-	590 (85,600)	-	BM	80 (59)	70 (52)	-	API 5L X65	11.1

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
M-12K (A-2)	4.0	25		1~13	570	30	40	AWS A5.17/ A5.23
A-2	L(DC+):4.0 T(AC):4.0	11.1		In side 1st Out side 2nd	(L)1050 (T)620 (L)1000 (T)660	34 40 34 40	200 200	Both Side Single-pass (tandem)

S-900SP × M-12K[A-2]

TYPE : Basic

AWS A5.17/ASME SFA5.17 F7A4-EM12K
JIS S502-H

AWS A5.23/ASME SFA5.23 F9A2-EA2-G
JIS S582-H

Applications

Butt and flat fillet welding of buildings, bridges and API Line-pipe (Longitudinal)

Characteristics on Usage

It provides good bead appearance, better slag removal and high impact value of the weld metal. It is relatively insensitive to rust and dirt on a base metal, and makes better resistance to pockmark and pit.

High impact values in both multi-run and two-run technique.

As the consumption of flux is low, it is very economical.

Notes on Usage

- ① Dry the flux at 300~350°C(572~662°F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Approval

I Current

AC, DC +

I Basicity Index

2.1

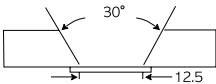
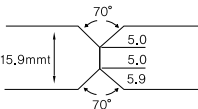
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	BM	Th.(mm)
M-12K	0.09	0.35	1.55	0.024	0.004	-	SS400	25
A-2	0.11	0.26	1.51	0.019	0.006	0.39	SM570	25
A-2	0.08	0.23	1.54	0.013	0.004	0.15	API 5L X70	15.9

Typical Mechanical Properties of All-Weld Metal

Wire	YS	TS	EL	Position of fracture	CVN-Impact Value J (ft · lbs)			BM	Th. (mm)
	MPa(lbs/in²)	MPa(lbs/in²)	(%)		-20°C(-4° F)	-30°C(-22° F)	-40°C(-40° F)		
M-12K	525 (76,100)	575 (83,400)	28	-	-	-	90 (66)	SS400	25
A-2	650 (94,300)	710 (103,000)	24	-	-	100 (73)	-	SM570	25
A-2	-	620 (89,900)	-	BM	110 (81)	-	-	API 5L X70	15.9

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
M-12K (A-2)	4.0	25		1~13	570	30	40	AWS A5.17/ A5.23
A-2	L(DC+):4.0 T(AC) :4.0	15.9		In side 1st Out side 2nd	(L)980 (T)800 (L)1000 (T)780	34 38 39 40	100 110	Both Side Single-pass (tandem)

SAW

S-460Y×H-14

TYPE : Basic

AWS A5.23/ASME SFA5.23 F8A8-EH14-G
KS(JIS) B0531(Z3183) S584-H
EN 760 - S A FB 1 / EN756 - S4

Applications

Multi-layer welding of high strength steels, such as EH47.

Characteristics on Usage

It produces the weld metal which has excellent impact value at low temperature service
Single and multi electrode welding can be performed. It has excellent X-ray characteristics and slag removal, because of insensitivity to rust, scale, primer on the surface to be welded.

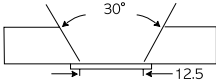
Notes on Usage

- ① Dry the flux at 300~350℃(572~662℉) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Use welding current and speed as low as possible at the first layer of groove to avoid cracking.
- ④ Preheat the thick plate according to rules if it has heavy restricted stress.

Approval	I Current	I Basicity Index
KR, ABS, LR, BV, DNV, GL, NK	AC, DC +	2.5

Typical Chemical Composition of All-Weld Metal (%)						
Wire	C	Si	Mn	P	S	BM
H-14	0.10	0.28	1.50	0.020	0.005	SM570

Typical Mechanical Properties of All-Weld Metal							
Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. ℃ (℉)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
H-14	610 (88,500)	640 (92,800)	27.0	-60 (-70)	100 (74)	SM570	25

Typical Welding Conditions								
Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.0	25		1~13	570	30	40	AWS A5.23

S-705EF×H-14

TYPE : High-Basic

Applications

One-side welding of ships, bridges and structural steels.

Characteristics on Usage

The usability with high heat input is suitable. As the deposition rate is high. It is very efficient. Suitable for one side welding of TMCP steel. Impact value of weld metal in the high heat input welding is high. Applicable to single or tandem electrode welding.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Add new flux periodically to prevent the weld defects and bad bead appearance which occurs when continuously reusing the flux.

Approval

KR, ABS, LR, BV, DNV, GL, NK

I Current

AC

I Basicity Index

4.5

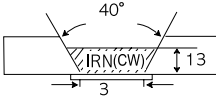
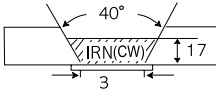
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	BM	Th.(mm)
H-14	0.10	0.20	1.23	0.017	0.011	0.80	AH36	15
	0.10	0.21	1.29	0.014	0.010	0.90	AH36	20

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
H-14	430 (62,400)	560 (81,300)	23	0 (32)	60 (44)	AH36	15
	400 (58,000)	550 (79,800)	23	0 (32)	60 (44)	AH36	20

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.8	15		1	900	35	22	
H-14	4.8	20		1	1000	36	20	

S-705HF × H-14

TYPE : High-Basic

Applications

One-side welding of ships, bridges and structural steels.

Characteristics on Usage

The usability with high heat input is good. As the deposition rate is high, it is very efficient.
Suitable for one side welding of TMCP steel.
Impact properties of weld metal in the high heat input welding are good.
Applicable to single or tandem electrode welding.

Notes on Usage

- ① Dry the flux at 300~350℃ (572~662℉) for 60 minutes before use.
- ② When the flux height is excessive, poor bead appearance may occur.
- ③ Add new flux periodically to prevent the weld defects and bad bead appearance which occurs when continuously reusing the flux.

Approval	I Current	I Basicity Index
KR, ABS, LR, BV, DNV, GL, NK	AC, DC +	4.2

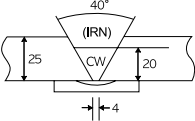
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	Mo	Ti	B	BM	Th.(mm)
	0.103	0.26	1.44	0.014	0.006	0.021	0.028	0.0045	EH36	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	Temp. ℃ (℉)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
H-14	509 (73,800)	618 (89,600)	22.6	-20(-4)	80(59)	EH36	25

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
H-14	4.8	25		1	1000	36	16	

Applications

High heat input welding of steel structures, box columns etc.

Characteristics on Usage

Because of the large amount of iron powder in flux, deposition rate is 1.3 times faster than existing flux. Suitable for high-heat input welding by tandem.

Stable arc at high current, low speed welding with good usability. Good bead appearance, easy slag removal.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② Excessive flux height may bring out poor bead appearance.

Approval

ABS

I Current

AC ,DC +

I Basicity Index

2.0

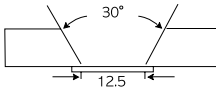
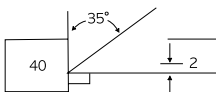
Typical Chemical Composition of All-Weld Metal (%)

Wire	C	Si	Mn	P	S	BM	Th.(mm)
L-8	0.07	0.27	1.25	0.025	0.020	SS400	25

Typical Mechanical Properties of All-Weld Metal

Wire	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	BM	Th.(mm)
L-8	480 (69,700)	520 (75,500)	31	-18 (0)	60 (44)	SS400	25
	450 (65,300)	520 (75,500)	33	0 (32)	50 (37)	SM490	40

Typical Welding Conditions

Wire	Dia. (mm)	Th. (mm)	Groove Design (mm)	Pass	Amp. (A)	Volt. (V)	Speed (cm/min)	Remarks
L-8	4.8	25		1~10	600	28	43	AWS A5.17
L-8	L(DC+):6.4 T(AC):6.4	40		1	L:1800 T:1350	38 42	20	

Applications

Welding of 18%Cr-8%Ni stainless steel.

Characteristics on Usage

Bonded type-flux containing appropriate contents of alloying element and weld metal contains proper contents of ferrite phase. Excellent resistance to crack, mechanical property and corrosion. Excellent weldability such as stable arc and easy slag removal. Good bead appearance, high welding efficiency in welding thin plate up to ultra-thick plate.

Notes on Usage

- ① Dry the flux at 300–350° C (572–662° F) for 1 hour before use.
- ② Avoid using high current to prevent harming of corrosion-resistibility in heat-affected zone.
Heat-input in welding should be kept as low as possible.
- ③ Welding in groove should be done in 2 passes to ease slag removal.

Approval	I Current	I Basicity Index
	AC, DC +	0.7

Typical Chemical Composition of All-Weld Metal (%)

Product Name	C	Si	Mn	Ni	Cr
YS-308	0.05	0.92	1.30	9.7	20.3
YS-308L	0.03	0.90	1.30	9.8	20.3

Typical Mechanical Properties of All-Weld Metal

Product Name	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
YS-308	610 (88,500)	40	-20 (-4)	70 (52)
YS-308L	600 (87,000)	42	-60 (-76)	40 (30)

Typical Welding Conditions

Wire Diameter mm (in)	3.2 (1/8)	4.0 (5/32)
Welding Current(A)	300–450	400–600
Welding Voltage(V)		30–36
Welding Speed(Cpm)		30–60

Applications

Welding of 22%Cr-12%Ni stainless steel and mild steel to stainless steel.

Characteristics on Usage

Bonded type-flux containing appropriate contents of alloying element, weld metal contains proper contents of ferrite phase. Excellent resistance to crack, mechanical property and corrosion. Excellent weldability such as stable arc and easy slag removal. Good bead appearance, high welding efficiency in welding thin plate up to ultra-thick plate.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 60 minutes before use.
- ② Avoid using high current to prevent harming of corrosion-resistibility in heat-affected zone, heat-input in welding should be kept as low as possible.
- ③ Welding in groove should be done in 2 passes to ease slag removal.

Approval

I Current

I Basicity Index

AC, DC +

0.7

Typical Chemical Composition of All-Weld Metal (%)

Product Name	C	Si	Mn	Ni	Cr
YS-309	0.05	0.91	1.40	12.5	22.6
YS-309L	0.03	0.93	1.40	12.8	22.5

Typical Mechanical Properties of All-Weld Metal

Product Name	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
YS-309	580 (84,200)	36	-20 (-4)	70 (52)
YS-309L	570 (82,700)	38	-60 (-76)	40 (30)
			-20 (-4)	80 (59)

Typical Welding Conditions

Wire Diameter mm (in)	3.2 (1/8)	4.0 (5/32)
Welding Current(A)	300~450	400~600
Welding Voltage(V)		30~36
Welding Speed(Cpm)		30~60

Applications

Welding of 18%Cr-12%Ni-2%Mo stainless steel.

Characteristics on Usage

Bonded type-flux containing appropriate contents of alloying element, weld metal contains proper contents of ferrite phase. Excellent resistance to crack, mechanical property and corrosion. Excellent weldability such as stable arc and easy slag removal. Good bead appearance, high welding efficiency in welding thin plate up to ultra-thick plate.

Notes on Usage

- ① Dry the flux at 300~350° C (572~662° F) for 1 hour before use.
- ② Avoid using high current to prevent harming of corrosion-resistibility in heat-affected zone.
Heat-input in welding should be kept as low as possible.
- ③ Welding in groove should be done in 2 passes to ease slag removal.

Approval	I Current	I Basicity Index
ABS, BV (YS-316L)	AC, DC +	0.7

Typical Chemical Composition of All-Weld Metal (%)

Product Name	C	Si	Mn	Ni	Cr	Mo
YS-316	0.05	0.90	1.40	12.2	19.3	2.1
YS-316L	0.03	0.90	1.40	12.1	19.2	2.1

Typical Mechanical Properties of All-Weld Metal

Product Name	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
YS-316	580 (84,200)	40	-20 (-4)	80 (59)
YS-316L	550 (79,800)	38	-20 (-4) -60 (-76)	70 (52) 50 (37)

Typical Welding Conditions

Wire Diameter mm (in)	3.2 (1/8)	4.0 (5/32)
Welding Current(A)	300~450	400~600
Welding Voltage(V)		30~36
Welding Speed(Cpm)		30~60

Applications

Used for welding of offshore oil/gas, chemical and petrochemical process industries, e.g. pipework systems, flowlines, risers, manifolds etc.

Characteristics on Usage

- ① Duplex stainless steel pipe, plate, fittings and forgings have an approximate 50:50 microstructure of austenite with a ferrite matrix.
- ② Superflux209 is a inert flux that composition of Si and Mn is hardly changed though welding condition is changed, and superflux209 is a high basicity flux (the basicity of superflux300 is 1.8).

Notes on Usage

- ① Dry the flux at 300~350°C (572~662°F) for 60 minutes before use.
- ② Preheat not generally required. Interpass temperature 100~150°C max, heat input in the range 1.0 ~ 1.5KJ/min-depending on material thickness.

Approval

DNV

I Current

DC +

I Basicity Index

1.8

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo	Nb	N
0.018	0.49	1.35	0.017	0.001	23.0	8.09	2.99	0.15	0.152

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft.lbs)
810 (117,500)	30	-20 (-4)	97 (72)
		-40 (-40)	90 (66)
		-60 (-76)	85 (63)

Typical Welding Conditions

Dia (mm)	Amp (A)	Vol (V)	Cpm (cm/min)	Remarks
2.4	275~325	28~30	30~60	-
3.2	350~400			
4.0	400~500			

GMAW SOLID WIRE & STAINLESS MIG WIRE



Applications

Butt and fillet welding of steel structures such as vehicles, machinery and bridges.

Characteristics on Usage

SM-70 is a solid wire designed for all position welding by short-circuiting type transfer. As the deposition efficiency is high and penetration is deep, highly efficient welding can be performed.

Notes on Usage

- ① Use with CO₂ /Argon+15~25% CO₂ gas.
- ② The Flow of quantity of shielding gas should be approximately 25ℓ /min.
- ③ Use wind screen against wind.
- ④ Keep distance between tip and base metal 6~15mm for less than 250A, and 15~25mm for more than 250A of welding current.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂/Ar+ CO₂

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S
0.07	0.83	1.48	0.017	0.020

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
430 (62,400)	540 (78,400)	28	-29 (-20)	70 (52)

Approval

KR, ABS, LR, BV, DNV, GL,
NK, CWB, TÜV

I Packing (Including Ball Pac)

Dia. (mm)	0.9	1.2	1.4	1.6	Spool(kg)	5	15	20
(in)	.035	.045	.052	1/16	(lbs)	11	33	44
Ball Pac								

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	0.9 (.035)	1.2 (.045)	1.6 (1/16)
F & HF	50~220	100~320	170~390
V-up,OH	50~140	50~140	-

Applications

Butt and fillet welding of steel structures such as vehicles, machinery and bridges.

Characteristics on Usage

SM-70 is a solid wire designed for all position welding by short-circuiting type transfer. As the deposition efficiency is high and penetration is deep, highly efficient welding can be performed.

Notes on Usage

- ① Use with CO₂ /Argon+15~25% CO₂ gas.
- ② The Flow of quantity of shielding gas should be approximately 25ℓ /min.
- ③ Use wind screen against wind.
- ④ Keep distance between tip and base metal 6~15mm for less than 250A, and 15~25mm for more than 250A of welding current.

Welding Position	Current	Shielding Gas
 1G 2F 3G 4G	DC +	CO ₂ /Ar+ CO ₂

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S
0.08	0.95	1.70	0.019	0.015

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. ℃ (°F)	CVN-Impact Value J (ft · lbs)
461 (66,900)	560 (81,200)	29	-29 (-20)	95 (55)

Approval	I Packing (Including Ball Pac)									
	Dia. (mm)	0.9	1.2	1.4	1.6	Spool(kg)	5	15	20	
	(in)	.035	.045	.052	1/16	(lbs)	11	33	44	
	Ball Pac									

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	0.9 (.035)	1.2 (.045)	1.6 (1/16)
F & HF	50~220	100~320	170~390
V-up,OH	50~140	50~140	-

Applications

Flat and horizontal fillet welding of construction machinery, structural steels, bridges, ships, vehicles, etc.

Characteristics on Usage

SM-70G is a solid MIG wire for flat and horizontal fillet welding and is to be used in a high current welding with CO₂ shielding gas. It benefits from a high deposition rate and excellent penetration. As this wire contains special elements, its weldability and impact values are excellent.

Notes on Usage

- ① Use with CO₂ gas.
- ② Flow quantity of shielding gas should be 25ℓ /min. approximately.
- ③ Use wind screen against wind.
- ④ Keep distance between tip and base metal of 6~15mm for less than 250A, and 15~25mm for more than 250A of welding current.

Welding Position



1G 2F

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ti
0.05	0.82	1.53	0.013	0.010	0.18

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. ℃ (°F)	CVN-Impact Value J (ft · lbs)
450 (65,300)	560 (81,200)	28	-29 (-20)	80 (59)

Approval

KR, ABS, LR, BV, DNV, GL,
NK,

I Packing (Including Ball Pac)

Dia. (mm) 0.9 1.2 1.4 1.6
(in) .035 .045 .052 1/16
Ball Pac

Spool(kg) 15 20
(lbs) 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.2 (.045) 200~350	1.4 (.052) 250~450	1.6 (1/16) 300~550
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Applications

Butt and fillet welding of vehicles, buildings, ships, machinery, etc.

Characteristics on Usage

SM-70S is a solid wire designed for all position welding and high speed welding of steel sheets can be performed easily by short-circuiting welding.
Arc is stable and spatter loss is low.

Notes on Usage

- ① Use with CO₂/Argon+15~25% CO₂ gas.
- ② Flow quantity of shielding gas should be 25ℓ /min. approximately.
- ③ Use wind screen against wind.
- ④ Keep the distance between tip and base metal of 6~15mm for less than 250A, and 15~25mm for more than 250A of welding current.

Welding Position	Current	Shielding Gas
    1G 2F 3G 4G	DC +	CO ₂ /Ar+ CO ₂

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S
0.07	0.65	1.14	0.015	0.010

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. ℃ (°F)	CVN-Impact Value J (ft · lbs)
440 (63,900)	560 (81,300)	28	-20 (-4)	80 (59)

Approval		I Packing (Including Ball Pac)							
ABS, LR, CWB	Dia. (mm)	0.9	1.2	1.4	1.6	Spool(kg)	15	20	
	(in)	.035	.045	.052	1/16				
	Ball Pac								
						(lbs)	33	44	

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	0.9 (.035)	1.2 (.045)	1.6 (1/16)
F & HF	50~200	80~350	170~390
V-up,OH	50~140	50~160	-

Applications

Butt and fillet welding of ships, steel structures and machinery.

Characteristics on Usage

SM-70GS is a solid wire for flat and fillet welding and is to be used with a high current welding with Ar+CO₂ mixed gas.

As this wire contains special elements, its weldability and impact values are excellent.

Notes on Usage

- ① Use with Ar+15~20% CO₂ gas.
- ② Flow quantity of shielding gas should be 25ℓ /min. approximately.
- ③ Use wind screen against wind.

Welding Position



1G 2F

Current

DC +

Shielding Gas

Ar+CO₂

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ti
0.06	0.62	1.21	0.015	0.006	0.10

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
480 (69,700)	550 (79,800)	28	-20 (-4)	90 (66)

Approval

I Packing (Including Ball Pac)

LR	Dia. (mm)	1.2	1.4	1.6	Spool(kg) (lbs)	15	20
	(in)	.045	.052	1/16		33	44
	Ball Pac						

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.2 (.045) 80~300	1.4 (.052) 150~350	1.6 (1/16) 200~390
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Applications

Flat and horizontal fillet welding of construction machinery, structural steels, bridges, ships and vehicles.

Characteristics on Usage

SM-55H is a solid wire for flat and horizontal fillet welding and is to be used in high current welding with CO₂ shielding gas.

It benefits from a high deposition rate and excellent penetration.

As this wire contains special elements, its weldability and impact values are excellent.

Notes on Usage

- ① Use with CO₂ gas.
- ② Shielding gas flow rate should be 25ℓ /min.
- ③ Use wind screen against wind.
- ④ Keep distance between tip and base metal of 6~15mm for less than 250A, and 15~25mm for more than 250A of welding current.

Welding Position



1G 2F

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ti
0.07	0.89	1.95	0.016	0.007	0.18

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
550 (79,800)	630 (91,500)	28	0 (32)	110 (81)

Approval

I Packing (Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	15	20
(in)	.045	.052	1/16	(lbs)	33	44
Ball Pac						

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	200~350	250~450	300~550

Applications

Butt and fillet welding of steel structures and using 550MPa or 600MPa tensile steels such as construction machinery, buildings and pressure vessels.

Characteristics on Usage

SM-80G is a solid wire for flat and horizontal fillet welding position. As the deposition rate is very high, highly efficient welding can be performed.

As the wire contains special elements, its bead appearance is excellent.

Notes on Usage

- ① Use with CO₂ gas.
- ② Flow quantity of shielding gas should be 25ℓ /min. approximately.
- ③ Use wind screen against wind.
- ④ Keep distance between tip and base metal of 6~15mm for less than 250A, and 15~25mm for more than 250A of welding current.

Welding Position



1G 2F

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Mo	Ti
0.06	0.81	1.85	0.018	0.007	0.27	0.15

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. ℃ (°F)	CVN-Impact Value J (ft · lbs)
580 (84,200)	660 (95,800)	24	-20 (-4)	120 (88)

Approval

I Packing (Including Ball Pac)

ABS	Dia. (mm)	1.2	1.4	1.6	Spool(kg) (lbs)	15	20
	(in)	.045	.052	1/16		33	44
	Ball Pac						

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.2 (.045) 200~350	1.4 (.052) 280~500	1.6 (1/16) 300~550
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Applications

All position welding of Industrial machine tools, pressure vessels, boiler structures and ocean structures.

Characteristics on Usage

- ① MIG welding for boiler steam pipe of Steam power generation and 1.0~1.25%Cr-0.5%Mo heat resisting steel using for refining oil & chemical industrial machine tool.
- ② Excellent TS and Impact value in a high temperature after heat treatment.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Cr	Mo
0.09	0.67	1.02	1.19	0.45

Typical Mechanical Properties of All-Weld Metal

Type	TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs)		PWHT
			-0°C (32°F)	-20°C (-4°F)	
SM-80CM	630 (91,500)	27	140 (103)	120 (88)	690°C - 1Hr
ST-80CM	630 (91,500)	28	290 (215)	280 (207)	

Typical Welding Conditions (GMAW: DC+(Pulse), GTAW: DC -)

Type	Dia (mm)	Amp (A)	Vol (V)	Cpm (cm/min)	Gas Flow (ℓ /min)	Shielding Gas
SM-80CM	1.2	250	26	30	25	100% Ar or Ar +2% O ₂
	1.6	300	29	35		

Type	Dia (mm)	Tungsten (mm)	Amp (A)	Gas Flow (ℓ /min)	Shielding Gas
ST-80CM	1.0~2.0	1.4	50~100	25	Ar
	1.6~3.2	2.4	100~200		
	2.4~3.2	3.2	200~300		
	3.2	4.0	300~400		

Applications

SM-100 is a 0.3Cr-1.7Ni-0.25Mo-alloyed, bare, solid wire for the GMAW of high strength steels with low-temperature impact toughness requirements.

Characteristics on Usage

Characteristic features include excellent start properties, trouble-free feeding at high wire speeds and lengthy feed distances, a very stable arc at high welding currents, extremely low levels of spatter, low fume emission, reduced contact tip wear and improved protection against corrosion of the wire.

Notes on Usage

- ① Use with 100%Ar or Ar+2~20%CO₂ gas.
- ② Flow quantity of shielding gas should be 25ℓ /min. approximately.
- ③ Use the wind-screen against wind.

GMAW

Shielding Gas

Ar + CO₂ (M21)

Current

Pulse

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Cr	Ni	Mo	V	Fe
0.081	0.48	1.76	0.014	0.012	0.28	1.76	0.23	0.09	Rem.

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
670 (97,300)	800 (116,000)	17.2	-20 (-4) -40 (-40)	42 (31) 40 (30)

Approval

I Packing (Including Ball Pac)

Dia. (mm)	1.2	1.6	Spool(kg)	5	12.5	15
(in)	.045	1/16	(lbs)	11	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)
F & HF	170 ~ 270

Applications

SM-110 is a 0.3Cr-1.9Ni-0.5Mo-alloyed, bare, solid wire for the GMAW of high strength steels with low-temperature impact toughness requirements.

Characteristics on Usage

Characteristic features include excellent start properties, trouble-free feeding at high wire speeds and lengthy feed distances, a very stable arc at high welding currents; extremely low levels of spatter, low fume emission, reduced contact tip wear and improved protection against corrosion of the wire.

Notes on Usage

- ① Use with 100%Ar or Ar+2~20%CO₂ gas.
- ② Flow quantity of shielding gas should be 25ℓ /min. approximately.
- ③ Use the wind-screen against wind.

Shielding Gas

Ar + CO₂ (M21)

Current

Pulse

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Cr	Ni	Mo
0.089	0.75	1.83	0.015	0.012	0.3	1.90	0.52

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. ℃ (°F)	CVN-Impact Value J (ft · lbs)
700 (103,000)	887 (128,700)	19.4	-40 (-40)	82 (60)
			-60 (-76)	69 (51)

Approval

I Packing (Including Ball Pac)

Dia. (mm)	1.2	1.6	Spool(kg)	5	12.5	15
(in)	.045	1/16	(lbs)	11	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)
F & HF	170 ~ 270

Applications

- ① Used for welding of austenite type STS 304 and high Mn steels.
- ② Used for joining dissimilar combinations of STS steels and carbon steels.

Characteristics on Usage

- ① Though SM-307Si is a austenite type stainless wire, the weld metal contains ferrite and resistance to crack is extremely good. The usability, such as arc stability and assimilability of welds to base metal is extremely good.
- ② Resistance to corrosion and the mechanical properties of the weld metal are good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Cr	Ni	Mo
0.08	0.87	7.17	19.6	9.3	0.12

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs) -0°C (32°F) -20°C (-4°F)		PWHT
610 (88,600)	42	83 (63)	59 (43)	690°C - 1Hr

Typical Welding Conditions (Pulse)

Dia (mm)	Amp (A)	Vol (V)	Cpm (cm/min)	Gas Flow (ℓ /min)	Shielding Gas
1.2	250	26	30	25	100% Ar or Ar +2%O ₂
1.6	300	29	35		

Applications

MIG welding of 18%Cr-8%Ni steel for chemical industries such as oil, medical, fertilizer and textile industries and for nuclear reactors.

Characteristics on Usage

Though SM-308 is austenitic type stainless steel wire, the weld metal contains ferrite and resistance to crack is extremely good. The usability, such as arc stability and assimilability of welds to base metal is extremely good.

Resistance to corrosion and the mechanical properties of the weld metal are good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.04	0.41	1.65	9.8	19.9

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs)	
		0°C (32°F)	-20°C (-4°F)
590 (85,600)	40	100 (74)	50 (37)

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	260	27	30	25	Shielding gas
1.6 (1/16)	300	29	34	25	100%Ar or Ar+2%O ₂

Applications

MIG welding of low carbon 18%Cr-8%Ni steel for chemical industries such as oil, medical, fertilizer and textile industries and for nuclear reactors.

Characteristics on Usage

Though SM-308L is austenitic type stainless steel wire, the weld metal contains ferrite and resistance to crack is extremely good. The usability, such as arc stability and assimilability of welds to base metal is extremely good.

Resistance to corrosion and the mechanical properties of the weld metal are good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.02	0.35	1.60	10.1	19.9

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs)	
		0°C(32°F)	-20°C (-4°F)
560 (81,300)	42	90 (66)	50 (37)

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	260	27	30	25	Shielding gas
1.6 (1/16)	300	29	34	25	100%Ar or Ar+2%O ₂

Applications

MIG welding of low carbon 18%Cr-8%Ni steel for chemical industries such as oil, medical, fertilizer and textile industries and for nuclear reactors.

Characteristics on Usage

SM-308LSi is an austenitic type stainless steel wire, the weld metal contains ferrite and crack sensitivity is extremely good. The Usability, such as arc stability and assimilability of welds to base metal is extremely excellent.
Resistance to corrosion and mechanical properties of weld metal are great.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.027	0.79	1.96	10.02	20.78	0.1

Typical Mechanical properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
610 (88,500)	40.4

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2	250	26	30	25	100%Ar or
1.6	300	29	35		Ar+2~5%O ₂

Applications

MIG welding of 22%Cr-12%Ni steel, heat resistant cast steel clad side of 18%Cr-8%Ni clad steel and stainless steel to Cr-Mo steel or carbon steel.

Characteristics on Usage

As the weld metal contains ferrite, its crack resistibility is good.
Due to its high level of alloy, it has excellent resistance to heat.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.09	0.39	1.60	12.8	23.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
660 (95,700)	36

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	290	28	34	25	100%Ar or Ar+2%O ₂

Approval

ABS

Applications

MIG welding of 22%Cr-12%Ni steel, heat resistant cast steel clad side of 18%Cr-8%Ni clad steel and stainless steel to Cr-Mo steel or carbon steel.

Characteristics on Usage

As the weld metal contains ferrite, its resistance to crack is good.

Due to its high level of alloy, it has excellent heat resistance.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.03	0.41	1.58	12.8	23.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
640 (92,900)	38

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	290	28	34	25	100%Ar or Ar+2%O ₂

Applications

MIG welding of 22%Cr-12%Ni steel, heat resistant cast steel clad side of 18%Cr-8%Ni clad steel and stainless steel to Cr-Mo steel or carbon steel.

Characteristics on Usage

SM-309LSi is an austenitic type stainless steel wire, the weld metal contains ferrite and crack sensitivity is extremely good. The Usability, such as arc stability and assimilability of welds to base metal is extremely excellent. The high silicon content of wire improves the welding properties, such as arc stability and bead wetting. Resistance to corrosion and mechanical properties of weld metal are great.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.022	0.79	1.61	13.97	24.11	0.1

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
571 (82,800)	40.2

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas 100%Ar or Ar+2%O ₂
1.6 (1/16)	300	29	35		

Applications

Mig Welding of dissimilar metals such as stainless steels and carbon steels

Characteristics on Usage

This wire contains a high ferrite level in its austenitic structure thus providing superior heat and corrosion resistance. SM-309MoL is suitable for the build up on low alloy or mild steel and welding of STS 316, 316L clad steel

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.01	0.35	1.8	13.7	23.2	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)
660 (95,700)	34

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	300	29	35	25	100%Ar or Ar+2%O ₂

Applications

MIG welding of 25%Cr-20%Ni stainless steel, welding on the clad side of stainless clad steel.

Welding of dissimilar metals.

Characteristics on Usage

SM-310 has full austenitic structure.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.09	0.35	1.90	20.9	26.8

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
610 (88,500)	40

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	300	29	35	25	100%Ar or Ar+2%O ₂

Applications

Mig Welding of 29%Cr-9%Ni stainless steel and dissimilar metals

Characteristics on Usage

Due to high Cr content, it has excellent resistance to corrosion.
This wire contains a high ferrite level in its austenitic structure thus providing better crack resistance.
SM-312 is suitable for the welding of dissimilar metal such as stainless steels, mild steels and low alloy and used build up of hardfacing.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.10	0.38	1.68	8.8	30.0

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)
720 (104,400)	32

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	300	29	35	25	100%Ar or Ar+2%O ₂

Applications

MIG welding of 18%Cr-12%Ni-2%Mo stainless steel for chemical industries and nuclear reactors.

Characteristics on Usage

Though SM-316 is austenitic type stainless steel wire, the weld metal contains ferrite and resistance to crack is quite good.

The usability, such as arc stability and assimilability of welds to base metal is good.

Resistance to corrosion and heat is quite good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.06	0.40	1.71	12.6	19.4	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
580 (84,100)	39

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	300	29	35	25	100%Ar or Ar+2%O ₂

Applications

MIG welding of low carbon 18%Cr-12%Ni-2%Mo stainless steel for chemical industries and nuclear reactors.

Characteristics on Usage

Though SM-316L is austenitic type stainless steel wire, the weld metal contains ferrite and resistance to crack is quite good.
The usability, such as, arc stability and assimilability of welds to base metal is good.
Resistance to corrosion and heat is quite good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.02	0.39	1.69	12.8	19.5	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)
570 (82,700)	39

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	300	29	35	25	100%Ar or Ar+2%O₂

Approval

ABS

Applications

MIG welding of low carbon 18%Cr-12%Ni-2% Mo steel for chemical industries and nuclear reactors.

Characteristics on Usage

SM-316LSi is an austenitic type stainless steel wire , the weld metal contains ferrite and crack sensitivity is extremely good. The Usability, such as arc stability and assimilability of welds to base metal is extremely excellent. The high silicon content of wire improves the welding properties, such as arc stability and bead wetting. Resistance to corrosion and mechanical properties of weld metal are great.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.030	0.65	2.36	11.62	19.76	2.50

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
597 (86,600)	37

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas 100%Ar or Ar+2%O ₂
1.6 (1/16)	300	29	35		

Applications

Mig Welding of 18%Cr-8%Ni-Nb(STS 347) and 18%Cr-8%Ni-Ti(STS 321) stainless steel

Characteristics on Usage

As the weld metal contains ferrite, its resistance to crack is good.
SM-347 has stabilizing element (Nb) thus providing good intergranular corrosion resistance and better heat resistance.
Due to high creep strength at high temperature, suitable for the welding of boiler and gas turbine.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Nb
0.05	0.43	1.66	9.6	20.0	0.7

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
680 (98,600)	30

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	300	29	35	25	100%Ar or Ar+2%O ₂

Applications

- ① Used for welding of 22%Cr-5%Ni-2%Mo-0.15%N STS steel.
- ② Used for welding of offshore oil/gas, chemical and petrochemical process industries, e.g. pipework systems, flowlines, risers, manifolds etc.

Characteristics on Usage

- ① Duplex stainless steel pipes, plates, fittings and forgings have an approximate 50:50 microstructure of austenite with a ferrite matrix.
- ② Preheat not generally required. Interpass temperature 100 ~ 150°C max, heat input in the range 1.0 ~ 1.5KJ/min - depending on material thickness.
- ③ Good general corrosion resistance in a range of environments.
- ④ High resistance to chloride induced stress corrosion cracking (CSCC).

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.01	0.41	1.70	8.9	23.4	3.2

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs) 0°C (32°F)	PREN
784 (113,700)	30	-20 (-4)	83	35

Ferrite Contents of All-Weld Metal (Shielding gas : 100%Ar)

	WRC-1992	Shaeffler Diagram(%)
As welded	40.8	46.4

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	300	29	35	25	100%Ar or Ar+2%O ₂

Applications

Mig Welding of 13%Cr stainless steel (STS 403, STS 410)

Characteristics on Usage

Structure of all-weld metal is martensite having magnetic properties thus providing high hardness, good anti-abrasive property.

Due to excellent resistance to corrosion and abrasion, It can be used to hardfacing application.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.10	0.38	0.34	0.17	12.0

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
540 (78,300)	35

Typical Welding Conditions (DC+)

Size mm(in)	A	V	Speed (cm/min.)	Gas Flow (ℓ /min.)	Remarks
1.2 (.045)	250	26	30	25	Shielding gas
1.6 (1/16)	300	29	35	25	100%Ar or Ar+2%O ₂

Applications

- ① SM-430LNb is a Mig wire for horizontal, fillet and flat position welding of 429 and 444 type stainless steels.
- ② Mainly used for automotive exhaust applications, especially for manifolds and catalytic converter canning.

Characteristics on Usage

- ① This wire gives excellent bead appearance and provides the operator with a soft stable arc and low spatter levels thus giving enhanced appearance.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Cr	Ni	Nb
0.01	0.41	0.33	18.4	0.27	0.45

Typical Welding Conditions (Pulse)

Dia (mm)	Amp (A)	Vol (V)	Cpm (cm/min)	Gas Flow (ℓ /min)	Shielding Gas
1.2	250	26	30	25	100% Ar or
1.6	300	29	35		Ar +2%O ₂

GTAW TIG ROD



Applications

Butt and fillet welding of carbon steel for pressure vessels, tubes for nuclear reactors, ships, penstock and aluminum-killed steel for low temperature service.

Characteristics on Usage

ST-50 G is a wire for TIG welding with pure Ar gas.

All position welding and steel sheet welding can be performed quite easily.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Shielding Gas
0.07	0.83	1.43	Ar

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J(ft.lbs) -20°C (-4°F)
460 (66,700)	530 (76,900)	27	170 (125)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

KR, ABS, DNV, LR, NK, BV, GL

Applications

Butt and fillet welding of carbon steel for pressure vessels, tubes for nuclear reactors, ships, penstock and aluminum-killed steel for low temperature service.

Characteristics on Usage

ST-50 · 6 is a wire for TIG welding with pure Ar gas.
All position welding and steel sheet welding can be performed quite easily.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Shielding Gas
0.07	0.85	1.50	Ar

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	CVN-Impact Value J(ft.lbs) -20°C (-4°F)
450 (65,300)	520 (75,500)	28	180 (132)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

ABS

Applications

Butt and fillet welding of carbon steel for pressure vessels, tubes for nuclear reactors, ships, penstock and aluminum-killed steel for low temperature service.

Characteristics on Usage

ST-50.3 is a wire for TIG welding with pure Ar gas.

All position welding and steel sheet welding can be performed quite easily.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Shielding Gas
0.07	0.65	1.15	Ar

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J(ft.lbs) -20°C (-4°F)
495 (71,800)	565 (81,950)	26	170 (125)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Applications

Oil and gas industry, Offshore industry, Power plant Petro chemical industry and oil pipes.

Characteristics on Usage

- ① As ST-1N contains 1% Ni, its impact value in low temperature is good.
- ② Both its bead apperarance and weldability are excellent.
- ③ ST-1N is designed for welding of back bead of pipes.
- ④ ST-1N meets NACE Standard.

Shielding Gas	Welding Current
Ar	GTAW: DC-

Typical Chemical Composition of Wire (%)						
C	Si	Mn	P	S	Ni	Cu
0.082	0.62	1.15	0.011	0.010	0.87	0.08

Typical Mechanical Properties of All-Weld Metal				
PWHT	YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	CVN-Impact Value J(ft.lbs) -45℃
As Weld	594 (86,000)	671 (97,300)	32.3	59
PWHT	568 (82,400)	645 (93,500)	34.0	108

Approval	Packing		
ABS	Size (mm)	2.0	2.4 3.2
	Weight	5kg* 900mm	

Applications

TIG welding of 18%-8%Ni stainless steel.

Characteristics on Usage

ST-308 is a filler rod for TIG welding with pure Ar gas.

As the weld metal contains ferrite, its crack resistibility is excellent.

Both its bead appearance and weldability are good.

Furthermore, resistance to corrosion and mechanical properties is good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.05	0.38	1.75	10.1	19.8

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J(ft.lbs) 0°C (32°F)
610 (88,500)	40	130 (95)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

KR, ABS, DNV

Applications

TIG welding of extra-low carbon 18%Cr-18%Ni and 18%Cr-8%Ni stainless steel.

Characteristics on Usage

ST-308L is a filler rod for TIG welding with pure Ar gas.
As the weld metal contains ferrite, its crack resistibility is excellent.
Both its bead appearance and weldability are good.
The corrosion resistibility and intergranular corrosion, resistibility are extremely excellent.
Furthermore, resistance to corrosion and mechanical properties are good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.02	0.36	1.70	10.3	20.0

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J(ft.lbs) 0°C (32°F)
600 (87,000)	41	110 (81)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

KR, ABS, DNV, LR, NK, BV, CCS

Applications

TIG welding of 22%Cr-12%Ni steel and a variety welding stainless with mild steel.
Clad steel side of 18%Cr-8%Ni clad steel.

Characteristics on Usage

ST-309 is a filler rod for TIG welding with pure Ar gas.
As the weld metal contains ferrite, its crack resistibility is excellent.
Furthermore, resistance to corrosion and heat is extremely good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.07	0.38	1.88	12.8	24.4

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J(ft.lbs) 0°C (32°F)
620 (90,000)	38	130 (96)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

ABS

Applications

TIG welding of low carbon 22%Cr-12%Ni steel and a dissimilar metals.
Clad side of 18%Cr-8%Ni clad steel.

Characteristics on Usage

ST-309L is a filler rod for TIG welding with pure Ar gas.
As the weld metal contains ferrite, its crack resistibility is excellent.
Furthermore, resistance to corrosion and heat is extremely good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.03	0.40	1.74	12.6	24.2

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J(ft.lbs) 0°C (32°F)
600 (87,000)	38	150 (110)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

ABS, DNV, LR, NK, BV, CCS

Applications

TIG Welding of dissimilar metals such as stainless steels and carbon steels.

Characteristics on Usage

This wire contains a high ferrite level in its austenitic structure thus providing superior heat and corrosion resistance.

ST-309MoL is suitable for the build up on low alloy or mild steel and welding of STS 316, 316L clad steel.

Both bead appearance and weldability are good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.02	0.35	1.8	13.7	23.2	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
650 (94,200)	32

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100		
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Applications

TIG welding of 25%Cr-20%Ni steel.

Characteristics on Usage

ST-310 is a filler rod for TIG welding with pure Ar gas.
The structure of the weld metal is all austenite.
Resistance to corrosion and heat of weld metal is excellent.
Elongation of weld metal is extremely good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.09	0.35	1.90	20.9	26.8

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J(ft.lbs) 0°C (32°F)
610 (88,500)	41	110 (81)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Applications

TIG Welding of 29%Cr-9%Ni stainless steel and dissimilar metals.

Characteristics on Usage

Due to high Cr content, it has excellent resistance to corrosion.

This wire contains a high ferrite level in its austenitic structure thus providing better crack resistance.

ST-312 is suitable for the welding of dissimilar metal such as stainless steels, mild steels and low alloy.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.10	0.38	1.68	8.8	30.0

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
770 (111,600)	27

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Applications

TIG welding of low carbon 18%Cr-12%Ni-2%Mo.

Characteristics on Usage

ST-316 is a filler rod for TIG welding with pure Ar gas.
As the weld metal contains ferrite, its crack resistibility is excellent.
Both bead appearance and weldability are good.
Resistance to corrosion and heat is extremely good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.05	0.41	1.82	12.5	18.9	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)	CVN-Impact Value J(ft.lbs) 0°C (32°F)
590 (85,600)	41	130 (95)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

ABS

Applications

TIG welding of low carbon 18%Cr-12%Ni-2%Mo steel.

Characteristics on Usage

ST-316L is a filler rod for TIG welding with pure Ar gas.

As the weld metal contains ferrite, its crack resistibility is excellent.

Both its bead appearance and weldability are good.

Resistance to corrosion and heat is extremely good.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.02	0.38	1.85	12.4	18.8	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J(ft.lbs) 0°C (32°F)
570 (82,700)	44	140 (103)

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

KR, ABS, DNV, GL, LR, NK, BV, CCS

Applications

TIG Welding of 18%Cr-8%Ni-Nb(SUS 347) and 18%Cr-8%Ni-Ti(SUS321) stainless steel

Characteristics on Usage

As the weld metal contains ferrite, its resistance to crack is good.

Bead appearance and weldability are good.

ST-347 has stabilizing element (Nb) thus providing good intergranular corrosion resistance and better heat resistance.

Due to high creep strength at high temperature, suitable for the welding of boiler and gas turbine.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Nb
0.05	0.43	1.66	9.6	20.0	0.7

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
680 (98,600)	32

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Applications

- ① Used for welding of 22%Cr-5%Ni-2%Mo-0.15%N STS steel.
- ② Used for welding of offshore oil/gas, chemical and petrochemical process industries, e.g. pipework systems, flowlines, risers, manifolds etc.

Characteristics on Usage

- ① Duplex stainless steel pipes, plates, fittings and forgings have an approximate 50:50 microstructure of austenite with a ferrite matrix.
- ② Preheat not generally required. Interpass temperature 100 ~ 150°C max, heat input in the range 0.5 ~ 1.5KJ/min - depending on material thickness.
- ③ Good general corrosion resistance in a range of environments.
- ④ High resistance to chloride induced stress corrosion cracking (CSCC).

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr	Mo
0.01	0.41	1.70	8.9	23.4	3.2

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	PREN
810 (116,700)	27	-20 (-4)	195	35

Ferrite Contents of All-Weld Metal(Shielding gas : 100%Ar)

	WRC-1992 (FN)	Shaeffler Diagram(%)
As welded	66	55

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

LR, DNV

Applications

- ① used for welding of 25%Cr-7%Ni-4.5%Mo-0.25%N Super Duplex steel.
- ② used for welding of Petochemical plants, offshore structures and FPSO.

Characteristics on Usage

- ① Weld metal has 30~60% ferrite contents
- ② Due to the high chromium contents, corrosion resistance is excellent in most environments(chloride enviroment)
- ③ Superior pitting resistance(PREN ≥ 40)

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	N
0.011	0.41	0.53	0.019	0.001	25.27	9.13	3.86	0.21	0.257

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs) 0°C (32°F)	PREN
890 (129,000)	28.6	-50 (-58)	195	40

Ferrite Contents of All-Weld Metal(Shielding gas : 100%Ar)

	WRC-1992 (FN)	Shaeffler Diagram(%)
As welded	66.9	80.3

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

Approval

I Packing

ABS

Applications

Used for welding of 20%Cr-25%Ni-4.5%Mo-1.5%Cu STS Steels.

Characteristics on Usage

- ① SMT-904L has a fully austenitic stucture.
- ② Good general corrosion resistance, especially for sulphuric acid and phosphoric acid.
- ③ Preferably keep Heat input below 1.5KJ/mm.

Shielding Gas | Welding Current

Ar, Ar+He GMAW: DC+(Pulse) GTAW : DC-

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu
0.013	0.31	1.89	0.013	0.001	24.96	20.52	4.32	1.42

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	CVN-Impact Value J(ft.lbs) +20°C	-196°C
490 (71,000)	650 (94,300)	35.0	110	70

Approval | Packing

SMT-904L	Size(mm)	1.0	1.2	1.6
	Weight	Spool : 12.5kg		
SMT-904L	Size(mm)	2.0	2.4	3.2
	Weight	5kg* 1,000mm		

GTAW

Applications

TIG Welding of 13%Cr stainless steel (STS 403, STS 410)

Characteristics on Usage

Structure of all-weld metal is martensite having magnetic properties thus providing high hardness, good anti-abrasive property. Both bead appearance and weldability are good.
Due to high hardness of all-weld metal and excellent resistance to corrosion and abrasion, it can be used to hardfacing of carbon steels and 13%Cr stainless steels application.

Typical Chemical Composition of Wire (%)

C	Si	Mn	Ni	Cr
0.10	0.38	0.34	0.17	12.0

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J(ft.lbs) 0°C (32°F)
530 (76,800)	37	-

Typical Welding Conditions (DC-)

Size mm(in)	Currents A	Gas Flow (ℓ /min.)	Shielding gas
1.2 (.045) ~ 2.0 (5/64)	50 ~ 100	25	Ar
1.6 (1/16) ~ 3.2 (1/8)	100 ~ 200		
2.4 (3/32) ~ 3.2 (1/8)	200 ~ 300		
3.2 (1/8)	300 ~ 400		

FCAW FLUX CORED WIRE



Applications

All position welding of building, shipbuilding, bridges, machinery and vehicles.

Characteristics on Usage

SF-71 is a titania type flux cored wire for all position welding with CO₂. Compared with solid wire, spatter loss is low, bead appearance is beautiful and arc is soft with good stability.

Slag covering is uniform with good removal.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas

Welding Position(All-Position)



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.04	0.49	1.29	0.010	0.009

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
548 (79,600)	582 (84,500)	28	0 (32)	86 (64)

Approval

KR, ABS, LR, BV, DNV, GL,
NK, TÜV, CWB, CE, CCS,
CRS

I Packing(Including Ball Pac)

Dia. (mm)	1.0	1.2	1.4	1.6	Spoo (kg)	5	12.5	15	20
(in)	.039	.045	.052	1/16	(lbs)	11	28	33	44
Ball Pac									

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	120~300	200~350	200~400
V-up, OH	120~260	180~280	180~280
V-down	200~300	220~320	250~300

Applications

All position welding in shipbuilding, machinery, bridges, buildings, vehicles using mild and higher strength steels.

Characteristics on Usage

SF-71LF is the most widely used titania type flux cored wire for all position welding with CO₂ shielding gas. As deposition rate is higher than solid wire and manual metal arc electrode, highly efficient welding can be performed.

Arc stability is excellent. Spatter loss is low and slag covering is uniform with good removability. Fume generation is lower than conventional flux cored wires.

SF-71LF is effective for use in insufficient ventilation areas.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position(All-Position)



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.03	0.50	1.45	0.009	0.011

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
550 (79,900)	590 (85,700)	27	0 (32)	90 (66)

Approval

ABS, NK, LR, DNV

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spoo (kg)	15	20
(in)	.045	.052	1/16	(lbs)	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	120~300	150~350	200~400
V-up,OH	120~260	180~280	180~280
V-down	200~300	220~320	250~300

Applications

All position welding of machinery, shipbuilding, bridges. Impact values of weld metal are good.

Characteristics on Usage

Supercored 71 is a flux cored wire which has been designed to get a good usability in all position for wide range of welding currents. With its quiet and smooth arc, its slag detachability is very good.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter, such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position(All-Position)



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.03	0.51	1.26	0.010	0.011

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
545 (79,100)	572 (83,100)	28	0 (32)	110 (81)
			-20 (-4)	70 (52)

Approval

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

I Packing(Including Ball Pac)

Dia. (mm)	1.0	1.2	1.4	1.6
(in)	.039	.045	.052	1/16
Ball Pac				

Spool(kg)	12.5	15	20
(lbs)	28	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	120~300	150~350	200~400
V-up,OH	120~260	140~270	180~280
V-down	200~300	220~320	250~300

Applications

All position welding of building, shipbuilding, bridge construction machinery, and vehicles.

Characteristics on Usage

SC-71LH is titania type flux cored wire for all position welding. It has extra low hydrogen levels(H5) and provide an exceptionally smooth and stable arc with a fast freezing slag system.

Notes on Usage

- ① Proper Preheating(50~150°C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position(All-Position)



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.47	1.35	0.014	0.012

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
550 (79,800)	590 (85,600)	27	-30 (-22)	70 (52)

Approval

ABS, BV, DNV, NK, LR

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
(in)	.045	.052	1/16	(lbs)	28	33	44
Ball Pac							

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	220~290	240~320	260~330
V-up,OH	180~250	200~260	230~290
V-down	210~290	250~320	270~330

Applications

All position welding of shipbuilding, bridges, building and structural fabrication.

Characteristics on Usage

Supercored 71H is a titania flux cored wire for all position welding with high amperage. Its impact value is very good under high heat-input, arc is smooth and slag detachability is excellent .

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position(All-Position)



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.03	0.46	1.36	0.008	0.011

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
550 (79,900)	570 (82,800)	27	-30 (-22)	90 (66)
			-40 (-40)	60 (44)

Approval

KR, ABS, LR, BV, DNV, GL,
NK, TÜV, CWB, CE, DB, CCS,
RINA, RS

I Packing(Including Ball Pac)

Dia. (mm) 1.2 1.4 1.6
(in) .045 .052 1/16
Ball Pac

Spool (kg) 15 20
(lbs) 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	120~300	150~350	180~400
V-up,OH	120~260	140~270	160~280
V-down	200~300	220~320	250~300

Applications

Building, shipbuilding, bridge construction, machinery, and vehicles.

Characteristics on Usage

Despite welding position, it will get low spatter, soft arc, good bead appearance and excellent weldability with this wire.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use Ar+20~25% CO₂ gas.

Welding Position(All-Position)	Current	Shielding Gas
	DC +	Ar + 20~25% CO ₂
1G 2F 3G 4G		

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.04	0.54	1.25	0.011	0.012

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
580 (84,200)	600 (87,100)	28	-30 (-22)	60 (44)

Approval		I Packing(Including Ball Pac)							
ABS, LR, BV, DNV, GL, TÜV, CE, DB, RINA, CWB	Dia. (mm)	1.0	1.2	1.4	1.6	Spool (kg)	12.5	15	20
	(in)	.039	.045	.052	1/16	(lbs)	28	33	44
	Ball Pac								

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	220~290	240~320	260~350
V-up, OH	180~250	200~260	230~290
V-down	210~290	250~320	270~330

SC-71LHM Cored

TYPE : Rutile

AWS A5.20 / ASME JFA A5.20 E71T-1M/-9M

JIS Z3313 T49 3 T1-1 M A-U H5

EN ISO 17632-A-T 46 3 P M 1 H5

Applications

All position welding of building, shipbuilding, bridge construction machinery, and vehicles.

Characteristics on Usage

SC-71LHM Cored is a titania type flux cored wire for all position welding. It has extra low hydrogen level(H5) and provides an exceptionally smooth and stable arc with a fast freezing slag system.

Notes on Usage

- ① Proper Preheating (50~150° C) (122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use Ar + 20~25% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.05	0.50	1.20	0.012	0.015

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
580 (84,100)	600 (87,100)	28	-30 (-22)	80 (59)

Approval

ABS, LR, BV, DNV, GL

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
(in)	.045	.052	1/16	(lbs)	28	33	44
Ball Pac							

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	220 ~ 290	240 ~ 320	260 ~ 330
V-up, OH	180 ~ 250	200 ~ 260	230 ~ 290
V-down	210 ~ 290	250 ~ 320	270 ~ 330

Applications

All position welding for ship hulls, vehicles, bridges, chemical plant machinery and other metal fabrication.

Characteristics on Usage

SF-71MC is a titania type flux cored wire applicable for all-position welding by 100%CO₂ shielding gas or 75%Ar+25%CO₂ shielding gas.

Less spattering and good slag removability shorten the time of bead grinding operation.

Notes on Usage

- ① Proper preheating (50~150° C) (122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use 100% CO₂ gas or Ar-CO₂ Mixture.

Welding Position(All-Position)



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂/Ar + 20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Shielding Gas
0.04	0.40	1.20	0.010	0.012	100%CO ₂
0.04	0.50	1.41	0.010	0.014	75%Ar + 25%CO ₂

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs)		Shielding Gas
			-20°C (-4°F)	-30°C (-22°F)	
510 (74,000)	550 (79,900)	28	95 (70)	75 (55)	100%CO ₂
540 (78,400)	605 (87,700)	28	110 (81)	90 (66)	75%Ar + 25%CO ₂

Approval

ABS, LR

I Packing(Including Ball Pac)

Dia. (mm) 1.2 1.4 1.6
(in) .045 0.52 1/16

Spool(kg) 12.5 15 20
(lbs) 28 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F	120~300	150~350	180~400
HF	120~300	150~350	180~340
V-up & OH	120~260	150~270	180~280
V-Down	200~300	220~300	250~300

Applications

As a metal cored wire, it is designed for high productive welding of structural steels in excess of 6mm.

Characteristics on Usage

This wire benefits from a high deposition rate with very low spatter loss. It gives excellent penetration and good arc stability.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use 100% CO₂ gas.

Welding Position(Flat,Horizontal fillet)

Current

Shielding Gas



1G 2F

DC +

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.05	0.50	1.50	0.011	0.010

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
560 (81,300)	590 (85,700)	28	0 (32)	60 (44)

Approval

I Packing(Including Ball Pac)

KR, ABS, LR, BV, DNV, GL,	Dia. (mm)	1.2	1.4	1.6	Spool (kg)	12.5	15	20
NK, CCS, CRS	(in)	.045	.052	1/16	(lbs)	28	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.2 (.045) 250~300	1.4 (.052) 300~350	1.6 (1/16) 300~350
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SC-70H Cored

TYPE : Semi-Metal

AWS A5.20 / ASME SFA5.20 E70T-1C/-9C
JIS Z3313 T49 3 T15-0 C A H10
EN ISO 17632-A-T 42 2 R C 3

Applications

Flat & H-Fillet welding of building, shipbuilding, bridge construction, machinery, vehicle using mild and 490MPa class high tensile steels.

Characteristics on Usage

SC-70H Cored is a flux cored wire for Flat & H-fillet efficient welding with CO₂ shielding gas. As deposition rate is very high, highly efficient welding can be performed. Weld metal has good impact properties at -30° C (-22° F). Slag is uniform and easy to remove.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position(Flat,Horizontal fillet)	Current	Shielding Gas
 	DC +	CO ₂
1G 2F		

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.05	0.56	1.48	0.014	0.010

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
495 (71,900)	580 (84,200)	27	-30 (-22)	51 (27)

Approval	I Packing(Including Ball Pac)				
CWB, ABS, CCS, LR, GL	Dia. (mm)	1.6	2.0	2.4	Coil (kg) 25
NK, CWB, TÜV	(in)	1/16	5/64	3/32	(lbs) 55
	Ball Pac				

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.6 (1/16)	2.0 (5/64)	2.4 (3/32)
F & HF	300~400	350~450	400~500

Supercored 70MXH

TYPE : Semi-Metal

AWS A5.20/ SME SFA5.20 E70T-1C
JIS Z3313 T49 2 T15-0 C A-U H5
EN ISO 17632-A-T 42 2 R C 3 H5

Applications

Supercored 70MXH is a metal cored wire for high speed single or twin tandem welding application in the flat and horizontal fillet position. This wire benefits from high deposition rate and is widely used for shipbuilding, construction of bridge, and structural fabrication.

Characteristics on Usage

Supercored 70MXH has very low spatter loss rate and minimum amount of slag. It gives excellent penetration and good arc stability. Especially has good anti-porosity to zinc-primer plate and mill scale plate in high speed single and twin tandem fillet welding.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use 100% CO₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.05	0.55	1.65	0.013	0.010

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
540 (78,400)	620 (90,000)	28	-20 (-4)	60 (44)

Approval

I Packing(Including Ball Pac)

KR, ABS, LR, BV, DNV, GL,
NK, CCS

Dia. (mm) 1.4 1.6
(in) .052 1/16
Ball Pac

Spool (kg) 15 20
(lbs) 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.4 (.052) 300~400	1.6 (1/16) 350~450	2.0 (5/64) 400~500
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SC-70T Cored

TYPE : Metal-Cored

AWS A5.18 / ASME SFA5.18 E70C-3C / -6M
JIS Z3313 T 49 2 T15-1 CA
Z3313 T 49 3 T15-1 MA
EN ISO 17632-A-T 42 2 M C 1
ISO 17632-A-T 46 2 M M 1 H5

Applications

SC-70T Cored is ideally suitable for thin plate welding and root pass welding of structural steel. Designed for high productivity and automatic applications where a large amount of filler metal can be deposited with a minimum amount of slag & spatter. Typical industrial applications include shipbuilding, machinery, bridge construction and structural fabrication.

Characteristics on Usage

SC-70T Cored has excellent arc stability and negligible spatter level at not only high current but also low current (down to 50Amp). There is minimum slag coverage so it can be used for multi-pass welding without the need to remove slag.

Notes on Usage

- ① Proper preheating (50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ Gas or Ar+20~25% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂/Ar+20~25% CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Shielding Gas
0.06	0.60	1.20	0.011	0.014	100% CO ₂
0.07	0.65	1.45	0.010	0.011	Ar+20~25% CO ₂

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	Shielding Gas
520 (75,500)	590 (85,700)	27	-20 (-4)	45 (33)	100% CO ₂
550 (79,900)	620 (90,000)	27	-30 (-22)	50 (37)	Ar+20~25% CO ₂

Approval

ABS, BV, DNV, GL, LR

I Packing(Including Ball Pac)

Dia. (mm) 1.2
(in) .045

Spool(kg) 15
(lbs) 33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)
F & HF	50~300
V-up,OH	50~160

SC-70Z Cored

TYPE : Metal-Cored

AWS A5.18/ ASME SFA5.18 E70C-G
EN ISO 17632-A-T 46 Z M M/C 3

Applications

Welding of galvanized steel sheets in the field of automobile manufacturing and galvanized steel in the structure of ships or construction as well.

Characteristics on Usage

SC-70Z Cored is designed for the welding of low carbon and low alloy galvanized steel sheets as well as vertical-up position welding of galvanized pipe line at relatively high weld rates. It has the high deposition rates due to the higher feedability than a solid wire. Applicable to the zinc plating weight less than 60g/m² generally.

Notes on Usage

① Use 100% CO₂ or Ar + 20~25% CO₂ gas.

Welding Position



1G 2F 3G

Current

DC +

Shielding Gas

CO₂/Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Shielding Gas
0.09	0.42	1.35	0.022	0.013	100%CO ₂
0.10	0.61	1.57	0.025	0.014	80%Ar+20%CO ₂

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	Shielding Gas
550 (79,900)	600 (87,100)	30	0 (32)	120 (89)	100%CO ₂
580 (84,200)	640 (92,900)	25	0 (32)	105 (77)	80%Ar+20%CO ₂

Approval

I Packing(Including Ball Pac)

KR, ABS, LR, BV, DNV, GL,
NK, CWB, TÜV

Dia. (mm) 1.2
(in) .045

Spool(kg) 15
(lbs) 33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	-
F & HF	200~300	-
V-up,OH	100~150	-

Supercored 70NS

TYPE : Metal-Cored

AWS A5.18 / ASME SFA5.18 E70C-6M

JIS Z3313 T49 3 T15-0 M A H5

EN ISO 17632-A-T 42 3 M M 3 H5

Applications

Supercored 70NS is used for welding in shipbuilding, machinery, bridge construction, structural fabrication, automated or robotic welding.

Characteristics on Usage

Supercored 70NS is a metal-cored wire which combines the high deposition rates of F.C.W with the high efficiencies of a solid wire, provides exceptionally smooth and stable arc, low spatter and minimal slag coverage.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking in may occur with wrong welding parameter such as high welding speed.
- ③ Use Ar+20~25% CO₂ gas.

Welding Position



1G 2F 3G

Current

DC +

Shielding Gas

Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.05	0.55	1.45	0.013	0.010

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
480 (69,700)	550 (79,900)	27.0	-30 (-22)	50 (37)

Approval

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

I Packing(Including Ball Pac)

Dia. (mm) 1.0 1.2 1.4 1.6
(in) .039 .045 .052 1/16
Ball Pac

Spool(kg) 12.5 15 20
(lbs) 28 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.2 (.045) 230~300	1.4 (.052) 260~340	1.6 (1/16) 290~360
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Applications

Mild and 490MPa high tensile strength steels for shipbuilding, machinery structures, bridges and heavy plant facilities.

Characteristics on Usage

Supercored 70B is a basic type flux cored wire with excellent characteristics and is suitable for steel with tensile strength up to 600MPa. Deposited metal shows superior crack resistance, excellent toughness at low temperature of -20~-50° C(-4~-58° F).

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use Ar+20~25% CO₂ gas for welding.

Welding Position(Flat,Horizontal fillet)

Current

Shielding Gas



1G 2F 3G

DC ±

Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.43	1.33	0.011	0.013

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
450 (65,300)	520 (75,400)	32	-40 (-40)	78 (58)

Approval

I Packing(Including Ball Pac)

ABS, DNV, BV, GL, LR

Dia. (mm)	1.0	1.2	1.4	1.6	2.0	Spool(kg)	12.5	15	20	
(in)	.039	.045	.052	1/16	5/64		(lbs)	28	33	44
Ball Pac										

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.0 (.039)	1.2 (.045)	1.4 (0.52)	2.0 (5/64)
F & HF	150~280	170~320	200~350	200~400
V-up,OH	70~130	80~150	90~180	

Supercored 70SB

TYPE : Basic

AWS A5.20 / ASME SFA5.20 E71T-5C
JIS Z3313 T49 3 T5-1 C A-U H5
EN ISO 17632-A-T 42 3 B C 2 H5

Applications

Supercored 70SB is suitable for welding of mild and 490MPa high tensile strength steels for shipbuilding, machinery structures, bridge construction and heavy plant facilities.

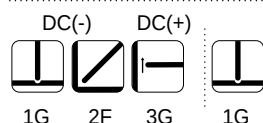
Characteristics on Usage

Supercored 70SB is a basic flux cored wire with excellent characteristics and is suitable for steel with a tensile strength up to 600MPa. Deposited metal shows superior crack resistance, excellent at low temperature at -20~-30° C(-4~-22° F).

Notes on Usage

- ① Proper preheating(50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Designed for use with DC(-).
- ④ Use 100% CO₂ gas.

Welding Position



Current

DC ±

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.39	1.39	0.013	0.014

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
DCEN(DC-)	570 (82,800)	620 (90,000)	26	-30 (-22)	70 (52)
DCEP(DC+)	500 (72,600)	550 (79,900)	31	-30 (-22)	80 (59)

Approval

I Packing(Including Ball Pac)

KR, ABS, BV, DNV, GL, LR,	Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
NK	(in)	.045	.052	1/16	(lbs)	28	33	44
	Ball Pac							

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	170~320	200~350	200~350
V-up	80~150	90~180	90~180

Applications

Vertical-up butt welding of side shell and various inner structures of ships, plates of storage tanks, and web members of box-girders of bridges.

Characteristics on Usage

SC-EG2 Cored is a small diameter flux cored wire to be used with CO₂ shielding gas for electro gas arc welding high speed. The arc is extremely stable and has good bead appearance. It provides highly efficient welding by electro gas process.

Notes on Usage

① Use 100% CO₂ gas.

Welding Position	Current	Shielding Gas
 3G	DC +	CO ₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Mo
0.08	0.30	1.52	0.012	0.010	0.12

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
510 (74,000)	560 (81,300)	27	-20 (-4)	60 (44)

Approval I Packing(Including Ball Pac)

KR, ABS, BV, DNV, GL, LR, NK, CCS	Dia. (mm) 1.6 (in) 1/16 Ball Pac	Spool(kg) 15 20 (lbs) 33 44
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Sizes Available and Recommended Currents (Amp.)

Size mm(in) V-Up	1.6 (1/16) 330~420
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SC-EG3

TYPE : Metal-Cored

Applications

Vertical-up butt welding of side shells and inner structures of bulk carriers in shipbuilding, box girder webs and plate girder in bridge, storage tank and other vertical welding lines

Characteristics on Usage

SC-EG3 is metal type flux cored wire to be used with CO₂ shielding gas for electro gas arc welding at high speed. Deposited weld metal toughness is good at low temperature range. Welding arc is stable and bead appearance is good . It provides highly efficient welding by electro gas process.

Notes on Usage

① Use 100% CO₂ gas.

Welding Position



3G

Current

DC+

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.07	0.28	1.73	0.013	0.010	1.49

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
575 (83,400)	672 (94,500)	23.5	-20 (-4)	95 (70)
			-60 (-76)	50 (37)

Approval

ABS, LR, DNV, BV, GL,
NK, KR

I Packing(Including Ball Pac)

Dia. (mm) 1.6
(in) 1/16
Ball Pac

Spool(kg) 20
(lbs) 44

Sizes Available and Recommended Currents (Amp.)

Size mm(in) V-up	1.6 (1/16) 330~420
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SC-55 Cored

TYPE : Rutile

AWS A5.29 / ASME SFA5.29 E81T1-GC
JIS Z3313 T55 2 T1-1 C A-U H10

Applications

All position welding for construction machinery, bridge structures and storage tanks.

Characteristics on Usage

SC-55 Cored is a titania type flux cored wire applicable for all-position welding by 100% CO₂ shielding gas has good weldability and low spatter levels and good bead appearance. Slag covering is uniform and easy to remove.

Notes on Usage

- ① Proper preheating (50~150°C)(122~302°F) and inter-pass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use 100% CO₂ gas.

Welding Position(All-Position)



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.06	0.45	1.40	0.012	0.006

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
560 (81,200)	610 (88,500)	28.5	-20 (-4)	80 (59)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
(in)	.045	.052	1/16	(lbs)	28	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F	120~300	150~350	180~380
HF	120~300	150~350	180~340
V-up & OH	120~260	150~270	180~280
V-Down	200~300	220~320	250~350

SC-55F Cored

TYPE : Semi-Metal

AWS A5.29 / ASME SFA5.29 E80T1-GC
JIS Z3313 T55 2 T15-0 C A-N1-U H10

Applications

Butt and fillet welding of steel structures using 520MPa class high tensile steel such as construction machinery, buildings and bridges.

Characteristics on Usage

SC-55F Cored is a metal type flux cored wire which produces smooth arc characteristics and minimum spatter levels and excellent slag remove.

Notes on Usage

- ① Proper Preheating(50~150℃)(122~302℉) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use 100% CO₂ gas.

Welding Position	Current	Shielding Gas
1G 2F	DC +	CO ₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S
0.05	0.48	1.56	0.012	0.010

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. ℃ (℉)	CVN-Impact Value J (ft · lbs)
580 (84,100)	625 (90,600)	24.5	-20 (-4)	60 (44)

Approval	I Packing(Including Ball Pac)							
	Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
	(in)	.045	.052	1/16	(lbs)	28	33	44
	Ball Pac							

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	250 - 300	300 - 350	300 - 350

Applications

All position welding for construction machinery, bridge structures and storage tanks.

Characteristics on Usage

Supercored 81 is an all position flux cored wire designed for 100% CO₂ shielding. You can get smooth arc, and low spatter, good weldability. The weld metal impact value at -30°C (°F) is excellent and has good bead appearance, slag covering is uniform and easy to remove.

Notes on Usage

- ① Proper preheating(50~150°C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.03	0.35	1.25	0.011	0.012	0.95

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
570 (82,700)	640 (92,900)	25	-30 (-22)	90 (66)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	15	20
(in)	.045	.052	1/16	(lbs)	33	44
Ball Pac						

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	250~300	260~320	290~350
V-up, OH	180~230	200~260	220~280
V-down	250~310	260~320	280~340

SF-80MX

TYPE : Semi-Metal

AWS A5.29/ ASME SFA5.29 E80T1-G
JIS Z3313 T55 2 T15-0 C A-N2 H10
EN ISO 17632-A-T 46 2 1Ni R C 3

Applications

As a metal type flux cored wired, Butt and fillet welding of steel structures using 590MPa class high tensile steel such as construction machinery, buildings and bridges.

Characteristics on Usage

SF-80MX is a metal type flux cored wire which produces smooth arc characteristics. It is used for joining from mild tensile steels to 590MPa class high tensile steels, and is suitable for both fillet and butt welds, providing high deposition rates, combined with minimal spatter and excellent slag release.

Especially it has good anti-porosity to zinc-primer plate and mill scale plate in fillet welding.

Notes on Usage

- ① Proper preheating 50~150° C(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use 100% CO₂ gas.

Welding Position	Current	Shielding Gas
1G 2F	DC +	CO ₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.06	0.55	1.42	0.015	0.010	1.00

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
590 (85,600)	630 (91,400)	24.0	-20 (-4)	53 (39)

Approval I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
(in)	.045	.052	1/16	(lbs)	28	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.2 (.045) 200~300	1.4 (.052) 300~350	1.6 (1/16) 300~350
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Applications

SC-80M is used for welding in bridge construction, structural fabrication automated or robotic welding.

Characteristics on Usage

SC-80M is a metal cored wire designed for single or multipass welding on high-tensile steel and weathering grade steels. SC-80M was designed specifically to meet the demand for weld deposits that color match the low alloy, high strength weathering grade steels, such as Corten steel

Notes on Usage

- ① Proper preheating(50~150°C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use Ar + 20 ~ 25% CO₂ gas.

Welding Position



1G 2F

Current

DC+

Shielding Gas

Ar + 20~25% CO₂ gas.

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Cr	Cu
0.07	0.63	1.65	0.014	0.010	0.72	0.25	0.34

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
610 (88,400)	658 (96,300)	24.5	-40 (-46)	60 (44)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	15
(in)	.045	.052	1/16	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	200~300	260~340	290~360
V-up, OH	100~150	140~180	150~180

Applications

SC-90M is used for welding in structural and mechanical fabrication automated or robotic welding

Characteristics on Usage

SC-90M is a metal cored wire designed for single or multipass welding on 90Grade high-tensile steel. SC-90M provides an exceptionally smooth and stable arc, low spatter and minimal slag coverage and achieves good impact value at low temperature.

Notes on Usage

- ① Proper preheating(50~150°C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use Ar + 20~25% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC+

Shielding Gas

Ar + 20~25% CO₂ gas.

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Mo
0.07	0.54	1.35	0.012	0.010	1.17	0.18

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
610 (88,450)	672 (97,400)	25.5	-50 (-58)	60 (44)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	Spool(kg)	15
(in)	.045	.052	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)
F & HF	200~300	260~340
V-up, OH	100~150	140~180

Applications

Typical industrial applications include shipbuilding, machinery, piping, bridge, structural fabrication and building.

Characteristics on Usage

SC-91P is a rutile-type flux cored wire to be used with Ar+CO₂ gas mixture shielding. Provide an exceptionally smooth and stable arc with a fast freezing slag system, this wire is ideal for pipe welding. Bead shape and appearance are excellent in all position welding.

Notes on Usage

- ① Proper Preheating(50~150°C)(122~302°F) and inter-pass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking that may occur with wrong welding parameter such as high welding speed
- ③ Use Ar+20~25%CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC(+)

Shielding Gas

Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Mo
0.05	0.45	1.30	0.013	0.010	0.85	0.22

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
640 (92,900)	680 (98,700)	26.0	0 (32)	80 (59)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	Spool(kg)	12.5	15	20
(in)	.045	(lbs)	28	33	44

Sizes Available and Recommended Currents (Amp.)

F & HF	120~300
V-up, OH	120~260
V-down	180~280

SC-91K2 Cored

TYPE : Rutile

AWS A5.29 / ASME SFA5.29 E91T1-K2C
JIS Z3313 T57 4 T1-1 C A-N3 H10
EN ISO 17632-A-T50 4 1.5Ni P C 1

Applications

SC-91K2 Cored is designed for the welding of low alloy steel such as 600Mpa grade high strength steels HY-80, and ASTM A710, A514, A517.

Characteristics on Usage

SC-91K2 Cored is a rutile type flux cored arc welding wire to be used with CO₂ shielding gas. Deposited weld metal toughness is good at low temperature range down -40° C(-40°F). To achieve good weld metal qualities, heat input must be controlled, not to exceed general welding condition.

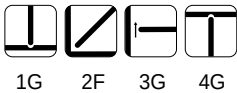
Welding arc is stable and bead apperance is good in all position welding.

Diffusible hydrogen content is low and crack resistance is excellent.

Notes on Usage

① Use 100% CO₂ gas.

Welding Position



Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Mo
0.04	0.35	1.25	0.013	0.012	1.55	0.09

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
620 (90,000)	650 (94,500)	27	-20 (-4) -40 (-40)	110 (82) 60 (44)

Approval

I Packing(Including Ball Pac)

ABS	Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
	(in)	.045	.052	1/16	(lbs)	28	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	200~300	250~350	280~380
V-up,OH	140~240	160~260	180~260

Applications

Supercored 110 is suitable for single or multipass welding for high strength low alloy steel.

Characteristics on Usage

Supercored 110 is titania type of flux cored wire for all position welding. It provides excellent impact values at low temperature.

Notes on Usage

- ① Proper Preheating(50~150° C) (122~302°F) and inter-pass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking that may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Mo
0.06	0.35	1.55	0.016	0.007	2.20	0.50

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
780 (113,000)	830 (121,000)	19.9	-40 (-40)	60 (44)

Approval

I Packing(Including Ball Pac)

ABS	Dia. (mm)	1.2	Spool(kg)	12.5	15	20
	(in)	.045	(lbs)	28	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)
F & HF	120~300
V-up,OH	120~260
V-down	180~280

SC-110M Cored

TYPE : Metal-Cored

AWS A5.28 / ASME SFA5.28 E110C-G
EN ISO 18276-A-T 69 4 Mn2NiMo M M 3

Applications

Single and multipass welding of high strength low alloy steels, such as HY-80, and HY-100.

Characteristics on Usage

SC-110M Cored is a metal cored wire which provides an exceptionally smooth and stable arc, low spatter and minimal slag coverage.

Notes on Usage

- ① Proper Preheating(50~150℃)(122~302℉) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use Ar+20-25% CO₂ gas.

Welding Position	Current	Shielding Gas
1G 2F	DC +	Ar+20~25%CO ₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo
0.04	0.70	1.80	0.015	0.015	2.0	0.10	0.60

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. ℃ (℉)	CVN-Impact Value J (ft · lbs)
760 (110,200)	820 (119,000)	20	-51 (-60)	45 (34)

Approval	I Packing(Including Ball Pac)
	Dia. (mm) 1.2 (in) .045
	Spool(kg) 12.5 15 20 (lbs) 28 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm (in) F & HF	1.2 (.045) 220 ~ 290
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Applications

SF-70W is an all position flux cored wire for use with CO₂ shielding gas. This wire is designed for the welding of weathering grade steels where weld metal and base metal color match is primary consideration.

Characteristics on Usage

SF-70W has a high deposition rate and excellent slag detachability. Its main applications are with 70Kpsi class weather poof steel and construction work using atmospheric corrosion resisting steels.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Cu
0.04	0.45	1.05	0.017	0.011	0.50	0.35	0.40

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
510 (74,000)	580 (84,200)	28	0 (32)	60 (44)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
(in)	.045	.052	1/16	(lbs)	28	33	44
Ball Pac							

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	200~300	250~350	300~400
V-up,OH	120~260	140~270	180~280
V-down	200~300	250~350	300~400

Applications

SF-80W is designed for the welding of weather-proof steel for example corten A-242 or A-588. Mainly used for flat and horizontal fillet welding on structural exposed steel usually found on buildings and bridges.

Characteristics on Usage

SF-80W is a titania type flux cored wire which can be used for all welding in conjunction with CO₂ shielding gas.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Cu
0.04	0.40	0.92	0.016	0.012	0.50	0.50	0.40

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
530 (77,000)	610 (88,600)	26	-30 (-22)	40 (30)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
(in)	.045	.052	1/16	(lbs)	28	33	44
Ball Pac							

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	200~300	250~350	300~400
V-up,OH	120~260	140~270	180~280
V-down	200~300	250~350	300~400

Applications

Oil and gas construction, pipe and off-shore structures.

Characteristics on Usage

SC-71SR is a titania type flux cored wire for all position welding for use with CO₂ gas.

It provides excellent notch toughness at low temperature, not only as-welded also stress relieved state.

Notes on Usage

① Use 100%CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.05	0.40	1.20	0.011	0.010	0.38

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs) -30°C(-22°F) -40°C(-40°F)		
560 (81,300)	580 (84,100)	28	115 (85)	80 (59)	As welded
540 (78,400)	560 (81,300)	30	84 (62)	60 (44)	PWHT(620° C@2hr)

Approval

ABS, BV, DNV, LR, GL

I Packing(Including Ball Pac)

Dia. (mm) 1.2 1.4
(in) .045 .052

Spool(kg) 12.5 15 20
(lbs) 28 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)
F & HF	120~300	150~350
V-up, OH	120~260	140~270
V-down	200~300	220~320

Applications

Oil and gas construction, pipe, and off-shore structures.

Characteristics on Usage

SC-71MSR is a titania type flux cored wire for all position welding. It provides excellent notch toughness at low temperature, not only as-welded but also stress relieved state.

All position welding can be achieved with excellent flat bead appearance, less spatter and easy slag removal and high welding current in vertical up position can be performed.

Notes on Usage

- ① Proper preheating (50~150° C)(122~302° F) and interpass temperature must be used in order to release hydrogen which may cause crack in weld metal when electrodes are used for medium and heavy thick plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use Ar+20~25% CO₂ gas for welding.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.06	0.35	1.24	0.012	0.012	0.45

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs) -40°C(-40°F) -50°C(-60°F)		
542 (78,600)	577 (83,600)	30	115 (85)	85 (63)	As welded
523 (75,700)	552 (80,000)	33	90 (66)	70 (52)	PWHT(620° C@2hr)

Approval

ABS, BV, DNV, LR

I Packing(Including Ball Pac)

Dia. (mm) 1.2
(in) .045
Ball Pac

Spool(kg) 12.5 15 20
(lbs) 28 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)
F & HF	200~290
V-up, OH	180~250
V-down	210~280

Applications

SC-70ML can be used on mild and high tensile steels in single and multi-pass applications. It is ideally suited for high production and automatic applications. Typical industrial applications include offshore, heavy equipment and general structural fabrications.

Characteristics on Usage

SC - 70ML is a gas shielded metal-cored wire which combines high deposition rates of a flux cored wire with high efficiency of a solid wire. Its design achieves low temperature impacts and can be used in semiautomatic and automatic applications.

Notes on Usage

① Use Ar + 20 ~ 25% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.05	0.57	1.56	0.013	0.010	0.42

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
510 (73,950)	560 (81,200)	27.0	-40 (-40)	70 (52)

Approval

ABS, LR, DNV, BV, GL

I Packing(Including Ball Pac)

Dia. (mm) 1.2 1.4 1.6
(in) .045 .052 1/16

Spool(kg) 15
(lbs) 33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	200 ~ 300	260 ~ 340	300 ~ 350
V-up, OH	100 ~ 150	140 ~ 180	150 ~ 180

SC-80MR

TYPE : Metal-Cored

AWS A5.28/ ASME SFA5.28 E80C-G
EN ISO 17632-A T 46 6 1.5Ni M M 2 H5

Applications

SC-80MR is used for welding in offshore structure and heavy equipment and general structural fabrication.

Characteristics on Usage

SC-80MR is a metal cored wire designed for single-side welding and is also suitable for multi-pass welding in thick plate. SC-80MR provides an exceptionally smooth and stable arc, low spatter and minimal slag coverage and achieves good impact value to low temperature(-60°C).

Notes on Usage

- ① Proper preheating(50~150°C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use Ar + 20~25% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC+

Shielding Gas

Ar + 20~25% CO₂ gas.

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.07	0.35	1.55	0.014	0.010	1.55

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
612 (88,700)	658 (95,400)	25.5	-60 (-76)	60 (44)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	Spool(kg)	15
(in)	.045	.052	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)
F & HF	200~300	260~340
V-up, OH	100~150	140~180

Applications

Supercored 81MAG can be used in oil and gas construction, pipe, and offshore structures.

Characteristics on Usage

Supercored 81MAG is a titania type flux cored wire to be used with Ar+CO₂ gas mixture shielding. This provides excellent notch toughness at low temperature, not only as-welded but also stress relieved state.

Notes on Usage

- ① Proper preheating (50~150° C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use Ar+20~25% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.05	0.28	1.20	0.008	0.012	0.93

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
550 (79,900)	590 (85,700)	26	-60 (-76)	60 (44)
510 (74,100)	570 (82,800)	28	-40 (-40)	98 (73)

As welded
PWHT(620° C@2hr)

Approval

ABS, BV, DNV, LR, CWB,
RINA

I Packing(Including Ball Pac)

Dia. (mm) 1.2 1.6
(in) .045 1/6
Ball Pac

Spool(kg) 12.5 15 20
(lbs) 28 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.6 (1/16)
F & HF	200~290	260~350
V-up,OH	180~250	230~290
V-down	210~280	270~330

Supercored 81-K2

TYPE : Rutile

AWS A5.29 / ASME SFA5.29 E81T1-K2C
JIS Z3313 T55 6 T1-1 C A-N3-U H5
EN ISO 17632-A-T 46 6 1.5Ni P C 1 H5

Applications

Supercored 81-K2 is used for the welding of low temperature service steels in the construction of LPG and LNG storage tanks.

Characteristics on Usage

Supercored 81-K2 is a titania type flux cored wire designed for all position welding with CO₂ shielding gas.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position	Current	Shielding Gas
	DC +	CO ₂
1G 2F 3G 4G		

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.04	0.35	1.35	0.012	0.011	1.50

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
540 (78,400)	620 (90,000)	28	-30 (-22) -60 (-76)	110 (81) 60 (44)

Approval	I Packing(Including Ball Pac)							
KR, ABS, BV, DNV, GL, LR, NK, CCS, RINA, RS, CWB	Dia. (mm)		1.2	1.4	1.6	Spool(kg)		
	(in)		.045	.052	1/16	(lbs)		
	Ball Pac					12.5	15	20
						28	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.6 (1/16)
F & HF	250~300	300~350
V-up, OH	170~230	200~250
V-down	250~300	300~350

Applications

SC-460 is suitable for single or multipass welding for low temperature service steel.

Characteristics on Usage

SC-460 is titania type of flux cored wire for all position welding. It provides excellent impact values at low temperature.

Notes on Usage

- ① Proper Preheating(50~150°C)(122~302°F) and inter-pass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking that may occur with wrong welding parameter such as high welding speed.
- ③ Use 100% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.06	0.35	1.20	0.008	0.011	1.50

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
580 (84,200)	630 (91,000)	26.0	-60 (-76)	60 (44)

Approval

ABS, BV, DNV, GL, LR,

I Packing(Including Ball Pac)

Dia. (mm) 1.2 1.4
(in) .045 .052
Ball Pac

Spool(kg) 5 15 20
(lbs) 28 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.6 (1/16)
F & HF	120~290	150~350
V-up, OH	120~260	140~270
V-down	200~300	220~350

Applications

Supercored 81-K2MAG is suitable for single or multipass MAG welding application for LNG, LPG tank, etc. and for all low temperature service steel.

Characteristics on Usage

Supercored 81-K2MAG is an all position flux cored wire for low temperature service steel. Excellent mechanical properties and low temperature impact toughness. Smooth arc characteristics and very low spatter level.

Notes on Usage

- ① Proper preheating(50~150° C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
- ③ Use Ar+20~25% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

Ar+20~25% CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.03	0.35	1.25	0.012	0.010	1.55

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
590 (85,600)	610 (88,500)	27	-30 (-22) -60 (-76)	110 (81) 70 (52)

Approval

TÜV, CE, DB

I Packing(Including Ball Pac)

Dia. (mm) 1.2
(in) .045
Ball Pac

Spool(kg) 12.5 15 20
(lbs) 28 33 44

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)
F & HF	250~300
V-up,OH	170~230
V-down	250~300

Applications

SC-80K2 is designed for welding of low temperature service. Butt and fillet welding of offshore structures, LNG and LPG carriers and storage tanks, etc.

Characteristics on Usage

SC-80K2 is a metal type flux cored wire for high speed welding applications in the flat and horizontal fillet position.

Arc stability is excellent. Spatter loss is low and slag covering is uniform with good removability.

Notes on Usage

- ① Proper Preheating(50~150℃)(122 ~ 302°F) and to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Use 100% CO₂ gas.

Welding Position(All-Position)



1G 2F

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni
0.05	0.40	1.31	0.011	0.010	1.45

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
550 (79,900)	590 (85,700)	25	-30 (-22)	90 (66)
			-60 (-76)	53 (39)

Approval

KR, ABS, LR, BV, DNV, GL,
NK

I Packing(Including Ball Pac)

Dia. (mm) 1.2 1.4
(in) .045 .052

Spool(kg) 15
(lbs) 33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)
F	250 ~ 300	280 ~ 320
HF	250 ~ 300	280 ~ 320

Applications

SC-81B2 can be used for welding of 1.25%Cr-0.5%Mo heat resistant steels used for steam pipes of boilers for electric power plants and marine use, equipment for oil refining industries and high temperature synthetic chemical industries.
Most common usage is in steam power plants and ships, chemical plants and refineries.

Characteristics on Usage

SC-81B2 is a titania type flux cored wire for all position welding. Arc stability is excellent. Spatter loss is low and slag covering is uniform with good removability.

Notes on Usage

- ① Use 100% CO₂ gas.
- ② All position gas shielded flux cored wire.

Welding Position	Current	Shielding Gas
	DC +	CO ₂
1G 2F 3G 4G		

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.066	0.41	0.83	0.016	0.017	1.19	0.51

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	PWHT
575 (83,500)	656 (95,200)	22.4	690 ± 15° C × 1Hr

Approval	I Packing(Including Ball Pac)					
	Dia. (mm)	1.2	1.4	1.6	Spool(kg)	15
	(in)	.045	.052	1/16	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	250~300	280~350	300~450
V-up & OH	200~260	220~260	240~280
V-Down	250~300	280~350	300~450

Applications

SC-91B3 can be used for welding of 2.25%Cr-1.0%Mo steel used for super heat tubes and steam pipes of boilers for electric power plant and marine use, equipment for oil refining industries and high temperature synthetic chemical industries.

Characteristics on Usage

SC-91B3 is a titania type flux cored wire for all position welding. Arc stability is excellent. Spatter loss is low and slag covering is uniform with good removability.

Notes on Usage

- ① Use 100% CO₂ gas.
- ② All position gas shielded flux cored wire.

Welding Position(All-Position)



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.063	0.47	0.83	0.022	0.017	2.32	0.99

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	PWHT
643 (93,300)	730 (106,000)	20	690° C ± 15 × 1Hr

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	15
(in)	.045	.052	1/16	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	250~300	280~350	300~450
V-up & OH	200~260	220~260	240~280
V-Down	250~300	280~350	300~450

SC-80D2

TYPE : Metal-Cored

AWS A5.28 / ASME SFA5.28 E80C-G
EN ISO 17632-A-T 46 0 MnMo M M 3

Applications

SC-80D2 can be used on high strength steels and low alloy steels in heavy industries and structural steels.

Characteristics on Usage

SC-80D2 is a metal-cored gas shielded cored wire which combines the high deposition rates of a flux cored wire with the high efficiencies of a solid wire. SC-80D2 is equivalent to ER80S-D2 solid wire.

It provides an exceptionally smooth and stable arc, low spatter and minimal slag coverage.

Notes on Usage

① use Ar + 20~25% CO₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

Ar+20~25% CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Mo
0.05	0.60	1.65	0.012	0.010	0.51

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
590 (85,600)	660 (95,700)	28	-20 (-4)	70 (52)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	12.5	15	20
(in)	.039	.045	1/16	(lbs)	28	33	44
Ball Pac							

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F & HF	200~310	200~340	230~360

Applications

Supercored 1CM can be used on 1.25%Cr-0.5%Mo steels. Recommended for welding of steam boiler plates and high temperature steels.

Characteristics on Usage

Supercored 1CM is a metal cored wire which combines the high deposition rates of F.C.W with the high efficiencies of a solid wire. It provides exceptionally smooth and stable arc, low spatter and minimal slag coverage.

Notes on Usage

- ① Proper preheating(130~165° C)(122~302°F) and interpass temperature must be used in order to release hydrogen which may cause cracking in weld metal when electrodes are used for medium and heavy plates.
- ② Keep the distance between tip and base metal at about 15mm.
- ③ Use Ar+20~25% CO₂ gas.

Welding Position(All-Position)



1G 2F

Current

DC +

Shielding Gas

Ar+20~25% CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Mo
0.07	0.39	0.81	0.013	0.010	1.25	0.51

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	Heat Treatment (°C/hr)
560 (81,300)	630 (91,000)	20	0 (32)	90 (66)	620/1hr
510 (74,100)	600 (87,100)	25	0 (32)	110 (81)	620/8hr

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.0	1.2	Spool(kg)	12.5	15
(in)	.039	.045	(lbs)	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.0 (.039)	1.2 (.045)
F & HF	150~300	200~310

Supershield 11

TYPE : Self-Shielded

AWS A5.20 /ASME SFA 5.20 E71T-11
JIS Z3313 T49 T14-1 N A
EN ISO 17632-A-T 42 Z Z Z N 1

Applications

Supershield 11 is used where light structurals, short assembly welds, other general fabrications and galvanized steel fixtures, gate etc.

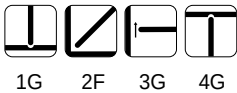
Characteristics on Usage

Supershield 11 is an all position self-shielded flux cored wire designed for single & multi-pass welding of thin mild and medium tensile steels not exceeding 510MPa.

Notes on Usage

- ① Do not use shielding gas.

Welding Position



Current

DC -

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Al
0.19	0.35	0.60	0.011	0.006	1.20

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)
520 (75,400)	590 (85,500)	21

Approval I Packing(Including Ball Pac)

Dia. (mm)	1.0	1.2	1.4	1.6	Spool(kg)	15	20
(in)	.039	.045	.052	1/16	(lbs)	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.0 (.039)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F	80~200	160 ~ 220	170 ~ 250	180 ~ 280
V-up, OH	55~120	120~ 180	140 ~ 200	160 ~ 220

Supershield 71GS

TYPE : Self-Shielded

AWS A5.20 /ASME SFA 5.20 E71T-GS

JIS Z3313 T49 T14-1 N S

EN ISO 17632-A-T 42 Z Z V N 1

Applications

Supershield 71GS is used where light structurals, short assembly welds, other general fabrications and galvanized steel fixtures, gate etc.

Characteristics on Usage

Supershield 71GS is an all position self-shielded flux cored wire designed for single-pass welding of thin mild and medium tensile steels not exceeding 510MPa.

Notes on Usage

① Do not use shielding gas.

Welding Position



1G 2F 3G 4G

Current

DC -

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Al
0.26	0.50	0.91	0.016	0.014	2.05

Typical Mechanical Properties of All-Weld Metal

As Welded	
Transverse Tensile Strength, MPa(psi) (Specimen broken in the base metal)	586 (85,000)
Longitudinal Guided Bend Test	Satisfactory

Approval

I Packing(Including Ball Pac)

-	Dia. (mm)	1.0	1.2	1.4	1.6	Spool(kg)	15	20
	(in)	.039	.045	.052	1/16	(lbs)	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.0 (.039)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F	80~200	160 ~ 220	170 ~ 250	180 ~ 280
V-up, OH	55~120	120 ~ 180	140 ~ 200	160 ~ 220

Supershield 4

TYPE : Self-Shielded

AWS A5.20/ ASME SFA5.20 E70T-4
EN ISO 17632-A T 42 Z Z W N 3

Applications

Only Flat, H-Fillet welding of general fabrication, structural fabrication, machinery bases and heavy equipment repair.

Characteristics on Usage

Supershield 4 is self-shield flux cored wire for high deposition rate flat and horizontal welding where impact properties are not required.

Notes on Usage

- ① Do not use shielding gas.

Welding Position



1G 2F

Current

DC+

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Al
0.19	0.38	0.40	0.012	0.010	1.25

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)
465 (67,400)	610 (88,400)	24.0

Approval I Packing(Including Ball Pac)

Dia. (mm)	2.0	Spool(kg)	12.5
Dia. (mm)	2.4	Coil(Kg)	25

Sizes Available and Recommended Currents (Amp.)

Size mm F & HF	2.0 250~350	2.4 250~450
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Applications

SW-307NS Cored is designed for welding dissimilar steels, 13Mn steels with reduced weldability and for cladding carbon steels.

Characteristics on Usage

SW-307NS Cored is a metal cored wire with a hot cracking resistant austenitic weld metal.

The tough weld metal has an excellent crack resistance, even when welding steels with very poor weldability.

This wire is designed for welding dissimilar steels, 13Mn steels with reduced weldability and for cladding carbon steels. Can also be used as a buffer layer prior to hard surfacing.

Designed for high deposition welding of multi-layer standing fillet welds.

Notes on Usage

- ① Use with 100%Ar or Ar+2~5%O₂ gas.
- ② Welders for solid wire can be used but as wire is softer than solid wire, pay full attention to adjust feeding roller and do not tighten them excessively.
- ③ Use the wind-screen against wind.
- ④ Where possible, preferred storage conditions of opened packs are 60% RH maximum, 18°C minimum.

Welding Position

Current

Shielding Gas



1G 2F

DC +

Ar/Ar+2~5% O₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% Ar)

C	Si	Mn	P	S	Cr	Ni	Mo
0.08	0.83	6.15	0.022	0.008	17.78	8.25	0.15

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% Ar)

YS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
627 (91,000)	40.8	-20 (-4) -60 (-76)	106 (78) 71 (52)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.6	Spool(kg)	5	12.5	15
(in)	.045	1/16	(lbs)	11	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.2 (.045) 170~270	1.6 (1/16) 200~350
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SW-308L Cored

TYPE : Rutile

AWS A5.22 / ASME SFA5.22 E308LT1-1/-4
JIS Z3323 TS308L-FB1
EN ISO 17633-A-T 19 9 L P M/C 2

Applications

SW-308L Cored is designed for welding of 18%Cr-8%Ni stainless steels.

Characteristics on Usage

SW-308L Cored is a flux cored wire for all position welding to be used with CO₂ or Argon +CO₂ mixed shielding gases. This wire benefits from a fast freezing slag system which assists the operator when welding out of position and performs equally as well when welding in the flat and horizontal position.

Notes on Usage

- ① Use with 100% CO₂ or Ar + 20~25% CO₂ gas.

Welding Position	Current	Shielding Gas
	DC +	CO ₂ /Ar+20~25% CO ₂
1G 2F 3G 4G		

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni
0.03	0.65	1.45	0.025	0.010	19.5	10.0

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

YS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
590 (85,600)	45	-20 (-4)	60 (44)

Approval	I Packing(Including Ball Pac)						
ABS, LR, NK, BV, DNV, TÜV, CWB, CE, DB	Dia. (mm)	0.9	1.2	1.6	Spool(kg)	5	12.5 15
	(in)	.035	.045	1/16	(lbs)	11	28 33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	0.9 (.035)	1.2 (.045)	1.6 (1/16)
F & HF	130~190	180~220	250~290
V-up,OH	100~140	120~160	-

Applications

SW-308LT is designed for welding of extra-low carbon 18%Cr-8%Ni stainless steel for cryogenic applications.

Characteristics on Usage

SW-308LT is a titania type flux cored wire for all position welding with CO₂ & Argon+CO₂ mixed shielding gas. This wire is designed for cryogenic applications, 304L austenitic stainless steels.

The high impact toughness at cryogenic temperature (-196°C) makes SW-308LT excellent in LNG applications.

Arc stability is excellent, so spatter loss is low and slag covering is uniform with good removability.

Notes on Usage

- ① Both 100% CO₂ and mixed (Ar+20~25% CO₂) gas are useful.
- ② Welders for solid wire can be used but as wire is softer than solid wire, pay full attention to adjust feeding roller and do not tighten them excessively.
- ③ Use the wind-screen against wind.
- ④ Where possible, preferred storage conditions of opened packs are 60% RH maximum, 18 minimum.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂/Ar+20~25% CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni
0.034	0.59	1.52	0.023	0.013	19.2	10.1

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
402 (58,300)	550 (79,800)	49.8	-196 (-320)	35 (26)

Approval

I Packing(Including Ball Pac)

ABS	Dia. (mm)	1.2	Spool(kg)	15
	(in)	.045	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)
F & HF	180 ~ 220
V-up, OH	120 ~ 160

SW-309L Cored

TYPE : Rutile

AWS A5.22 / ASME SFA5.22 E309LT1-1/-4
JIS Z3323 TS309L-FB1
EN ISO 17633-A-T 23 12 L P M/C 2

Applications

SW-309L Cored is designed for the welding of dissimilar metals such as stainless steels and carbon steels or stainless steels and low alloy steels.

Characteristics on Usage

SW-309L Cored is a flux cored wire for all position welding to be used with CO₂ or Argon + CO₂ mixed shielding gases. This wire contains a high ferrite level in its austenitic structure thus providing better weldability together superior heat and corrosion resistance. As larger amounts of alloying elements are added, it becomes suitable for the welding of dissimilar joints where dilution from ferrite steel takes place.

Notes on Usage

① Use with 100% CO₂ or Ar + 20~25% CO₂ gas.

Welding Position	Current	Shielding Gas
 1G 2F 3G 4G	DC +	CO ₂ /Ar+20~25%CO ₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni
0.03	0.65	1.30	0.025	0.010	23.0	12.3

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
590 (85,600)	40	-20 (-4)	50 (37)

Approval I Packing(Including Ball Pac)

KR, ABS, LR, BV, GL, NK, DNV, TÜV, CWB, CE, DB, CRS	Dia. (mm) (in)	0.9 .035	1.2 .045	1.6 1/16	Spool(kg) (lbs)	5 11	12.5 28	15 33
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Sizes Available and Recommended Currents (Amp.)

Size mm (in)	0.9 (.035)	1.2 (.045)	1.6 (1/16)
F & HF	130~180	180~220	250~290
V-up,OH	100~140	120~160	-

SW-309LNS Cored

TYPE : Metal-Cored

AWS A5.9 / ASME SFA5.9 EC309L

JIS Z3323 TS309L-MA0

EN ISO 17633-A-T 23 12 L M M

Applications

Main uses are for thin plate stainless steels and for the welding of automotive mufflers in 22%Cr-12%Ni stainless steels.

Characteristics on Usage

SW-309LNS Cored is a metal type stainless steel flux cored wire for welding of 22%Cr-12%Ni steel, heat resistant cast steel and for the joining of chrome nickel clad steels to Cr-Mo steel or mild steel. This wire is designed for flat and horizontal fillet welding. Its weld metal contains ferrite in austenitic structure, it gives excellent weldability, good corrosion and heat resistance.

Notes on Usage

① Use with 100% Ar or Ar + 2~5% O₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

Ar/Ar+2~5%O₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% Ar)

C	Si	Mn	P	S	Cr	Ni
0.03	0.65	1.80	0.020	0.010	24.0	13.0

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% Ar)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
590 (85,600)	45	-20 (-4)	60 (44)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.6	Spool(kg)	5	12.5	15
(in)	.045	1/16	(lbs)	11	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.2 (.045) 170~270
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SW-309MoL Cored

TYPE : Rutile

AWS A5.22 / ASME SFA5.22 E309LMoT1-1/4
JIS Z3323 TS309LMo-FB1
EN ISO 17633-A-T 23 12 2 L P M/C 2

Applications

Main uses are for the applications of resistance to heat and corrosion and for the joining of stainless steels to mild or low alloy steels.

Characteristics on Usage

SW-309MoL Cored is designed for the welding of 22%Cr-12%Ni-2.5%Mo stainless steels. This wire has excellent crack resistance combined with good arc characteristics for the use of downhand and vertical up.

Notes on Usage

① Use with 100%CO₂ or Ar + 20~25% CO₂ gas.

Welding Position	Current	Shielding Gas
 1G 2F 3G 4G	DC +	CO ₂ /Ar+20~25%CO ₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni	Mo
0.03	0.70	1.20	0.025	0.010	22.5	12.5	2.5

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
690 (100,000)	32	-20 (-4)	40 (30)

Approval I Packing(Including Ball Pac)

CWB, DNV, GL, NK	Dia. (mm) (in)	0.9 .035	1.2 .045	1.6 1/16	Spool(kg) (lbs)	5 11	12.5 28	15 33
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Sizes Available and Recommended Currents (Amp.)

Size mm (in)	0.9 (.035)	1.2 (.045)	1.6 (1/16)
F & HF	130~180	180~220	250~290
V-up,OH	100~140	120~160	-

SW-316L Cored

TYPE : Rutile

AWS A5.22/ASME SFA5.22 E316LT1-1/-4

JIS Z3323 TS316L-FB1

EN ISO 17633-A-T 19 12 3 L P M/C 2

Applications

SW-316L Cored is designed for the welding of low carbon 18%Cr-12%Ni-2% Mo stainless steels or for the welding of dissimilar joints of stainless steels.

Characteristics on Usage

SW-316L Cored is a flux cored wire for all position welding to be used with CO₂ or Argon + CO₂ mixed shielding gases.

Due to ferrite contents in the weld metals austenitic structure, it has excellent crack resistance.

Notes on Usage

① Use with 100% CO₂ or Ar + 20~25% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂/Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni	Mo
0.03	0.70	1.20	0.025	0.010	18.0	12.0	2.50

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
590 (85,600)	40	-20 (-4)	50 (37)

Approval

I Packing(Including Ball Pac)

KR, ABS, LR, BV, DNV, GL, TÜV , CWB, CE, DB, CCS	Dia. (mm) (in)	0.9 .035	1.2 .045	1.6 1/16	Spool(kg) (lbs)	5 11	12.5 28	15 33
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Sizes Available and Recommended Currents (Amp.)

Size mm (in)	0.9 (.035)	1.2 (.045)	1.6 (1/16)
F & HF	130~180	180~220	250~290
V-up,OH	100~140	120~160	-

Applications

SW-316LT is designed for welding of extra-low carbon 18%Cr-12%Ni-2%Mo stainless steels for cryogenic applications.

Characteristics on Usage

SW-316LT is a titania type flux cored wire for all position welding with CO₂ & Argon+CO₂ mixed shielding gas. This wire is designed for cryogenic applications, 316L austenitic stainless steels. SW-316LT is also available to order as a variant with a controlled composition and low ferrite content, designed for cryogenic service.

This is particularly relevant to attack by chloride solutions and sulphurous acid.

Notes on Usage

- ① Both 100% CO₂ and mixed (Ar+20~25% CO₂) gas are useful.
- ② Welders for solid wire can be used but as wire is softer than solid wire, pay full attention to adjust feeding roller and do not tighten them excessively.
- ③ Use the wind-screen against wind.
- ④ Where possible, preferred storage conditions of opened packs are 60% RH maximum, 18°C minimum.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂/Ar+20~25% CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni	Mo
0.024	0.71	1.72	0.022	0.012	18.2	12.4	2.1

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
540 (78,300)	44	-196 (-320)	35 (26)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	Spool(kg)	15
(in)	.045	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)
F & HF	180 ~ 220
V-up, OH	120 ~ 160

SW-317L Cored

TYPE : Rutile

AWS A5.22/ASME SFA5.22 E317LT1-1/-4
JIS Z3323 TS317L-FB1

Applications

SW-317L Cored is designed for the welding of low carbon 18%Cr-12%Ni-2% Mo and 19%Cr-13%Ni-3%Mo stainless steels.

Characteristics on Usage

SW-317L Cored is a flux cored wire for all position welding to be used with CO₂ or Argon + CO₂ mixed shielding gases.

Due to ferrite contents in the weld metals austenitic structure, it has excellent crack resistance.

Notes on Usage

① Use with 100% CO₂ or Ar + 20~25% CO₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂/Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni	Mo
0.03	0.70	1.20	0.025	0.010	19.0	13.0	3.5

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
600 (87,000)	35	-20 (-4)	40 (30)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	0.9	1.2	1.6	Spool(kg)	5	12.5	15
(in)	.035	.045	1/16	(lbs)	11	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	0.9 (.035)	1.2 (.045)	1.6 (1/16)
F & HF	130~180	180~220	250~290
V-up,OH	100~140	120~160	-

SW-347 Cored

TYPE : Rutile

AWS A5.22/ASME SFA5.22 E347T1-1/-4
JIS Z3323 TS347-FB1
EN ISO 17633-A-T 19 9 Nb P M/C 2

Applications

Main uses are for the welding of stainless steel boilers and gas turbines.

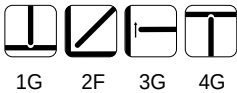
Characteristics on Usage

SW-347 Cored is a titania type flux cored wire designed for welding of 347 and 321 type stainless steels.

Notes on Usage

① Use with 100% CO₂ or Ar + 20~25% CO₂ gas.

Welding Position



Current

DC +

Shielding Gas

CO₂/Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni	Nb
0.04	0.80	1.20	0.025	0.010	19.5	10.0	0.40

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
610 (88,500)	45	-20 (-4)	60 (44)

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.6	Spool(kg)	5	12.5	15
(in)	.045	1/16	(lbs)	11	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.6 (1/16)
F & HF	180~220	250~290
V-up,OH	120~160	-

SW-410NiMo Cored

TYPE : Rutile

AWS A5.22 /ASME SFA5.22 E410NiMoT1-1/4
JIS Z3323 TS410NiMo-FB1
EN ISO 17633-A-T 13 4 P M/C 2

Applications

All position welding of martensitic stainless steels, hardfacing of continuous casting rolls, valve seats, etc.

Characteristics on Usage

SW-410NiMo Cored is a flux cored wire for martensitic stainless steel like CA6NM. SW-410NiMo cored is a titania type flux cored wire for all position welding with CO₂ & Mixed gas. As deposition rate is higher than solid wire and MMA electrode, highly efficient welding can be performed.

Arc stability is excellent, so spatter loss is low and slag covering is uniform with good removability.

Notes on Usage

- ① Proper preheating (50~150°C) (122~302°F) and interpass temperature must be adopted in order to release hydrogen which may cause crack in weld metal.
- ② Both 100% CO₂ and mixed (Ar+20~25% CO₂) gas are useful.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂/Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni	Mo
0.03	0.41	0.46	0.011	0.010	12.2	4.30	0.51

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	Hardness (HRC)	PWHT
700 (102,000)	850 (123,000)	17	0 (32)	50 (37)	As weld:37 PWHT :27	600° C X 1Hr,AC
710 (103,000)	890 (129,000)	20	0 (32)	50 (37)	As weld:37 PWHT :26	590° C X 3Hr,FC

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.6
(in)	.045	1/16

Spool(kg)	12.5	15
(lbs)	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.6 (1/16)
F&HF	200~350
V-up,OH	170~260

SW-2209 Cored

TYPE : Rutile

AWS A5.22 /ASME SFA5.22 E2209T1-1/-4

JIS Z3323 TS2209-FB1

EN ISO 17633-A-T 22 9 3 N L M/C 2

Applications

SW-2209 Cored is an all positional flux cored wire for duplex stainless steels like 2205.

Characteristics on Usage

SW-2209 Cored is a titania type flux cored wire for all position welding with CO₂ & Mixed gas. As deposition rate is higher than solid wire and MMA electrode highly efficient welding can be performed.

Notes on Usage

- ① Proper preheating (50~150°C)(122~302°F) and interpass temperature must be adopted in order to release hydrogen which may cause crack in weld metal.
- ② Both 100% CO₂ and mixed (Ar+20~25% CO₂) gas are useful.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

CO₂/Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni	Mo	N
0.03	0.70	1.10	0.02	0.010	23.5	8.7	3.2	0.10

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)	PREN
680 (98,600)	820 (119,100)	27	-20 (-4) -50 (-58)	60 (44) 50 (37)	36

Pitting Resistance Equivalent (Shielding Gas : 100%CO₂)

PRE = Cr+3.3×Mo+16×N

Approval

I Packing(Including Ball Pac)

BV, DNV

Dia. (mm) 1.2 1.6
(in) .045 1/16

Spool(kg) 12.5 15
(lbs) 28 33

Ferrite Contents of All Weld Metal (Shielding Gas: 100% CO₂)

	WRC-1992(FN)	Shaeffler Diagram(%)
As welded	53~55	58~59

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.6 (1/16)
F & HF	170~220	240~280
V-up,OH	110~160	-

Applications

Supercored 308L is designed for use in petrochemical processing, textile industries and can be used for welding 18%Cr-8%Ni stainless steels.

Characteristics on Usage

Supercored 308L for welding stainless steels has a rapid solidifying slag which enables flat and horizontal position welding. It gives a stable arc and low spatter.

Notes on Usage

① Use with 100% CO₂ or Ar + 20~25% CO₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

CO₂/Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni
0.03	0.70	1.50	0.025	0.010	19.5	9.5

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
600 (87,000)	43	-20 (-4)	60 (44)

Approval

TÜV, CE, DB

I Packing(Including Ball Pac)

Dia. (mm)	0.9	1.2	1.6	Spool(kg)	5	12.5	15
(in)	.035	.045	1/16	(lbs)	11	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	0.9 (.035)	1.2 (.045)	1.6 (1/16)
F&HF	120~180	150~220	240~300

Supercored 309L

TYPE : Rutile

AWS A5.22/ASME SFA5.22 E309LT0-1/-4
JIS Z3323 TS309L-FB0
EN ISO 17633-A-T 23 12 L R M/C 3

Applications

Supercored 309L is designed for the welding of dissimilar metals such as stainless steels and carbon steels or stainless steels and low alloy steels.

Characteristics on Usage

Supercored 309L which contains a high ferrite level in its austenitic structure has excellent heat and corrosion resistibility. It has a good stable arc and excellent slag removal properties.

Notes on Usage

① Use with 100% CO₂ or Ar + 20~25% CO₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

CO₂/Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni
0.03	0.70	1.50	0.025	0.010	23.5	12.5

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
600 (87,000)	35	-20 (-4)	50 (37)

Approval

I Packing(Including Ball Pac)

TÜV, CE, DB, BV, DNV, GL	Dia. (mm) (in)	0.9	1.2	1.6	Spool(kg) (lbs)	5	12.5	15
		.035	.045	1/16		11	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in) F & HF	0.9 (.035) 120~180	1.2 (.045) 150~220	1.6 (1/16) 240~300
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Supercored 309MoL

TYPE : Rutile

AWS A5.22/ASME SFA5.22 E309LMoT0-1/-4
JIS Z3323 TS309LMo-FB0
EN ISO 17633-A-T 23 12 2 L R M/C 3

Applications

Supercored 309MoL is designed for applications of resistance to corrosion and for the joining of stainless to mild or low alloy steels.

Characteristics on Usage

Supercored 309MoL which contains a high ferrite level in austenitic has excellent heat, corrosion and crack resistibility. It has a good stable arc and excellent slag removal properties.

Notes on Usage

① Use with 100% CO₂ or Ar + 20~25% CO₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

CO₂ VAr+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni	Mo
0.03	0.60	1.30	0.025	0.010	23.0	12.5	2.5

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
600 (87,000)	35	-20 (-4)	50 (37)

Approval I Packing(Including Ball Pac)

BV, DNV, GL	Dia. (mm)	0.9	1.2	1.6	Spool(kg)	5	12.5	15
	(in)	.035	.045	1/16		(lbs)	11	28 33

Sizes Available and Recommended Currents (Amp.)

Size mm (in) F&HF	0.9 (.035) 120~180	1.2 (.045) 150~220	1.6 (1/16) 240~300
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Supercored 316L

TYPE : Rutile

AWS A5.22/ASME SFA5.22 E316LT0-1/-4
JIS Z3323 TS316L-FB0
EN ISO 17633-A-T 19 12 3 L R M/C 3

Applications

Supercored 316L is designed for the welding of low carbon 18%Cr-12%Ni-2%Mo stainless steels or for the welding of dissimilar joints of stainless steels.

Characteristics on Usage

Supercored 316L gives good arc stability and easy slag removal due to its low carbon content. It has excellent resistance against granular corrosion.

Notes on Usage

① Use with 100% CO₂ or Ar + 20~25%CO₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

CO₂/Ar+20~25%CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	P	S	Cr	Ni	Mo
0.03	0.70	1.40	0.025	0.010	18.0	12.0	2.5

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% CO₂)

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
590 (85,600)	40	-20 (-4)	50 (37)

Approval

I Packing(Including Ball Pac)

TÜV, CE, DB, BV, DNV, GL	Dia. (mm) (in)	0.9 .035	1.2 .045	1.6 1/16	Spool(kg) (lbs)	5 11	12.5 28	15 33
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Sizes Available and Recommended Currents (Amp.)

Size mm (in) F & HF	0.9 (.035) 120~180	1.2 (.045) 150~220	1.6 (1/16) 240~300
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Applications

SF-409Ti is a metal type flux cored wire designed for the horizontal fillet welding of AISI 409 ferrite stainless steels.

Characteristics on Usage

This wire has been specifically formulated for use in the welding of automotive exhaust systems and mufflers.

It benefits from being spatter free and without slag formation when used with argon or argon oxygen mixed shielding gas. It also has an excellent deposition rate and corrosion resistance. High speed welding can be carried out with this product on thin plate material without burning through.

SF-409Ti can be used in the welding of similar chemical composition alloys.

Notes on Usage

① Use with Ar or Ar + 2~5%O₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

Ar/Ar+2~5%O₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% Ar)

C	Si	Mn	P	S	Cr	Ti
0.03	0.50	0.55	0.012	0.010	12.5	1.0

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% Ar)

TS MPa(lbs/in ²)	EL (%)
500 (72,600)	20

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	Spool(kg)	12.5	15
(in)	.045	(lbs)	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F&HF	1.2 (.045) 150~250
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SF-430

TYPE : Metal-Cored

AWS A5.9 /ASME SFA5.9 EC430
JIS Z3323 TS430-MAO

Applications

SF-430 is a metal cored wire for horizontal, fillet and flat position welding of 409 and 430 type stainless steels as found in ferrite stainless steels automotive mufflers.

Characteristics on Usage

This wire gives excellent bead appearance and provides the operator with a soft stable arc and very low spatter levels thus giving enhanced cosmetic appearance.

Notes on Usage

- ① Use with Ar or Ar + 2~5%O₂ gas.

Welding Position	Current	Shielding Gas
	DC +	Ar/Ar+2~5%O ₂
1G 2F		

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% Ar)

C	Si	Mn	P	S	Cr	Ti
0.03	0.30	0.50	0.005	0.010	16.5	0.45

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% Ar)

TS MPa(lbs/in ²)	EL (%)	Heat Treatment
500 (72,600)	40	770° C(1418°F) × 4hr FC to 600° C(1112°F) AC to RT

Approval I Packing(Including Ball Pac)

Dia. (mm)	1.2	Spool(kg)	12.5	15
(in)	.045	(lbs)	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F & HF	1.2 (.045) 150~250
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SF-430Nb

TYPE : Metal-Cored

JIS Z3323 TS430Nb-MAO
EN 12072 G Z 17 L Nb

Applications

SF-430Nb is a metal cored wire for horizontal, fillet and flat position welding of 409 and 430 type stainless steel as found in ferrite stainless steel automotive mufflers.

Characteristics on Usage

This wire gives excellent bead appearance and provides the operator with a soft stable arc and very low spatter levels thus giving enhanced cosmetic appearance.

Notes on Usage

① Use with 100%Ar or Ar+2~5%O₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

Ar/Ar+2~5%O₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: Ar+2%O₂)

C	Si	Mn	P	S	Cr	Nb	Ti
0.03	0.40	0.17	0.010	0.010	16.5	0.50	0.40

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: Ar+2%O₂)

TS MPa(lbs/in ²)	EL (%)
520 (75,400)	24

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	Spool(kg)	12.5	15	20
(in)	.045	(lbs)	28	33	44

Sizes Available and Recommended Currents (Amp.)

Size mm(in) F&HF	1.2 (.045) 150~250
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SF-436

TYPE : Metal-Cored

Applications

SF-436 is a metal cored wire for horizontal, fillet and flat position welding of 409,430 and 436 type stainless steels as found in ferrite stainless steels automotive mufflers.

Characteristics on Usage

This wire gives excellent bead appearance and provides the operator with a soft stable arc and very low spatter levels thus giving enhanced cosmetic appearance.

Notes on Usage

① Use with Ar or Ar + 2~5% O₂ gas.

Welding Position



1G 2F 3G 4G

Current

DC +

Shielding Gas

Ar/Ar+2~5%O₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% Ar)

C	Si	Mn	P	S	Cr	Mo	Ti
0.03	0.60	0.40	0.008	0.010	17.5	1.0	0.40

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% Ar)

TS MPa(lbs/in ²)	EL (%)	Heat Treatment
500 (72,600)	35	770° C × 4hr FC to 600° C AC to RT

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	Spool(kg)	12.5	15
(in)	.045	(lbs)	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)
F&HF	150~250

SC-439Ti Cored

TYPE : Metal-Cored

Applications

SC-439Ti Cored is a metal cored wire designed for flat and horizontal fillet welding of AISI 439 ferrite stainless steels.

Characteristics on Usage

This wire has specifically formulated for use in the welding of automotive exhaust systems and mufflers. It benefits from being spatter free and without slag formation when used in conjunction with argon or argon oxygen mixed shielding gas. It also has an excellent deposition rate and corrosion resistance.

High speed welding can be carried out with this product on thin plate material without burning through. SC-439Ti Cored can used in the welding of similar chemical composition alloys.

Notes on Usage

① Use with Ar or Ar + 2~5%O₂ gas.

Welding Position



1G 2F

Current

DC +

Shielding Gas

Ar/Ar+2~5%O₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% Ar)

C	Si	Mn	P	S	Cr	Ti
0.03	0.30	0.60	0.005	0.010	18.5	0.75

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% Ar)

TS MPa(lbs/in ²)	EL (%)	Heat Treatment
500 (72,600)	40	770° C × 4hr FC to 600° C AC to RT

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	Spool(kg)	12.5	15
(in)	.045	(lbs)	28	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)
F & HF	150~250

SC-42H

Applications

SC-42H is welding for the wearing part between metals such as machines, construction, building, crane wheel, shaft, etc.

Characteristics on Usage

SC-42H is a flux cored wire designed for hardfacing application with 100% CO₂ shielding gas. It is highly recommendable to use on wear and impact between metals. The pure hardness of welded metal is HRC41~44.

Notes on Usage

- ① Preheat at 150°C(302°F) and more than that in general.
- ② Use with 100% CO₂ shielding gas.

Welding Position	Current	Shielding Gas
 1G	DC+	CO ₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	Cr	Mo	V	Nb	Co
0.10	0.50	1.60	4.95	2.60	0.34	0.34	1.05

Typical Mechanical Properties of All-Weld Metal

Preheat temp.°C(°F)	Postheat	Heat Treatment	Hardness(HRC)
150 (302)	-	-	42~44

Approval

I Packing

Dia. (mm)	1.6	Spool(kg)	15
(in)	1/16	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.6(1/16)
F	300~380

Applications

For intermetallic abrasion, hardfacing of roller, gear, etc, welding between wear metals.

Characteristics on Usage

SC-250H is a flux cored wire designed for hardfacing application with 100% CO₂ shielding gas. It is highly recommendable to use on wear plate and weld metal's hardness should be over Hv 250

Notes on Usage

- ① Preheat at 150°C(302°F) and more than that in general.
- ② Use with 100% CO₂ shielding gas.

Welding Position



1G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr
0.06	0.5	1.6	1.2

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% Ar)

Preheat temp. °C (°F)	HRc	Hardness	Hv
150 (302)	25~30		260~300

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.6	Spool(kg)	15
(in)	.045	1/16	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)		
F	1.2 (.045)	1.6 (1/16)
	250~350	300~380

Applications

For intermetallic abrasion, hardfacing of roller, gear, etc, welding between wearred metals.

Characteristics on Usage

SC-350H is a flux cored wire designed for hardfacing application with 100% CO₂ shielding gas. It is highly recommendable to use on wear plate and weld metal's hardness should be over Hv 350

Notes on Usage

- ① Preheat at 150℃(302°F) and more than that in general.
- ② Use with 100% CO₂ shielding gas.

Welding Position	Current	Shielding Gas
 1G	DC +	CO ₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr	Mo
0.1	0.6	1.6	1.2	0.3

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% Ar)

Preheat temp.℃ (°F)	HRc	Hardness	Hv
150 (302)	35~40		350~400

Approval I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.6	Spool(kg)	15
(in)	.045	1/16	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	1.2 (.045)	1.6 (1/16)
F	250~350	300~380

Applications

For intermetallic abrasion, hardfacing of roller, gear, etc, welding between wear metals.

Characteristics on Usage

SC-450H is a flux cored wire designed for hardfacing application with 100% CO₂ shielding gas. It is highly recommendable to use on wear plate and weld metal's hardness should be over Hv 450

Notes on Usage

- ① Preheat at 150°C(302°F) and more than that in general.
- ② Use with 100% CO₂ shielding gas.

Welding Position



1G

Current

DC +

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr	Mo
0.2	0.7	1.5	1.8	0.6

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: 100% Ar)

Preheat temp. °C (°F)	HRc	Hardness	Hv
150 (302)	45~49		450~500

Approval

I Packing(Including Ball Pac)

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	15
(in)	.045	.052	1/16	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2 (.045)	1.4 (.052)	1.6 (1/16)
F	250~300	280~340	300~380

Applications

For intermetallic abrasion, hardfacing of roller, gear, etc, welding between wear metals.

Characteristics on Usage

SC-600H is a flux cored wire designed for hardfacing application with 100% CO₂ shielding gas. It is highly recommendable to use on wear plate and weld metal's hardness should be over Hv 600

Notes on Usage

- ① Preheat at 150°C(302°F) and more than that in general.
- ② Use with 100% CO₂ shielding gas.

Welding Position	Current	Shielding Gas
	DC+	CO ₂
1G		

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	Cr	Mo
0.37	0.5	0.75	4.1	0.58

Typical Mechanical Properties of All-Weld Metal

Preheat temp.°C (°F)	HRc	Hardness	Hv
150 (302)	55~60		620~660

Approval I Packing

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	15
(in)	.045	.052	1/16	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2(.045)	1.4(.052)	1.6(1/16)
F	250~300	280~340	300~380

Applications

For intermetallic abrasion, hardfacing of roller, gear, etc, welding between wear metals.

Characteristics on Usage

SC-700H is a flux cored wire designed for hardfacing application with 100% CO₂ shielding gas. It is highly recommendable to use on wear plate and weld metal's hardness should be over Hv 700

Notes on Usage

- ① Preheat at 150°C(302°F) and more than that in general.
- ② Use with 100% CO₂ shielding gas.

Welding Position(All-Position)



1G

Current

DC+

Shielding Gas

CO₂

Typical Chemical Composition of All-Weld Metal (%) (Shielding Gas: 100% CO₂)

C	Si	Mn	Cr	W
0.7	0.6	1.3	5.2	0.4

Typical Mechanical Properties of All-Weld Metal

Preheat temp. °C (°F)	HRc	Hardness	Hv
150 (302)	60~62		700~720

Approval

I Packing

Dia. (mm)	1.2	1.4	1.6	Spool(kg)	15
(in)	.045	.052	1/16	(lbs)	33

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	1.2(.045)	1.4(.052)	1.6(1/16)
F	250~300	280~340	300~380

Supershield AP-O

Description & Applications

It is suitable for the build up on the part which has high impact and weight or joining build up. (Crusher Rolls & Components : High-Mn/Cr type)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr
0.4	0.5	16.5	13.0

Hardness

HRc
18~22
WH40~50

Packaging Standard

Dia.(mm)	1.6/2.4/2.8
Coil(kg)	25
Pailpack(kg)	150, 250

Supershield 16Mn-O

Description & Applications

It is suitable for the build up depositing Mn steel, the saw of crusher, roller, the train rail. (Crusher Hammer, Liners : High-Mn type)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr
0.6	0.5	16.5	3.0

Hardness

HRc
18~22
WH40~50

Packaging Standard

Dia.(mm)	2.4/2.8
Coil(kg)	25
Pailpack(kg)	150, 250

Supershield 307-O

Description & Applications

It has good work hardening and anti rusty as Austenite. It can be used for roller and guide. (Buffer layer, Crane & Mine Car Wheels)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Ni	Cr	Mo
0.10	0.6	6.0	8.5	19.0	1.0

Hardness

HRc
15~20
WH40~50

Packaging Standard

Dia.(mm)	2.8
Coil(kg)	25
Pailpack(kg)	150, 250

Supershield 309L-O

Description & Applications

Cr, Ni Alloy, diluting base steels to obtain deposited metal of 304 element. (Welding of dissimilar metals, Cladding : High-Cr/Ni STS type)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Ni	Cr
0.03	0.5	1.4	12.5	23.0

Hardness

HRc
-

Packaging Standard

Dia.(mm)	2.8
Coil(kg)	25
Pailpack(kg)	150, 250

SC-BU Cored

Description & Applications

Build up as low alloy steels (Build-Up : Low Alloy type).

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr
0.12	0.8	2.7	1.0

Hardness

HRc
25~35

Packaging Standard

Dia.(mm)	2.4/2.8
Coil(kg)	25
Pailpack(kg)	150, 250

Supershield 430-O

Description & Applications

Good weldability(Non-Gas) and PWHT is not required.
(Steel Mill Rolls, Casting Rolls)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr
0.06	0.7	0.9	17.0

Hardness

HRc
-

Packaging Standard

Dia.(mm)	2.4/2.8
Coil(kg)	25
Pailpack(kg)	150, 250

Supershield 410NiMo-O

Description & Applications

Good weldability(Non-Gas) and PWHT is not required.
(Steel Mill Rolls, Casting Rolls)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Ni	Cr	Mo	Nb
0.06	0.7	0.9	4.2	13.0	0.5	0.2

Hardness

HRc
34~38

Packaging Standard

Dia.(mm)	2.4/2.8
Coil(kg)	25
Pailpack(kg)	150, 250

SC-410NiMoS

Description & Applications

Good at defect-resistance and weldability etc. by shielding weld metal with flux from defects.
(Steel Mill Rolls, Casting Rolls)

Welding Process

SAW Type (with S-717, S-400HF Flux)

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Ni	Cr	Mo
0.06	0.7	1.8	4.5	13.0	0.5

Hardness

HRc
34~38

Packaging Standard

Dia.(mm)	3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-414S

Description & Applications

Good at defect-resistance and weldability etc. by shielding weld metal with flux from defects.
(Steel Mill Rolls, Casting Rolls)

Welding Process

SAW Type (with S-717, S-400HF Flux) DC +

Current Type

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Ni	Cr	Mo	Nb	V
0.15	0.5	1.5	2.8	13.8	1.2	0.2	0.2

Hardness

HRc
40~45

Packaging Standard

Dia.(mm)	2.4/3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-420S

Description & Applications

Good at defect-resistance and weldability etc. by shielding weld metal with flux from defects.
(Steel Mill Rolls, Casting Rolls)

Welding Process

SAW Type (with S-717, S-400HF Flux) DC +

Current Type

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Ni	Cr	Mo	Nb	W	V
0.3	0.7	1.8	0.5	12.2	1.6	0.15	1.4	0.2

Hardness

HRc
48~52

Packaging Standard

Dia.(mm)	3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-420SG

Description & Applications

Good at defect-resistance and weldability etc. by shielding weld metal with flux from defects.
(Steel Mill Rolls, Casting Rolls)

Welding Process

SAW Type (with S-717, S-400HF Flux)

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Ni	Cr	Nb
0.23	0.5	1.5	0.2	13.0	0.2

Hardness

HRc
48~52

Packaging Standard

Dia.(mm)	3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-423S

Description & Applications

Good at defect-resistance and weldability etc. by shielding weld metal with flux from defects.
(Steel mill Roll, Casting Roll)

Welding Process

SAW Type (with S-717, S-400HF Flux)

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Ni	Cr	Mo	Nb	V
0.06	0.40	1.40	2.4	17.0	1.10	0.20	0.30

Hardness

HRc
-

Packaging Standard

Dia.(mm)	3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-430S

Description & Applications

Good at defect-resistance and weldability etc. by shielding weld metal with flux from defects.
(Steel mill Roll, Casting Roll)

Welding Process

SAW Type (with S-717, S-400HF Flux) DC +

Current Type

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr
0.06	0.80	1.40	17.0

Hardness

HRc
48~52

Packaging Standard

Dia.(mm)	3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-30S

Description & Applications

For Low/Middle alloy type metal-metal wear-resistance
(Crane Wheel, Rod Wheel, Tractor Roller etc.)

Welding Process

SAW Type (with S-717 Flux)

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr	Mo
0.13	0.4	1.8	2.0	0.35

Hardness

HRc
28~32

Packaging Standard

Dia.(mm)	3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-45S

Description & Applications

Build up or Hardfacing on the part which does not have much alloy elements.
(Crane & Mine Car Wheels)

Welding Process

SAW Type (with S-717, S-400HF Flux)

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr	Mo
0.2	0.4	1.8	3.2	0.5

Hardness

HRc
40~45

Packaging Standard

Dia.(mm)	3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-48S

Description & Applications

For Middle alloy type metal-metal wear-resistance.
(Crane Wheel, Rod Wheel, Tractor Roller etc.)

Welding Process

SAW Type (with S-717, S-400HF Flux)

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr	Mo	V
0.25	0.8	2.5	6.0	0.6	0.3

Hardness

HRc
46~50

Packaging Standard

Dia.(mm)	3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-55S

Description & Applications

For the hardfacing of Steel mill table roll as Martensite alloy
(Steel Mill Rolls - required to get high hardness and abrasion resistance)

Welding Process

SAW Type (with S-717, S-400HF Flux) DC +

Current Type

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Cr	Mo	W
0.30	0.5	1.6	6.1	1.5	1.5

Hardness

HRc
50~55

Packaging Standard

Dia.(mm)	3.2
Coil(kg)	25
Pailpack(kg)	150, 250

SC-A4S

AWS A5.23 F8P2 ECA4-A4

Description & Applications

For High strength TMCP or Creep-resistance steels.
(Creep-resistance steels, Fine-grained steels)

Welding Process

SAW Type (with S-717 Flux)

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	Mo
0.10	0.4	1.4	0.5

Typical Mechanical Properties (PWHT)

Y.S MPalbs/in ²)	T.S MPalbs/in ²)	EL. (%)	Temp. °C (°F)	CVN-Impact Value J(ft.lbs)	Heat Treatment
610 (88,000)	676 (97,000)	24.4	-29 (-20)	70 (52)	600° C(1112° F)×1hr FC

Packaging Standard

Dia.(mm)	2.4
Coil(kg)	25
Pailpack(kg)	150, 250

Supershield CrC

Description & Applications

To use on severe abrasive part such as Gyratory Cone & Mantles, Chemical Pipe & Valve.
(Pulverizer Rolls & Tables : Cr-Carbide type)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

Dia.(mm)	C	Si	Mn	Cr
1.2/1.6	4.8	0.4	1.6	27.0
2.4/2.8	5.5	0.7	1.6	30.0

Hardness

Dia.(mm)	(HRc)
1.2/1.6	54~58
2.4/2.8	58~62

Packaging Standard

Dia.(mm)	1.2/1.6	2.4/2.8
Type(kg)	15kg Spool	25kg Coil
Pailpack(kg)	-	150, 250

Supershield CrCW

Description & Applications

Use on wear plate (Raw material transfer and storage tank : Cr-Carbide type)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

Dia.(mm)	C	Si	Mn	Cr
1.2/1.6	5.2	0.8	0.8	25.0
2.4/2.8	5.8	1.8	1.8	25.0

Hardness

Dia.(mm)	(HRc)
1.2/1.6	54~58
2.4/2.8	60~64

Packaging Standard

Dia.(mm)	1.2/1.6	2.4/2.8
Type(kg)	15kg Spool	25kg Coil
Pailpack(kg)	-	150, 250

Supershield CrCH

Description & Applications

Use on wear plate(Crush rolls, wear plate, screw augers,coal pulverizer rolls, earth engaging tools, slurry pipe and elbows). Single layer deposit make sure of high hardness(HRC=59)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

Dia.(mm)	C	Si	Mn	Cr	Others
2.8	5.8	1.6	0.2	29.0	+

Hardness

Dia.(mm)	(HRc)
2.8	60~64
Single layer	59
2nd layer	62

Packaging Standard

Dia.(mm)	2.8
Type(kg)	25kg Coil
Pailpack(kg)	150, 250

Supershield CrCNb

Description & Applications

To use on severe abrasive part such as conveyor screws, wear plates, bucket teeth on bucket wheel excavators.(Cr-carbide+Nb-carbide)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

Dia.(mm)	C	Si	Mn	Cr	Nb	Others
2.8	5.4	1.0	0.2	24.0	7.0	+

Hardness

Dia.(mm)	(HRc)
2.8	64~66

Packaging Standard

Dia.(mm)	1.6/2.8
Type(kg)	25kg Coil
Pailpack(kg)	150, 250

Supershield CrCB

Description & Applications

Supershield CrCB is an open arc wire. It is Chromium Carbide base added boron for hardenability. Used for hardfacing components subject to extreme abrasion and heavy impact. (Cement roll mill, Gyratory Crusher, Crusher & Coke Hammers etc.)

Welding Process

Open Arc

Current Type

DC +

Welding Position



1G

Typical Chemical Composition of All-Weld Metal (%)

Dia.(mm)	C	Si	Mn	Cr	Ti	B
3.2	4.50	0.60	1.45	26.5	0.13	0.30

Hardness

Dia.(mm)	(HRC)
3.2	60~64

Packaging Standard

Dia.(mm)	3.2
Type(kg)	25kg Coil
Pailpack(kg)	150, 250

NON-FERROUS METAL WELDING CONSUMABLES



Applications

SR-182 is designed for welding of Inconel 600 + 601 and dissimilar welding of stainless steels and low-alloyed steel & Nickel-alloyed steel. It can be used for welding of Ni-Cr-Fe alloyed clad steel as well.

Characteristics on Usage

SR-182 has an excellent crack resistibility due to high portion of Mn of weld metal. Arc & slag stability make good bead appearance as well. In practice welding, superior anti-heat feature enables better productivity.

Notes on Usage

- ① Remove rust, scales, oil, paint, slag of tack welds.
- ② Keep the arc as short as possible.
- ③ Dry the electrodes at 350~450°C(482~842°F) for 60 minutes before use.
- ④ Keep the welding current as low as possible.

Welding Position



1G 2F 3G 4G

Current

AC or DC +

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Cr	Na+Ta	Fe
0.060	0.45	6.20	0.010	0.010	72.0	16.5	1.8	5.2

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp. °C (°F)	CVN-Impact Value J (ft · lbs)
640 (93,300)	40	-196 (-321)	76 (56)

Approval

I Packing

Packet 5 kg (11 lbs)
Carton 5 kg (11 lbs) × 4 : 20kg(44 lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm (in)	3.2 (1/8)	4.0 (5/32)
Length mm(in)	350 (14)	350 (14)
F	70 - 115	95 - 150
V-up, OH	65 - 110	85 - 135

Applications

SR-625 is designed for welding of Inconel 600 + 625 and Nickel alloys, 9% Nickel steels.
(LNG storage tank manufacture, desulfurization, Heat exchanger, Building of chemical carrier)

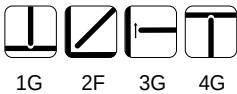
Characteristics on Usage

SR-625 has an Excellent corrosion resistance of Crevice and Pitting, SCC. it provides good tensile strength in high temperature

Notes on Usage

- ① Remove rust, scales, oil, paint, slag of tack welds.
- ② Keep the arc as short as possible.
- ③ Dry the electrodes at 300~350℃(572~662℉) for 60 minutes before use.
- ④ Keep the welding current as low as possible.

Welding Position



Current

AC or DC+

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Nb	Fe
0.06	0.35	0.001	0.001	0.003	62.61	21.21	9.2	3.58	1.57

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)	CVN-Impact Value J (ft · lbs) -196℃
772 (111,000)	32	48

Approval

ABS

I Packing

Packet 5Kg(11lbs)
Carton 5Kg(11lbs)x4: 20Kg(44lbs)

Sizes Available and Recommended Currents (Amp.)

Size mm(in)	2.6 (3/32)	3.2 (1/8)	4.0 (5/32)	5.0 (3/16)
Length mm(in)	300 (12)	350 (14)	350 (14)	350 (14)
F	90~95	100~105	120~140	140~180
V-up/OH	90~95	100~105	110~115	110~130

Applications

Used for welding heat resisting alloys including Inconel 601, Incoloy 800/800H or combination of these with other alloys for furnace equipments, petrochemical plants and power generation plants.

Characteristics on Usage

- ① Superflux300 is a inert flux that composition of Si and Mn is hardly changed though welding condition is changed, and superflux300 is a bonded type flux and a high basicity flux.
(the basicity of superflux300 is 2.7)
- ② Excellent arc stability and slag release.
- ③ Both its bead appearance and weldability are good.

Notes on Usage

- ① Dry the flux at 300~350°C (572~662°F) for 60 minutes before use.
- ② No preheat required and maximum interpass of 250°C. When welding superaustenitic alloys the interpass temperature should be controlled to a maximum of 100°C.

Welding Position

Current



1G 2F 3G 4G

AC or DC ±

Typical Chemical Composition of All-Weld Metal (%)

C	Si	Mn	P	S	Cr	Ni	Mo	Nb
0.023	0.44	0.40	0.003	0.002	21.0	61.8	9.0	3.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs)
715 (103,000)	37.7	-

Typical Welding Conditions (DC +)

Dia(mm)	Amp(A)	Vol(V)	Cpm(cm/min)	Remark
2.4	250~400			
3.2	300~450	28~36	30~60	
4.0	400~600			

Applications

- ① Used for high-alloy steel, heat-resistant steel, 9%Ni steel and similar steel with high notch toughness at extra-low temperatures.
- ② Used for welding heat resisting alloys including Inconel 601, Incoloy 800/800H or combination of these with other alloys for furnace equipments, petrochemical plants and power generation plants.

Characteristics on Usage

- ① SMT-625 is a wire with about 68%Ni+22%Cr+9%Mo+3.5%Nb for strong tough corrosion and heat resistant deposit.
- ② No preheat required and maximum interpass of 250℃. When welding superaustenitic alloys the interpass temperature should be controlled to a maximum of 100℃.

Shielding Gas	Welding Currents	GMAW	GTAW
Ar, Ar + He		DC+(Pulse)	DC -

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Cr	Ni	Mo	Nb
0.02	0.20	0.03	0.006	0.001	22.0	64.0	9.00	3.60

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)	Temp. ℃ (°F)	CVN-Impact Value J (ft · lbs)
770 (111,000)	40	-196 (-320)	100 (75)

Packing

SMT-625	Size(mm)	1.0	1.2	1.4	1.6
	Weight	Spool: 12.5kg			
	Size(mm)		2.0	2.4	3.2
	Weight	5kg*1,000mm			

Approval

ABS, GL, LR, DNV, NK, BV, KR

Applications

Used for welding of LNG storage tank. (welding for 9%Ni steel), FPSO

Characteristics on Usage

- ① Having good toughness at cryogenic temperature.
- ② Provide excellent strength in various temperature range.
- ③ stable arc and smooth bead appearance.

Shielding Gas

Ar, Ar+He

Welding Currents

GMAW

DC+(Pulse)

GTAW

DC-

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu	W
0.014	0.012	0.010	0.002	0.001	70.20	2.0	19.4	0.01	2.62

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs) -196°C
725 (105,100)	38.0	176

Packing

SMT-08	Size(mm)	1.0	1.2	1.6
	Weight	Spool: 12.5kg		
	Size(mm)	2.0	2.4	3.2
	Weight	5kg*1,000mm		

Applications

Ship engine, Heat exchanger, Sea plant, Chemical plant, FGD, etc.

Characteristics on Usage

- ① SM-455 and ST-455 has high level of corrosion resistance in multiple chemical environment(chlorine, formic acid, acetic acid, sea water).
- ② SM-455 and ST-455 have high level of stability, resistance of stress, corrosiveness and oxidation.
- ③ Avoid high level of heat treatment.

Shielding Gas	Welding Currents	GMAW	GTAW
Ar, Ar+He		DC+(Pulse)	DC-

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Fe
0.013	0.05	0.01	0.004	0.003	65.0	17.5	15.0	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)
700 (101,000)	40.0

Packing

SM-455	Size(mm)	1.0	1.2	1.4	1.6
	Weight	Spool: 12.5kg			
ST-455	Size(mm)		2.0	2.4	3.2
	Weight	5kg*1,000mm			

Applications

FGD, Offshore structures and Petrochemical plants

Characteristics on Usage

- ① SMT-22 has a extreamly high resistance for corrosion of a limited part
- ② Welding for Inconel 625+601, Hastelloy C-22, and Overlay of Ni-Alloy metals

Shielding Gas	Welding Currents	GMAW	GTAW
Ar, Ar+He		DC+(Pulse)	DC -

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ni	Cr	Mo	Co	V	W	Cu	Fe
0.009	0.06	0.38	0.001	0.001	55.52	22.30	14.10	0.04	0.04	2.85	0.01	4.13

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)
720 (104,000)	41.0

Packing

SMT-22	Size(mm)	1.0	1.2	1.6
	Weight	Spool: 12.5kg		
	Size(mm)	2.0	2.4	3.2
	Weight	5kg*1,000mm		

Applications

LNG and LPG storage plant, boilers of thermal power station.

Characteristics on Usage

- ① SM-82(ST-82) is a Ni-based MIG(TIG) wire for welding a wide range of Ni based alloys and high temperature alloys.
- ② Used where good corrosion-resistance and heat-resistance for the GMAW(GTAW) of high-alloyed steel, heat-resistant steel, and corrosion-resistant steel.
- ③ Use for welding 9%Ni steels to give good strength and toughness.
- ④ Requirements for preheat and PWHT will be dependent on the base material being welded. For most nickel-base materials, no preheat is required.

Shielding Gas	Welding Currents	GMAW	GTAW
Ar, Ar + He		DC+(Pulse)	DC -

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Cr	Ni	Fe	Nb+Ta
0.04	0.20	3.20	0.006	0.001	20.0	73.0	1.00	2.50

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)	Temp. ℃ (°F)	CVN-Impact Value J (ft · lbs)	Shielding Gas
660 (93,700)	35	-196 (-320)	80 (59)	70% Ar + 30% He

Packing

SM-82	Size(mm)	1.0	1.2	1.4	1.6
	Weight	Spool: 12.5kg			
ST-82	Size(mm)		2.0	2.4	3.2
	Weight	5kg*1,000mm			

Applications

Pumps, valves, pipework and vessels for use in aggressive environments in chemical process plants, also in equipment for flue gas desulphurisation and critical equipment in offshore oil and gas production.

Characteristics on Usage

- ① SM-276(ST-276) is a Ni-based MIG(TIG) wire with 60%Ni+17%Cr+16%Mo provide good corrosion resistance in a wide range of aggressive organic and inorganic acid media.
- ② Preheat is not required, interpass temperature should preferably be kept below 100°C and heat input restricted to 1.5KJ/min.

Shielding Gas

Ar, Ar + He

Welding Currents

GMAW

DC+(Pulse)

GTAW

DC -

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Cr	Ni	Mo	W
0.02	0.05	0.50	0.003	0.001	17.0	61.0	16.00	3.50

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
750 (108,100)	33

Packing

SM-276	Size(mm)	1.0	1.2	1.4	1.6
	Weight	Spool: 12.5kg			
ST-276	Size(mm)		2.0	2.4	3.2
	Weight	5kg*1,000mm			

Applications

Used for welding of heat exchanger, piping, vessels and salt purification.

Characteristics on Usage

- ① SM-400(ST-400) is a MIG(TIG) wire with about 65%Ni+30%Cu+2%Ti+1%Fe and used for welding similar alloys and for mixed welds between them or Cupronickels and carbon steels.
- ② No preheat required, maximum interpass temperature 150°C and no PWHT required.

Shielding Gas	Welding Currents	GMAW	GTAW
Ar, Ar + He		DC+(Pulse)	DC -

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ni	Cu	Ti	Fe
0.02	0.15	3.20	0.005	0.001	64.0	29.0	2.20	0.90

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)
530 (76,400)	45

Packing

SM-400	Size(mm)	1.0	1.2	1.4	1.6
	Weight	Spool: 12.5kg			
ST-400	Size(mm)		2.0	2.4	3.2
	Weight	5kg*1,000mm			

Applications

- ① Mainly used for welding high-strength aircraft components, liquid rocket components, jet engine parts and nuclear power plants involving cryogenic temperatures.
- ② Used for welding alloys 718, 706 and X-750`.

Characteristics on Usage

- ① This is a high-strength, high-temperature resistant and corrosion resistant nickel-chromium alloy.
It is suitable for use at cryogenic temperatures and also for use in air up to 1300°F.
The alloy is readily worked and can be age-hardened.
- ② Precautions should be taken with high heat input processes to avoid microfissuring.

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Cr	Ni	Mo	Fe	Nb	Ti
0.04	0.2	0.25	0.004	0.001	19.0	53	3.1	Rem.	5.05	1.0

Typical Mechanical Properties of All-Weld Metal (Shielding Gas: Ar+He)

YS MPa(lbs/in2)	TS MPa(lbs/in2)	EL (%)
630 (91,400)	860 (123,900)	27

Typical Welding Conditions (Pulse)

Dia (mm)	Amp (A)	Vol (V)	Cpm (cm/min)	Gas Flow (ℓ /min)	Shielding Gas
1.2	250	26	30	25	100% Ar or
1.6	300	29	35		Ar +30% He

Applications

Used for welding for food machine, magnetic machine, chemical facility, plant, etc.

Characteristics on Usage

- ① SM-60 and ST-60 has high level of mechanical properties and corrosion resistance especially in alkali case.
- ② SM-60 and ST-60 can be used for welding Ni 200 + 201, double welding of Ni alloy metal, hardfacing welding, etc.

Shielding Gas	Welding Currents	GMAW	GTAW
Ar, Ar+He		DC+(Pulse)	DC -

Typical Chemical Composition of Wire (%)						
C	Si	Mn	P	S	Ni	Ti
0.02	0.40	0.40	0.005	0.001	96.0	3.0

Typical Mechanical Properties of All-Weld Metal	
TS MPa(lbs/in²)	EL (%)
480 (69,700)	30.0

Packing					
SM-60	Size(mm)	1.0	1.2	1.4	1.6
	Weight	Spool: 12.5kg			
ST-60	Size(mm)		2.0	2.4	3.2
	Weight	5kg*1,000mm			

Superflux300 × SA-82

Applications

- ① Boilers of thermal power station and Offshore structures
- ② Superflux300 X SA-82 is for welding of a wide range of Ni based alloys and high temperature alloys.

Characteristics on Usage

- ① Superflux300 is a inert flux that composition of Si and Mn is hardly changed though welding condition is changed, and is a bonded type flux and a high basicity flux(The basicity of superflux300 is 2.7)
- ② Stable Arc and Slag Release, both its bead appearance and weldability are good.

Notes on Usage

- ① Dry the flux at 300~350°C for 60 minutes before use.
- ② Avoid using high current to prevent corrosion deterioration of HAZ and control Heat input as low as possible.
- ③ No preheat required and maximum interpass of 250°C. When welding super austenitic alloys, the interpass temperature should be controlled to maximum of 100°C.

Welding Position



1G

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Cr	Ni	Mo	Ti
0.067	0.220	3.33	0.0001	0.014	19.66	69.88	0	0.119

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	CVN-Impact Value J (ft · lbs) -196°C
619 (89,000)	46.4	117

Approval

I Packing

SA-82(Wire) : 25Kg Coil
Superflux300(Flux) : 20Kg Can

NON-FERROUS

Applications

Used for welding desalination plant, evaporators, etc in salt and sea water processing system.

Characteristics on Usage

- ① SMT-7030 is a MIG(TIG) Wire used to weld different copper-nickel types Cu/Ni 70.30, 80.20 and 90.10.
- ② Preheating not normally required, maximum interpass temperature 150°C and no PWHT. contamination of the weld zone with foreign material, particularly any source of lead, tin or zinc must be scrupulously avoided to prevent weld metal cracking.

Shielding Gas	Welding Currents	GMAW	GTAW
Ar, Ar + He		DC+(Pulse)	DC -

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ni	Ti	Cu
0.02	0.20	0.90	0.001	0.001	31.0	0.40	67.0

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)
500 (72,000)	30

Packing

SMT-7030	Size(mm)	1.0	1.2	1.4	1.6
	Weight	Spool: 12.5kg			
	Size(mm)		2.0	2.4	3.2
	Weight	5kg*1,000mm			

Approval

ABS

Applications

Used for welding of offshore oil/gas, and petrochemical process industries.

Characteristics on Usage

- ① Used for welding 90%Cu-10%Ni copper-nickel alloys and dissimilar welding copper-nickel alloys.
- ② Provide good corrosion resistant in various corrosive environmental conditions.

Shielding Gas

Ar, Ar+He

Welding Currents

GMAW

DC+(Pulse)

GTAW

DC -

Typical Chemical Composition of Wire (%)

C	Si	Mn	P	S	Ni	Ti	Cu
0.005	0.04	0.85	0.006	0.001	10.5	0.27	Rem.

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in²)	EL (%)
380 (55,000)	36.0

Packing

SM-9010	Size(mm)	1.0	1.2	1.4	1.6
	Weight	Spool: 12.5kg			
ST-9010	Size(mm)		2.0	2.4	3.2
	Weight	5kg*1,000mm			

Approval

KR

APPENDIX



APPENDIX

AWS SPECIFICATIONS FOR WELDING CONSUMABLES DESIGNATIONS FOR MANUAL ELECTRODES (AWS A5.1 - 04 and A5.5 - 06)

- (1) The prefix "E" designates arc-welding electrode
- (2) The first two digits of four-digit number or the first three digits of five-digit numbers indicate minimum tensile strength.
 E60XX60,000 psi Minimum Tensile strength
 E70XX70,000 psi Minimum Tensile strength
 E110XX110,000 psi Minimum Tensile strength
- (3) The next-to-last digit indicates position.
 EXX0X, EXX1XAll positions
 EXX2XFlat position and horizontal fillets
- (4) The suffix (Example: EXXX-A1) indicates the approximate alloy in the weld deposit.

-A1	0,40-0,65% Mo
-B1	0,40-0,65%Cr,0,40-0,65% Mo
-B2	1,00-1,50%Cr,0,40-0,65% Mo
-B2L	1,00-1,50%Cr,0,40-0,65% Mo
-B3	2,00-2,50%Cr,0,90-1,20% Mo
-B3L	2,00-2,50%Cr,0,90-1,20% Mo
-B4L	1,75-2,25%Cr,0,40-0,65% Mo
-B5	0,40-0,60%Cr,1,00-1,25% Mo,0,05%V
-C1	2,00-2,75%Ni
-C1L	2,00-2,75%Ni
-C2	3,00-3,75%Ni
-C2L	3,00-3,75%Ni
-C3	0,08-1,10%Ni,0,15%Cr,0,35%Mo,0,05%V
-NM	0,08-1,10%Ni,0,05%Cr,0,40-0,65%Mo,0,02%V
-D1	0,25-0,45%Mo
-D2	0,25-0,45%Mo
-D3	0,40-0,65%Mo
-G	0,50%min. Ni,0,30%min. Cr,0,20%min. Mo,0,10%min.V (only one element required)
-M	(E9018M):1,40-1,80%Ni,0,15%Cr,0,35%Mo,0,05%V
	(E10018,M):1,40-2,10%Ni,0,35%Cr,0,25-0,50%Mo,0,05%V
	(E11018,M):1,25-2,50%Ni,0,40%Cr,0,25-0,50%Mo,0,05%V
	(E12018,M):1,75-2,50%Ni,0,30-0,55%Cr,0,30-0,5%Mo,0,05%V
-M1	3,00-3,80%Ni,0,65%Cr,0,20-0,30%Mo,0,05%V
-W	(E7018W1):0,20-0,40%Ni,0,15-0,30%Mo,0,08%V,0,30-0,60%Cu
	(E8018W2):0,40-0,80%Ni,0,45-0,70%Cr,0,30-0,75%Cu

APPENDIX

ELECTRODE DESIGNATIONS FOR COVERED ARC-WELDING ELECTRODES

(AWS A5.1 - 04)

Designation	Current	Covering Type
EXX10	DCEP only	Organic
EXX11	AC or DCEP	Organic
EXX12	AC or DCEN	Rutile
EXX13	AC or DCEP,DCEN	Rutile
EXX14	AC or DCEP,DCEN	Rutile, iron-powder (approx,30%)
EXX15	DCEP only	Low-hydrogen
EXX16	AC or DCEP	Low-hydrogen
EXX18	AC or DCEP	Low-hydrogen, iron-powder (approx,25%)
EXX19	AC or DCEP,DCEN	iron oxide titanic potassium
EXX20	AC or DCEP,DCEN	High iron - oxide
EXX24	AC or DCEP,DCEN	Rutile, iron-powder (approx,50%)
EXX27	AC or DCEP,DCEN	Mineral, iron-powder (approx,50%)
EXX28	AC or DCEP	Low-hydrogen, iron-powder (approx,50%)
EXX48	AC or DCEP	Low-hydrogen, iron-powder

MINIMUM MECHANICAL PROPERTY OF ALL WELD METAL FOR COVERED ELECTRODES FOR ARC-WELDING

(AWS A5.1 - 04)

AWS Class	Tensile Strength, min. psi	Yield Point min. psi	Elongation in 2 inch min Percent	Radiographic standard	V-notch Impact ^d
E60 Series ^b					
E6010	60,000	48,000	22	Grade II	20 ft · lb at-20°F
E6011	60,000	48,000	22	Grade II	20 ft · lb at-20°F
E6012	60,000	48,000	17	Not required	Not required
E6013	60,000	48,000	17	Grade II	Not required
E6019	60,000	48,000	22	Grade I	15ft · lb at 0°F
E6020	60,000	48,000	22	Grade II	Not required
E6027	60,000	48,000	22	Grade II	20 ft · lb at-20°F
E70 Series ^c					
E7014	70,000	58,000	17	Grade II	Not required
E7016	70,000	58,000	22	Grade I	20 ft · lb at-20°F
E7018	70,000	58,000	22	Grade I	20 ft · lb at-20°F
E7024	70,000	58,000	17	Grade II	Not required
E7028	70,000	58,000	22	Grade II	20 ft · lb at-0°F
E7048	70,000	58,000	22	Grade I	20 ft · lb at-20°F

- See AWS A5.1 - 04, Fig. 7.
- For each increase of one percentage point in elongation over the minimum, the yield point or tensile strength, or both, may decrease 1,000 psi to a minimum of 60,000 psi for the tensile strength and 48,000 psi for the yield point for all classifications of the 60 - series except E6012 and E6013. For the E6012 and E6013 classifications the yield point and tensile strength may decrease to a minimum of 65,000 psi for the tensile strength and 53,000 psi for the yield point.
- For each increase of one percentage point in elongation over the minimum, the yield point or tensile strength may decrease to a minimum of 65,000 psi for the tensile strength and 53,000 psi for the yield point.
- The extremely lowest and highest value obtained in the test shall be disregarded. Two of the three remaining values shall be greater than the specified 20 ft · lb energy level; one of the three may be lower but shall not be less than 15 ft · lb. The computed average values shall be equal to or greater than the 20 ft · lb energy level.

APPENDIX

COMPOSITION REQUIREMENTS OF COVERED ELECTRODES FOR LOW ALLOY STEELS

(AWS A5.5 - 06)

Electrode Class.	Chemical Composition, Percent						
	C	Mn	P	S			
Carbon-Molybdenum Steel Electrodes							
E7010-A1 E7011-A1 E7015-A1 E7016-A1 E7018-A1 E7020-A1 E7027-A1	0,12	0,60 0,60 0,90 0,90 0,90 0,60 1,00	0,03	0,03			
Chromium-Molybdenum Steel Electrodes							
E8016-B1 E8018-B1		0,05 to 0,12			0,90	0,03	0,03
E7016-B2L		0,05			0,90	0,03	0,03
E8016-B2 E8018-B2		0,05 to 0,12			0,90	0,03	0,03
E9015-B3 E9016-B3 E9018-B3		0,05 to 0,12			0,90	0,03	0,03
E8018-B3L E8015-B3L E8016-B5		0,05 0,05 0,07 to 0,15			0,90 0,90 0,04 to 0,70	0,03	0,03
Nickel Steel Electrodes							
E8016-C1 E8018-C1	0,12	1,25	0,03	0,03			
E8016-C2 E8018-C2	0,12	1,25	0,03	0,03			
E8016-C3 E8018-C3	0,12	0,04 to 1,25	0,03	0,03			
Manganese-Molybdenum Steel Electrodes							
E8018-D1	0,12	1,00 to 1,75	0,03	0,03			
E10015-D2 E10016-D2 E10018-D2	0,15	1,65 to 2,00	0,03	0,03			
Other Low-Alloy Steel Electrodes							
EXX10-G EXX11-G EXX13-G EXX15-G EXX16-G EXX18-G E7020-G	...	1,00min	...	...			
E9018-M E10018-M E11018-M E12018-M	0,10 0,10 0,10 0,10	0,60 to 1,25 0,75 to 1,70 1,30 to 1,80 1,30 to 2,25	0,030 0,030 0,030 0,030	0,030 0,030 0,030 0,030			

Note : single values shown are Maximum percentage except where otherwise specified

SI	NI	Cr	Mo	V
0,40 0,40 0,60 0,60 0,80 0,40 0,40	...	...	0,40 to 0,65	...
0,60 0,80	...	0,40 to 0,65	0,40 to 0,65	...
0,60	...	1,00 to 1,50	0,40 to 0,65	...
0,60	...	1,00 to 1,50	0,40 to 0,65	...
1,00	...	2,00 to 2,50	0,90 to 1,20	...
1,00 0,60 0,80	...	2,00 to 2,50	0,90 to 1,20	...
0,80	...	2,00 to 2,50	0,90 to 1,20	...
1,00	...	1,75 to 2,25	0,40 to 0,65	...
0,30 to 0,60	...	0,40 to 0,60	1,00 to 1,25	0,05
0,60 0,80	2,00 to 2,75	...	...	...
0,60 0,80	3,00 to 3,75	...	...	...
0,80	0,80 to 1,10	0,15	0,35	0,05
0,80	...	...	0,25 to 0,45	...
0,60 0,60 0,80	...	...	0,25 to 0,45	...
0,80min	0,50min	0,30min	0,20min	0,10min
0,80	1,40 to 1,80	0,15	0,35	0,05
0,60	1,40 to 2,10	0,35	0,25 to 0,50	0,05
0,60	1,25 to 2,50	0,40	0,25 to 0,50	0,05
0,60	1,75 to 2,25	0,30 to 1,50	0,30 to 0,55	0,05

APPENDIX

MECHANICAL PROPERTY REQUIREMENTS OF ALL WELD METAL FOR COVERED ELECTRODES FOR LOW ALLOY STEELS

(AWS A5.5 - 06)

AWS Classification	Tensile Strength min. psi	Yield Strength at 0.2 Percent offset, psi	Elongation 2 inch, min, Percent
E7010-X	70,000	57,000	22
E7011-X			22
E7015-X			25
E7016-X			25
E7018-X			25
E7020-X			25
E7027-X	80,000	67,000	25
E8010-X			19
E8011-X			19
E8013-X			16
E8015-X			19
E8016-X			19
E8018-X			19
E8016-C3	80,000	68,000 to 80,000	24
E8018-C3			
E9010-X	90,000	77,000	17
E9011-X			17
E9013-X			14
E9015-X			17
E9016-X			17
E9018-X			17
E9018-M	90,000	78,000 to 110,000	24
E10010-X	100,000	87,000	16
E10011-X			16
E10013-X			13
E10015-X			16
E10016-X			16
E10018-X			16
E10018-M	100,000	88,000 to 90,000	20
E11051-X	110,000	97,000	15
E11016-X			
E11018-X			
E11081-M	110,000	98,000 to 110,000	20
E12015-X	120,000	107,000	14
E12016-X			
E12018-X			
E12018-M	120,000	108,000 to 120,000	18
E12018-M1			

IMPACT-PROPERTY REQUIREMENTS OF COVERED ELECTRODES FOR LOW ALLOY STEELS

(AWS A5.5 - 06)

AWS Classification	Minimum V-Notch Impact Requirement
E8018-NM E8016-C3 E8018-C3	20 ft · lb at -40° F ^b (27J at -40°C)
E8016-D3 E8018-D3 E8015-D1 E8018-D1 E10015-D2 E10016-D2 E10018-D2	20 ft · lb at -60° F ^b (27J at -51°C)
E7018-W1 E8018-W2	20 ft · lb at 0° F ^b (27J at -18°C)
E9018-M E10018-M E11018-M E12018-M	20 ft · lb at -60° F ^b (27J at -51°C)
E12018-M1	50 ft · lb at 0° F ^b (68J at -18°C)
E8016-C1 E8018-C1	20 ft · lb at -75° F ^b (27J at -59°C)
E7015-C1L E7016-C1L E7018-C1L E8016-C2 E8018-C2	20 ft · lb at -100° F ^b (27J at -73°C)
E7015-C2L E7016-C2L E7018-C2L	20 ft · lb at -150° F ^b (27J at -101°C)
All other classifications	Not required

- The extremely lowest value obtained together with the extremely highest value shall be disregarded for this test. Two of the three remaining values shall be greater than the specified 20 ft · lb energy level; one of the three may be lower but shall not be less than 15 ft · lb. The computed average value of the three remaining values shall be equal to, or greater than, the 20 ft · lb energy level
- As-welded impact properties.
- Stress-relieved properties.

Chemical Composition Requirements for Undiluted Weld Metal

(AWS A5.4 - 06)

AWS Classification	Weight Percent ^b										Cu
	C ^a	Cr	Ni	Mo	Co(Nb) plus Ta	Mn	Si	P	S	N	
E209-XX ^c	0.06	2.50-24.0	9.5-12.0	1.5-3.0	-	4.0-7.0	1.00	0.04	0.03	0.10-0.30	0.75
E219-XX	0.06	19.0-21.5	5.5-7.0	0.75	-	8.0-10.0	1.00	0.04	0.03	0.10-0.30	0.75
E240-XX	0.06	17.0-19.0	4.0-6.0	0.75	-	10.5-13.5	1.00	0.04	0.03	0.10-0.30	0.75
E307-XX	0.04-0.14	18.0-21.5	9.0-10.7	0.5-1.5	-	3.30-4.75	1.00	0.04	0.03	-	0.75
E308-XX	0.08	18.0-21.0	9.0-11.0	0.75	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E308H-XX	0.04-0.08	18.0-21.0	9.0-11.0	0.75	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E308L-XX	0.04	18.0-21.0	9.0-11.0	0.75	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E308Mo-XX	0.08	18.0-21.0	9.0-12.0	2.0-3.0	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E308MoL-XX	0.04	18.0-21.0	9.0-12.0	2.0-3.0	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E309-XX	0.15	22.0-25.0	12.0-14.0	0.75	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E309L-XX	0.04	22.0-25.0	12.0-14.0	0.75	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E309Cb-XX	0.12	22.0-25.0	12.0-14.0	0.75	0.70-1.00	0.5-2.5	1.00	0.04	0.03	-	0.75
E309Mo-XX	0.12	22.0-25.0	12.0-14.0	2.0-3.0	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E309LMo-XX	0.04	22.0-25.0	12.0-14.0	2.0-3.0	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E310-XX	0.08-0.20	25.0-28.0	20.0-22.5	0.75	-	1.0-2.5	0.75	0.03	0.03	-	0.75
E310H-XX	0.35-0.45	25.0-28.0	20.0-22.5	0.75	-	1.0-2.5	0.75	0.03	0.03	-	0.75
E310Cb-XX	0.12	25.0-28.0	20.0-22.0	0.75	0.70-1.00	1.0-2.5	0.75	0.03	0.03	-	0.75
E310Mo-XX	0.12	25.0-28.0	20.0-22.0	2.0-3.0	-	1.0-2.5	0.75	0.03	0.03	-	0.75
E312-XX	0.15	28.0-32.0	8.0-10.5	0.75	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E316-XX	0.08	17.0-20.0	11.0-14.0	2.0-3.0	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E316H-XX	0.04-0.08	17.0-20.0	11.0-14.0	2.0-3.0	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E316L-XX	0.04	17.0-20.0	11.0-14.0	2.0-3.0	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E317-XX	0.08	18.0-21.0	12.0-14.0	3.0-4.0	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E317L-XX	0.04	18.0-21.0	12.0-14.0	3.0-4.0	-	0.5-2.5	1.00	0.04	0.03	-	0.75
E318-XX	0.08	17.0-20.0	11.0-14.0	2.0-3.0	6 C,min to 1.00 max, 8 C,min to 1.00 max,	0.5-2.5	1.00	0.04	0.03	-	0.75
E320-XX	0.07	19.0-21.0	32.0-36.0	2.0-3.0	8 C,min to 1.00 max, 8 C,min to 0.40 max,	0.5-2.5	1.00	0.04	0.03	-	3.0-4.0
E320LR-XX	0.03	19.0-21.0	32.0-36.0	2.0-3.0		1.5-2.5	0.30	0.020	0.015	-	3.0-4.0

CONTINUED

(AWS A5.4 - 06)

AWS Classification	Weight Percent ^b										
	C ^a	Cr	Ni	Mo	Cb(Nb) plus Ta	Mn	Si	P	S	N	Cu
E330-XX	0.18-0.25	14.0-17.0	33.0-37.0	0.75	-	1.0-2.5	1.00	0.04	0.03	-	0.75
E330H-XX	0.35-0.45	14.0-17.0	33.0-37.0	0.75	-	1.0-2.5	1.00	0.04	0.03	-	0.75
E347-XX	0.08	18.0-21.0	9.0-11.0	0.75	6 C, min to 1.00 max	0.5-2.5	1.00	0.04	0.03	-	0.75
E349-XX	0.13	18.0-21.0	8.0-10.0	0.35-0.65	0.75-1.20	0.5-2.5	1.00	0.04	0.03	-	0.75
E383-XX	0.03	26.5-29.0	30.0-33.0	3.2-4.2	-	0.5-2.5	0.90	0.02	0.02	-	0.6-1.5
E385-XX	0.03	19.5-21.5	24.0-26.0	4.2-5.2	-	1.0-2.5	0.90	0.03	0.02	-	1.2-2.0
E410-XX	0.12	11.0-13.5	0.7	0.75	-	1.0	0.90	0.04	0.03	-	0.75
E410NiMo-XX	0.06	11.0-12.5	4.0-5.0	0.40-0.70	-	1.0	0.90	0.04	0.03	-	0.75
E430-XX	0.10	15.0-18.0	0.6	0.75	-	1.0	0.90	0.04	0.03	-	0.75
E502-XX	0.10	4.0-6.0	0.4	0.45-0.65	-	1.0	0.90	0.04	0.03	-	0.75
E630-XX	0.05	16.00-16.75	4.5-5.0	0.75	0.15-0.30	0.25-0.75	0.75	0.04	0.03	-	3.25-4.00
E16-8.2-XX	0.10	14.5-16.5	7.5-9.5	1.0-2.0	-	0.5-2.5	0.60	0.03	0.03	-	0.75
E7Cr-XX	0.10	6.0-8.0	0.4	0.45-0.65	-	1.0	0.90	0.04	0.03	-	0.75
E2209-XX	0.04	21.5-23.5	8.5-10.5	2.5-3.5	-	0.5-2.0	0.90	0.04	0.03	0.08-0.20	0.75
E2553-XX	0.06	24.0-27.0	6.5-8.5	2.9-3.9	-	0.5-1.5	1.0	0.04	0.03	0.10-0.25	1.5-2.5

Notes:

A: Analysis shall be made for the elements for which specific values are shown in the table. If however, the presence of other elements is indicated in the course of routine analysis, further analysis shall be made to determine that the total these other elements, except iron, is not present in excess of 0.50 percent.

B: Single values are maximum percentages.

C: Classification suffix-XX may be - 15, -16, -17, -25 or -26

D: Vanadium shall be 0.10 to 0.30 percent

E: Titanium shall be 0.15 percent max.

F: Tungsten shall be from 1.25 to 1.75 percent.

APPENDIX

MECHANICAL PROPERTY REQUIREMENT OF ALL-WELD METAL FOR COVERED ELECTRODES

(AWS A5.4 - 06)

AWS Classification	Tensile strength, mi.		Elongation min, Percent	Heat Treatment
	Ksi	Mpa		
E209-XX	100	690	15	none
E219-XX	90	620	15	none
E240-XX	100	690	15	none
E307-XX	85	590	30	none
E308-XX	80	550	35	none
E308H-XX	80	550	35	none
E308L-XX	75	520	35	none
E308Mo-XX	80	550	35	none
E309-XX	80	550	35	none
E309L-XX	75	520	30	none
E309Cb-XX	80	550	30	none
E309Mo-XX	80	550	30	none
E309MoL-XX	75	520	30	none
E310-XX	80	550	30	none
E310H-XX	90	620	10	none
E310Cb-XX	80	550	25	none
E310Mo-XX	80	550	30	none
E312-XX	95	660	22	none
E316-XX	75	520	30	none
E316H-XX	75	520	30	none
E316L-XX	70	490	30	none
E317-XX	80	550	30	none
E317L-XX	75	520	30	none
E318-XX	80	550	25	none
E320-XX	80	550	30	none
E320LR-XX	75	520	30	none
E330-XX	75	520	25	none
E330H-XX	90	620	10	none
E347-XX	75	520	30	none
E349-XX	100	690	25	none
E383-XX	75	520	30	none
E385-XX	75	520	30	none
E410-XX	75	450	20	a
E410NiMo-XX	110	760	15	c
E430-XX	65	450	20	d
E502-XX	60	420	20	b
E505-XX	60	420	20	b
E630-XX	135	930	7	e
E16-8-2-XX	80	550	35	none
E7Cr-XX	60	420	20	b
E2209-XX	100	690	20	none
E2553-XX	110	760	15	none

Note:

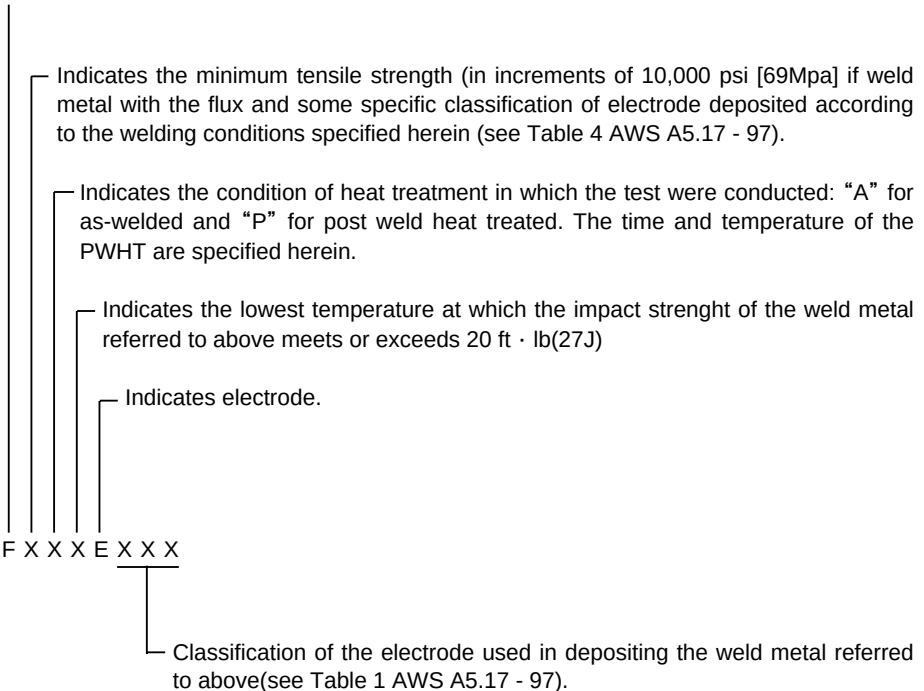
- Heat to 1350 to 1400°F (730 to 760°C), hold for one hour, furnace cool at rate of 100°F (60°C) per hour to 600°F (315°C) and air cool to ambient.
- Heat to 1550 to 1600°F (840 to 870°C), hold for two hour, furnace cool at rate not exceeding 100°F (55°C) per hour to 1100°F (595°C) and air cool to ambient.
- Heat to 1100 to 1150°F (595 to 620°C), hold for one hour, and air cool to ambient.
- Heat to 1400 to 1450°F (760 to 790°C), hold for two hour, furnace cool at rate not exceeding 100°F (55°C) per hour to 1100°F (595°C) and air cool to ambient.
- Heat to 1875 to 1925°F (1025 to 1050°C), hold for one hour, and air cool to ambient, and than precipitation harden at 1135 to 1165°F (610 to 630°C), hold for four hours, and air cool to ambient.

Classification system

1. CLASSIFICATION FOR CARBON STEEL ELECTRODES AND FLUXES FOR SUBMERGED

ARC WELDING (AWS A5.17 - 97)

Indicates flux.



Example

F7A6 - EM12K is a complete designation. It refers to a flux that will produce weld metal which, in the as - welded condition, will have a tensile strength no lower than 70,000 psi and Charpy V - notch impact strength of at least 20ft - lb at - 60° F when deposited with an EM12K electrode under the conditions called for in this specification

Specification for Carbon steel Electrodes and Fluxes for Submerged Arc Welding

(AWS A5.17 - 97)

Kind	AWS Classification	Chemical composition, Percent							Tension		Impact Values (ft · lb)
		C	Mn	Si	S	P	Cu	Total Other Element	Tension Strength (psi)	Yield Strength (psi)	
Wire	EL8	≤0.10	0.25-0.60	≤0.07	≤0.030	≤0.030	≤0.35	≤0.50	-	-	-
	EL8K	≤0.10	0.25-0.60	0.10-0.25	≤0.030	≤0.030	≤0.35	≤0.50	-	-	-
	EL12	0.04-0.14	0.25-0.60	≤0.10	≤0.030	≤0.030	≤0.35	≤0.50	-	-	-
	EM12	0.06-0.15	0.80-1.25	≤0.10	≤0.030	≤0.030	≤0.35	≤0.50	-	-	-
	EM12K	0.05-0.15	0.80-1.25	0.10-0.35	≤0.030	≤0.030	≤0.35	≤0.50	-	-	-
	EM13K	0.06-0.16	0.90-1.40	0.35-0.75	≤0.030	≤0.030	≤0.35	≤0.50	-	-	-
	EM15K	0.10-0.20	0.80-1.25	0.10-0.35	≤0.030	≤0.030	≤0.35	≤0.50	-	-	-
	EH14	0.10-0.20	1.70-2.20	≤0.10	≤0.030	≤0.030	≤0.35	≤0.50	-	-	-
Flux	F6A2-XXX	-	-	-	-	-	-	-	-	-	≥20(0°F)
	F6A0-XXX	-	-	-	-	-	-	-	-	-	≥20(-20°F)
	F6A2-XXX	-	-	-	-	-	-	-	60,000	≥48,000	≥20(-40°F)
	F6A4-XXX	-	-	-	-	-	-	-	-80,000	-	≥20(-50°F)
	F6A5-XXX	-	-	-	-	-	-	-	-	-	≥20(-60°F)
	F6A6-XXX	-	-	-	-	-	-	-	-	-	≥20(-80°F)
	F6A8-XXX	-	-	-	-	-	-	-	-	-	-
	F7A2-XXX	-	-	-	-	-	-	-	-	-	≥20(0°F)
	F7A0-XXX	-	-	-	-	-	-	-	70,000	≥48,000	≥20(-20°F)
	F7A2-XXX	-	-	-	-	-	-	-	-95,000	-	≥20(-40°F)
	F7A4-XXX	-	-	-	-	-	-	-	-	-	≥20(-50°F)
	F7A5-XXX	-	-	-	-	-	-	-	-	-	≥20(-60°F)
	F7A6-XXX	-	-	-	-	-	-	-	-	-	≥20(-80°F)

1. SPECIFICATION FOR LOW ALLOY STEEL ELECTRODES AND FLUXES FOR SUBMERGED

ARC WELDING (AWS A5.23 - 97)

Indicates flux.

Indicates the minimum tensile strength (in increments of 10,000 psi [69Mpa] of weld metal with the flux and some specific classification of electrode deposited according to the welding conditions specified herein ,Two digits are used for weld metal of 100,000 psi(690 Mpa) tensile strength and higher (see Table. 7 AWS A5. 23 - 97)

Designates the condition of heat treatment in which the test were conducted: "A" for as-welded and "P" for postweld heat treated. The time and temperature of the PWHT are specified herein.

Indicates the lowest temperature at which the impact strenght of the weld metal referred to above meets or exceeds 20 ft · lb(27J)

Indicates electrode.

Indicates composite electrode, Omission of the "C" indicates solid electrode.

Classification of the electrode used in depositing the weld metal referred to above (see Table 1).

Indicates the chemical composition of the weld metal. One or more letters or digits are used (see Table 2).

F X X X - E C X X X N - X N

The "N" is used only when footnote C to Tables 1 and 2 apply (see Appendix A 2,2 for explanation)

Example

F9P0 - EB3 - B3 is a complete designation. It refers to a flux that will produce weld metal which, in the postweld heat - treated condition, will have a tensile strength no lower than 90,000 psi and Charpy V - notch impact strength of at least 20ft · lb at 0° F when deposited with an EB3 electrode under the conditions called for in this specification/ The composition of the weld metal will be B3 (see Table 2)

Specification for Low Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

1. Composition requirements for electrodes

(AWS A5.23 - 97)

Electrode Class.	Chemical composition, Percent													Remarks
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	V	Al	Ti	Zr	
EL12	0.04/0.14	0.25/0.60	0.10	0.030	0.030	-	-	-	0.35	-	-	-	-	carbon steel
EM12K	0.05/0.15	0.80/1.25	0.10/0.35	0.030	0.030	-	-	-	0.35	-	-	-	-	steel
EA1	0.07/0.17	0.65/1.00	0.20	0.030	0.025	-	-	0.45/0.65	0.35	-	-	-	-	C-Mo steel
EA2	0.07/0.17	0.95/1.35	0.20	0.030	0.025	-	-	0.45/0.65	0.35	-	-	-	-	
EA3	0.07/0.17	1.65/2.20	0.20	0.030	0.025	-	-	0.45/0.65	0.35	-	-	-	-	
EA4	0.07/0.17	1.20/1.70	0.20	0.030	0.025	-	-	0.45/0.65	0.35	-	-	-	-	
EB2	0.07/0.15	0.45/1.00	0.05/0.30	0.030	0.025	1.00/1.75	-	0.45/0.65	0.35	-	-	-	-	
EB2H	0.28/0.33	0.45/0.80	0.55/0.75	0.015	0.015	1.00/1.50	-	0.10/0.65	0.30	0.20/0.30	-	-	-	
EB3	0.05/0.15	0.40/0.80	0.05/0.30	0.025	0.025	2.25/3.00	-	0.90/1.10	0.35	-	-	-	-	Cr-Mo steel
EB5	0.18/0.23	0.40/0.70	0.40/0.60	0.025	0.025	0.45/0.65	-	0.90/1.10	0.35	-	-	-	-	
EB6	0.10	0.35/0.70	0.05/0.60	0.025	0.025	4.50/6.00	-	0.45/0.70	0.35	-	-	-	-	
EB6H	0.25/0.40	0.75/1.00	0.25/0.50	0.030	0.025	4.80/6.00	-	0.45/0.65	0.35	-	-	-	-	
EN1	0.12	0.75/1.25	0.05/0.30	0.020	0.020	0.15	0.75/1.25	0.30	0.35	-	-	-	-	Ni steel
EN2	0.12	0.75/1.25	0.05/0.30	0.020	0.020	-	2.10/2.90	-	0.35	-	-	-	-	
EN3	0.13	0.60/1.20	0.05/0.30	0.020	0.020	0.15	3.10/3.80	-	0.35	-	-	-	-	
EN4	0.12/0.19	0.60/1.00	0.10/0.30	0.020	0.015	-	1.60/2.10	0.10/0.30	0.35	-	-	-	-	
EF1	0.07/0.15	0.90/1.70	0.15/0.35	0.025	0.025	-	0.95/1.60	0.25/0.55	0.35	-	-	-	-	
EF2	0.10/0.18	1.70/2.40	0.20	0.025	0.025	-	0.40/0.80	0.40/0.65	0.35	-	-	-	-	
EF3	0.10/0.18	1.70/2.40	0.30	0.025	0.025	-	0.70/1.10	0.40/0.65	0.35	-	-	-	-	
EF4	0.16/0.23	0.60/0.90	0.15/0.35	0.035	0.025	0.10/0.60	0.10/0.80	0.15/0.30	0.35	-	-	-	-	Other low alloy steel
EF5	0.10/0.17	1.70/2.20	0.20	0.010	0.010	0.25/0.50	2.30/2.80	0.45/0.65	0.50	-	-	-	-	
EF6	0.07/0.15	1.45/1.90	0.10/0.30	0.015	0.015	0.20/0.55	1.75/2.25	0.40/0.65	0.25	-	-	-	-	
EM2	0.10	1.25/1.80	0.20/0.60	0.010	0.010	0.30	1.40/2.10	0.25/0.55	0.25	0.05	0.10	0.10	0.10	
EM3	0.10	1.40/1.80	0.20/0.60	0.010	0.010	0.55	1.90/2.60	0.25/0.65	0.25	0.04	0.10	0.10	0.10	
EM4	0.10	1.40/1.80	0.20/0.60	0.010	0.010	0.60	2.00/2.80	0.30/0.65	0.25	0.03	0.10	0.10	0.10	
EW	0.12	0.35/0.65	0.20/0.35	0.040	0.030	0.50/0.80	0.40/0.80	-	0.30/0.80	-	-	-	-	
EG	-	-	-	-	-	-	-	-	-	-	-	-	-	

Specification for Low Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

2. Composition requirements for weld metal (both solid and composite electrodes)

(AWS A5.23 - 97)

Electrode Class.	Chemical composition, Percent										Remarks
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	V,Ti,Zr	
A1	0.12	1.00	0.80	0.040	0.030	-	-	0.40/0.65	0.35	-	C-Mo steel
A2	0.12	1.40	0.80	0.040	0.030	-	-	0.40/0.65	0.35	-	
A3	0.15	2.10	0.80	0.040	0.030	-	-	0.40/0.65	0.35	-	
A4	0.15	1.60	0.80	0.040	0.030	-	-	0.40/0.65	0.35	-	
B2	0.15	1.20	0.80	0.010	0.030	-	1.00/0.50	0.40/0.65	0.35	-	Cr-Mo steel
B2H	0.10/0.25	1.20	0.80	0.040	0.030	-	1.00/1.50	0.40/0.65	0.35	0.30V	
B3	0.15	1.20	0.80	0.040	0.030	-	2.00/2.50	0.90/1.20	0.35	-	
B4	0.12	1.20	0.80	0.040	0.030	-	1.75/2.25	0.40/0.65	0.35	-	
B5	0.18	1.20	0.80	0.040	0.030	-	0.45/0.65	0.90/1.20	0.35	-	
B6	0.12	1.20	0.80	0.040	0.030	-	0.45/6.00	0.40/0.65	0.35	-	
B6H	0.10/0.25	1.20	0.80	0.040	0.030	-	0.45/6.00	0.40/0.65	0.35	-	Ni steel
N1	0.12	1.60	0.80	0.030	0.030	0.75/1.10	0.15	0.35	0.35	0.05Ti	
N2	0.12	1.60	0.80	0.030	0.030	2.00/2.90	-	-	0.35	-	
N3	0.12	1.60	0.80	0.030	0.030	2.80/3.80	0.15	-	0.35	-	
N4	0.14	1.60	0.80	0.030	0.030	1.40/2.10	-	0.35	0.35	-	Other low alloy steel
F1	0.12	0.70/1.50	0.80	0.040	0.030	0.90/1.70	0.15	0.55	0.35	-	
F2	0.17	1.25/2.25	0.80	0.040	0.030	0.40/0.80	-	0.40/0.65	0.35	-	
F3	0.17	1.25/2.25	0.80	0.040	0.030	0.70/1.10	-	0.40/0.65	0.35	-	
F4	0.17	1.60	0.80	0.040	0.030	0.40/0.80	0.60	0.25	0.35	0.03Ti	
F5	0.17	1.20/1.80	0.80	0.030	0.030	2.00/2.80	0.65	0.30/0.80	0.50	-	
F6	0.14	0.80/1.85	0.80	0.030	0.030	1.50/2.25	0.65	0.60	0.40	-	Other low alloy steel
M1	0.10	0.60/1.60	0.80	0.040	0.030	1.25/2.00	0.15	0.35	0.30	0.03Ti	
M2	0.10	0.90/1.80	0.80	0.040	0.030	1.40/2.10	0.35	0.25/0.65	0.30	0.03Ti	
M3	0.10	1.30/2.25	0.80	0.030	0.030	1.80/2.60	0.65	0.20/0.70	0.35	0.03Ti	
M4	0.10	0.50/1.60	0.80	0.040	0.030	2.00/2.80	0.80	0.30/0.80	0.30	0.03Ti	Other low alloy steel
W	0.12	0.50/1.60	0.80	0.040	0.030	0.40/0.80	0.45/0.70	-	0.30/0.75	-	
G	-	-	-	-	-	-	-	-	-	-	

APPENDIX

3. Mechanical Property Requirements

AWS Classification	Tensile Strength (psi)	Yield Strength (psi)	Elongation (%)
F7XX-EXXX-X	70,000-95,000	≥ 58,000	≥ 22
F8XX-EXXX-X	80,000-100,000	≥ 68,000	≥ 20
F9XX-EXXX-X	90,000-110,000	≥ 78,000	≥ 17
F10XX-EXXX-X	100,000-120,000	≥ 88,000	≥ 16
F11XX-EXXX-X	110,000-130,000	≥ 98,000	≥ 15
F12XX-EXXX-X	120,000-140,000	≥ 108,000	≥ 14

4. Impact Strength Requirements

Digit	Impact Values (ft · lb)
Z	-
0	≥ 20(0 °F)
2	≥ 20(-20 °F)
4	≥ 20(-40 °F)
5	≥ 20(-50 °F)
6	≥ 20(-60 °F)
8	≥ 20(-80 °F)
10	≥ 20(-100 °F)
15	≥ 20(-150 °F)

5. Postweld Heat-treatment Temperature

Weld metal Classification	Postweld-Heat-Treatment-Temperature °F ± 25(°C ± 14)
F4,F5,F6	1050(566)
M1,M2,M3,M4,W	1125(607)
A1,A2,A3,A4,B1	
B2,B2H,B5,Ni1,Ni2	1150(621)
Ni3,Ni4,F1,F2,F3	
B3,B4	1275(691)
B6,B6H,B8	1375(746)

1. CHEMICAL-COMPOSITON REQUIREMENTS FOR CARBON STEEL ELECTRODES AND RODS.
FOR GAS SHIELDED ARC WELDING SOLID ELECTRODES AND RODS

(AWS A5.18 - 05)

AWS class.	Chemical Composition, Percent												
	C	Mn	Si	P	S	Ni	Cr	Mo	V	Cu	Ti	Zr	Al
GROUP A-MILD STEEL ELECTRODES													
ER70S-2	0.07	0.90 to 1.40	0.40 to 0.70							0.50	0.05 to 0.15	0.02 to 0.12	0.05 to 0.15
ER70S-3	0.06 to 0.15		0.45 to 0.75							0.50	...	...	...
ER70S-4	0.07 to 0.15	1.00 to 1.50	0.65 to 0.85	0.025	0.035	(d)	(d)	(d)	(d)	0.50	...	...	...
ER70S-6	0.06 to 0.15	1.40 to 1.85	0.80 to 1.15							0.50	...	...	...
ER70S-7	0.07 to 0.15	1.50 to 2.00	0.50 to 0.80							0.50	...	...	...
not specified ^a													
GROUP B-LOW ALLOY STEEL ELECTRODES													
ER80S-D2	0.04 to 0.12	1.60 to 2.10	0.50 to 0.80	0.025	0.025	0.15	...	0.40 to 0.60	...	0.50	...	...	...
E70C-6X	0.12	1.75	0.90	0.03	0.03	...	...	...	...	0.50	...	...	...

Note - Singable values shown are maximums.

- a. These elements may be present but are not intentionally added.
- b. For this classification there are no chemical requirements for the elements listed with the exception that there shall be no insertional addition to Ni,Cr,Mo, or B.
- c. The maximum weight % of copper in the rod or electrode due to any coating plus the residual copper content in the steel shall be 0.50.
- d. This residual elements shall not exceed 0.50% in total.

2. WELDING CONDITION AND TENSION TEST REQUIREMENTS OF ALL-WELD METAL(AS-WELDED)

AWS Classification	Shielding Gas ^b	Current and Polarity ^c	Tensile Strength min,psi	Yield Strength at 0.2% offset, min.	Elongation in 2 inches, min, Percent
GROUP A-MILD STEEL ELECTRODES					
ER 70S-2	CO ₂	DCEP	70,000	58,000	22 ^{d,e}
ER 702-3					
ER 70S-4					
ER 70S-6					
ER 70S-7					
ER 70S-G					
	not specified ^b				
GROUP - LOW ALLOY STEEL ELECTRODES					
ER 80S-D2	CO ₂	DCEP	80,000 ^{d,e}	68,000 ^{d,e}	17 ^{d,e}
E70C-6X					
					22

a. As-welded mechanical properties

b. The use of CO₂ for classification purposes shall not be construed to restrict the use of Argon-CO₂ or Argon-O₂ shielding gas mixtures. A filler metal classified with CO₂ with also meet the requirements of this specification when used with Argon-CO₂ or Argon-O₂ mixtures.

c. Reverse polarity means electrode is positive; straight polarity means electrode is negative.

d. Mechanical properties as determined from an all-weld-metal-test specimen.

e. For each increase of one percentage point in elongation over the minimum, the yield strength of tensile strength, of both may decrease 1,000 psi to a minimum of 70,000 psi for the tensile strength and 58,000 psi for the yield strength.

IMPACT - TEST REQUIREMENTS OF ALL-WELD METAL

AWS Classification	Minimum V-notch Impact Requirement
ER70S-2	20 ft · lb at -20°F
ER70S-6	
ER70S-7	
ER80S-D2	
E70C-6X	
ER70S-3	20 ft · lb at 0°F
ER70S-4	Not required
ER70S-G	

- a. The lowest value obtained, together with the highest value obtained, shall be disregarded for this test. Two of the three remaining values shall be greater than the specified 20 ft · lb energy level; one of the three may be lower but shall not be less than 15 ft · lb. The computed average value of the three values shall be equal to or greater than 20 ft · lb energy level.

APPENDIX

Approvals

Classification			Max Dia. (m)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
S-4301,I	E4301	E6019	5,0	All	3	3	3	3	3	3	KMW3
			6,0	F	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0
S4303,V	E4303	-	5,0	All	3	3	3	3	3	3	KMW3
			6,0	F,H-Fil	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0
S-6010,D	-	E6010	5,0	All	2	2	2	2	2	2	KMW2
			6,0	F,H-Fil	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0
S-6011,D	E4311	E6011	5,0	All	2	2	2	2	2	2	KMW2
			6,0	F,H-Fil	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0
S-6013,LF	E4313	E6013	5,0	All	2	2	2	2	2	2	KMW2
			6,0	F,H-Fil	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0
S-6013,V	E4313	E6013	6,0	All V-Down	2 2,6-5,0	2 2,6-5,0	2 2,6-5,0				KMW2 2,6-5,0
S-6027,LF	E4327	E6027	8,0	F,H-Fil	3 4,0-8,0	3 4,0-8,0	3,3G 4,0-8,0	3 4,0-8,0	3 4,0-8,0	3 4,0-8,0	KMW3 4,0-8,0
S-7016,H	D5016	E7016	5,0	All	3H10, 3YH10	3H10,3Y	3,3YH15	3YHH	3YH10	3YH10	KMW53HH
			6,0	F	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0
S-7016,LF	D5016	E7016	6,0	All	3H10, 3YH10	3H10,3Y	3,3YH15	3,3YHH	3YH10	3YH10	KMW53HH
					2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0
S-7016,M	E4316	E7016	5,0	All	3H10, 3YH10	3H10,3Y					KMW53HH
			6,0	F	2,6-6,0	2,6-6,0					2,6-6,0
S-7016,O	E4316	E7016	6,0	All	3H10, 3YH10	3H10,3Y	3,3YH15		3YH10		KMW53HH
					3,2-5,0	2,6-5,0	2,6-5,0		2,6-5,0		3,2-5,0
S-7014,F	E4313	E7014	5,0	All	2, 2Y	2Y	2,2Y	2,2Y	2	2Y	KMW52
			6,0	F,H-Fil	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0
S-7024,F	E4324	E7024	7,0	F,H-Fil		2	2,2Y,2YG		2		KMW2
						3,2-7,0	3,2-6,0		3,2-7,0		KMW52 3,2-6,0
S-7010,A1		E7010-A1	5,0	All		AWS A5,5	2Y				
			6,0	F,H-Fil		E7010-A1 2,6-6,0	2,6-6,0				

Classification			Max Dia. (mm)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
S-7018,G	D5016	E7018	5,0	All	3H10, 3YH10	3H10,3Y	3,3YH15	3YHH	3YH10	3YH10	KMW53HH
			6,0	F	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0	2,6-6,0
	D5016	E7018-1	6,0	All		3H10,3Y	3,3YH15	3YHH	3YH10	3YH10	
						2,6-5,0	2,6-5,0	2,6-5,0	2,6-5,0	2,6-5,0	
S-7016,LS	-	E7016-G	5,0	All	3H10, 3YH10	3H10,3Y	5Y40H15	3,3YHH(KV)	5YH10		
			6,0	F,H-Fil	(-60℃) 2,6-6,0	(-60℃) 2,6-6,0	2,6-6,0	(-60℃) 2,6-6,0	2,6-6,0		
S-7028,F	D5026	E7028	7,0	F,H-Fil	3Y	3,3Y	3,3Y,3YG	3,3Y	3	3Y	KMW3
					3,2-7,0	3,2-7,0	4,0-7,0	3,2-7,0	3,2-7,0	3,2-7,0	KMW53 4,0-7,0
S-7048,V	D5016	E7048	5,5	All, V-Down	3H10, 3YH10	3H10,3Y	3,3YH15	3,3YHH	3YH10	3YH10	KMW53HH
			6,0	F,H-Fil	3,2-6,0	3,2-6,0	3,2-6,0	3,2-6,0	3,2-6,0	3,2-6,0	3,2-6,0
S-8016,B2	-	E8016-B2	4,0	All		AWS A5,5					
			6,0	F,H-Fil		E8016-B2 2,6-6,0					
S-8018,B2	-	E8018-B2	4,0	All		AWS A5,5					
			6,0	F,H-Fil		E8018-B2 2,6-6,0					
S-9018,B3	-	E9018-B3	4,0	All	AWS A5,5	AWS A5,5	AWS A5,5		H10(NV2, 25Cr1Mo)		
			6,0	F,H-Fil	E9018-B3 3,2-6,0	E9018-B3 3,2-6,0	E9018-B3 3,2-6,0		3,2-6,0		
S-9016,G	D5316	E8016-G	6,0	All		AWS A5,5 E8016-G 2,6-6,0					
S-9016,G	D5816	E9016-G	6,0	All		AWS A5,5 E9016-G 2,6-6,0					
S-10016,G	D7016	E10016-G	6,0	All		AWS A5,5 E10016-G 2,6-6,0					

APPENDIX

Classification			Max Dia. (m)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
S-11016,G	D8016	E11016-G	6,0	All		AWS A5,5 E11016-G 2,6-6,0					
S-9018,M	-	E9018-M	5,0	All		AWS A5,5 E9018-M 2,6-5,0					
S-11018,M	-	E11018-M	4,0 6,0	All F,H-Fil		AWS A5,5 E11018-M 2,6-6,0					
S-308,16N	D308,16	E308-16	4,0 5,0	All F,H-Fil	RD308 2,4-5,0	AWS A5,4 E308-16 2,4-5,0			308 2,4-5,0		
S-308L,16N	D308L,16	E308L-16	4,0 5,0	All F,H-Fil	RD308L 2,4-5,0	AWS A5,4 E308L-16 2,4-5,0	304L 2,4-5,0	E308L 2,0-5,0	308L 2,4-5,0		KD308L 2,0-5,0
S-308L,17		E308L-17	4,0 5,0	All F,H-Fil		AWS A5,4 E308L-17 2,0-5,0					
S-309,16N	D309,16	E309-16	4,0 5,0	All F,H-Fil	RD309 2,4-5,0	AWS A5,4 E309-16 2,4-5,0	SS/CMn 2,4-5,0		309 2,4-5,0		
S-309L,16	D309L,16	E309L-16	4,0 5,0	All F,H-Fil	RD309L 2,0-5,0	AWS A5,4 E309L-16 2,0-5,0	SS/CMn 2,4-5,0	UP (E309L-16) 2,0-5,0	309L 2,0-5,0	4332 2,0-5,0	KD309L 2,0-5,0
S-309L,17		E309L-17	4,0 5,0	All F,H-Fil		AWS A5,4 E309L-17 2,0-5,0					
S-309Mo,16	D309Mo,16	E309Mo-16	4,0 5,0	All F,H-Fil		AWS A5,4 E309Mo-16 2,4-5,0					
S-309MoL,16	D309MoL,16	E309MoL-16	4,0 5,0	All F,H-Fil					309MoL (-20℃) 2,6-5,0		

Classification			Max Dia. (m)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
S-316,16N	D316,16	E316-16	4,0	All	RD316	AWS A5,4 E316-16		UP (E316-16)	316L		
			5,0	F,H-Fil	2,6-5,0	2,4-5,0		2,0-5,0	2,4-5,0		
S-316L,16N	D316L,16	E316L-16	4,0	All	RD316L	AWS A5,4 E316L-16	316L	UP (E316L-16)	316L		KD316L
			5,0	F,H-Fil	2,4-5,0	2,4-5,0	2,4-5,0	2,0-5,0	2,4-5,0		2,0-5,0
S-316L,17		E316L-17	4,0	All		AWS A5,4 E316L-17					
			5,0	F,H-Fil		2,0-5,0					
ST-2209	-	ER2209	1,6 3,2	All			S31803 1,6-3,2		Duplex S/S 1,6-3,2		
ST-308	Y308	ER308	3,2	All	RY308G 0,8-3,2	AWSA5,9 ER308 0,8-3,2			308 0,8-3,2		
ST-308L	Y308L	ER308L	3,2	All	RY308L (-196℃) 0,8-3,2	AWS A5,9 ER308L 0,8-3,2	304L (-196℃) 0,8-3,2	UP (KV-196℃) 0,8-3,2	308L (-196℃) 0,8-3,2		KY308L 0,8-3,2
ST-309	Y309	ER309	3,2	All		AWS A5,9 ER309 0,8-3,2					
ST-309L	Y309L	ER309L	3,2	All		AWSA5,9 ER309L 0,8-3,2	SS/CMn 0,8-3,2	309L 0,8-3,2	309L 0,8-3,2		KY309L 0,8-3,2
ST-316	Y316	ER316	3,2	All		AWS A5,9 ER316 0,8-3,2					
ST-316L	Y316L	ER316L	3,2	All	RY316L (-196℃) 0,8-3,2	AWS A5,9 ER316L 0,8-3,2	316L (-196℃) 0,8-3,2	UP (KV-196℃) 0,8-3,2	316L (-196℃) 0,8-3,2	4435 0,8-3,2	KY316L 0,8-3,2
SM-309	Y309	ER309	3,2	F		AWS A5,9 ER309 0,8-3,2					

APPENDIX

Classification			Max Dia. (mm)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
SM-316L	Y316L	ER316L	3,2	F		AWS A5.9 ER316L 0.8-3.2					
SMT-625	-	ERNiCrMo-3	1,0 3,2	All		AWS A5.14 ERNiCrMo- (-196℃) 1.0-3.2	9Ni H15 1.0-3.2		MS NV 1.5Ni, 9Ni 1.0-3.2	NiCr21 Mo9Nb 1.0-3.2	
SMT-7030	-	ERCuNi	1,2 3,2	All		AWS A5.7 ERCuNi 1.0-3.2					
ST-9010	YCuNi-1	-	1,6 3,2		KS D7044 YCuNi-1						
ST-50,6	YGT50	ER70S-6	3,2	All		AWS A5.18 ER70S-6 1.6-3.2					
ST-50G	YGT50	ER70S-G	3,2	All	3YSG 1.2-3.2	AWS A5.18 ER70S-G 1.2-3.2	3,3YH15 1.2-3.2	UP (-20℃) 1.2-3.2	III YM 1.2-3.2	3Y 1.2-3.2	KSW53G 1.2-3.2
SM-70 (CO.)	YGW12	ER70S-6	1,2 1,6	All (Except OH)	3SG,3YSG(C) 0.8-1.6	3SA, 3YSA 0.8-1.6	3S, 3YSH15 0.8-1.6	SA3,3YM 0.8-1.6	III YMS 0.8-1.6	3YS 0.8-1.6	KSW53G(C) 0.8-1.6
SM-70 (85%Ar+15%CO.)	YGW12	ER70S-6	1,6	F,H-Fil	3YSG(M2) 3YMG(M2) 0.8-1.6	3SA, 3YSA 0.8-1.6	3YSH15 0.8-1.6	SA3YM 0.8-1.6	III YMS 0.8-1.6	3YS 0.8-1.6	KSW53G, KAW53MG (M2) 0.8-1.6
SM-70EN (CO.)	YGW12	ER70S-6	1,6	All V-down					III Y40MS 0.8-1.6		
SM-70EN (80%Ar+20%CO.)	YGW12	ER70S-6	1,6	All V-down					III Y40MS 0.8-1.6		
SM-70G (CO.)	YGW11	ER70S-G	1,2 1,6	F,H-Fil	3SG,3YSG 3MG,3YMG (C1) 0.8-1.6	3SA, 3YSA 0.8-1.6	3YSH15 0.8-1.6	SA3,3YM 0.8-1.6	III YMS 0.8-1.6	3YS 0.8-1.6	KSW53G, KAW53MG(C) 0.8-1.6
SM-70G (80%Ar+20%CO.)	YGW11	ER70S-G	1,2 1,6	F,H-Fil		3SA, 3YSA 0.8-1.6			III YMS 0.8-1.6		KSW3G, KSW53G(M2) KAW3MG, KAW53MG(M2) 0.8-1.6

Classification			Max Dia. (mm)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
SM-70S (CO ₂)	YGW16	ER70S-3	1,6	All		3SA, 3YSA 0,8-1,6	3S, 3YSH15 0,8-1,6				
SM-70S (80%Ar+20%CO ₂)	YGW16	ER70S-3	1,6	All		3SA, 3YSA 0,8-1,6	3S, 3YSH15 0,8-1,6				
SM-70GS (80%Ar+20%CO ₂)	YGW15	ER70S-G	1,6	All			3YSH15 0,8-1,6				
SM-80G (CO ₂)	YGW21	ER80S-G	1,6	All		AWS A5,28 ER80S-G 1,0-1,6					
SM-70 Copper Free (CO ₂)	YGW12	ER70S-6	1,6	All		3SA,3YSA 0,8-1,6					
SM-70 Copper Free (80%Ar+20%CO ₂)	YGW12	ER70S-6	1,6	All		3SA,3YSA 0,8-1,6					
SM-70G Copper Free (CO ₂)	YGW11	ER70S-G	1,6	F		3SA,3YSA 0,8-1,6					
SM-70G Copper Free (80%Ar+20%CO ₂)	YGW11	ER70S-G	1,6	F		3SA, 3YSA 0,8-1,6					
SC-460 (CO ₂)		E81T1-K2C	1,4	All V-Down	5Y46SQ(C1)H5 1,2-1,4	5YQ460SAH5 1,2-1,4	5Y46H5 1,2-1,4	SA5Y46HH 1,2-1,4	VY46MS(H5) 1,2-1,4	6Y46H5 1,2-1,4	KSW5Y46G(C)H5 KSW63Y47G(C)H5 1,2-1,4
SF-70MX (CO ₂)	YFW- C50DM	E70T-1	C 1,6	F,H-Fil	2SG, 2YSG(C1)H10 2MG, 2YMG(C1)H10 1,2-1,6	2SAH10, 2YSA 1,2-1,6	2S, 2YSH10 1,2-1,6	SA2YMH 1,2-1,6	1YMSH10 1,2-1,6	2YH10S 1,2-1,6	KSW2G, KSW52G(C)H10, KAW2MG, KAW52MG(C)H10 1,2-1,6
SF-71 (CO ₂)	YFW- C50DR	E71T-1C	1,6	All V-Down	2SMG 2YSMG(C)H10 1,2-1,6	2SA, 2YSAH10 1,2-1,6	2S, 2YSH10 1,2-1,6	SA2M, SA2YMH A2M, A2YMH 1,2-1,6	1YMSH15 1,2-1,6	2YH10S 1,2-1,6	KSW52Y40G(C)H10 H10 1,2-1,6
SF-71/CBM8061 (CO ₂)			1,4	F,V			2YSH10 1,2-1,4				

APPENDIX

Classification			Max Dia. (mm)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
SF-71LF (CO ₂)	YFW-C50DR	E71T-1C	1,6	All V-Down		2YSAH10 1,2-1,6	2S,2YSH10 1,2-1,6		IIYSMH10 1,2-1,6		KSW52G(C)H10 KAW52MG(C) 1,2-1,6
SF-71LF/CBM8061 (CO ₂)			1,6	F,V			2S,2YSH10 1,2-1,6				
Supercored71 (CO ₂)	YFW-C502	E71T-1C	1,6	All V-Down	3SMG 3YSMG(C)H10 0,9-1,6	3SAH10, 3YSA 0,9-1,6	3S, 3YSH10 0,9-1,6	SA3M,SA3YM A3MA3YMH-H	IIYMSH10 0,9-1,6	3YH10S 0,9-1,6	KSW53G(C)H10 KAW53MG(C)H10 0,9-1,6
Supercored71 /CBM8061 (CO ₂)			1,6				3S, 3YS 0,9-1,6				
Supercored71H (CO ₂)	YFW-C502R	E71T-1C	1,6	All V-Down	4YSMG(C)H10 1,2-1,4 3YSMG(C)H10 1,6	4YSAH10 1,2-1,4 3YSAH10 1,6	4YSH10 1,2-1,4 3YSH10 1,6	SA4YMH-H 1,2-1,4 SA3YMH-H 1,6	IVYSMH10 1,2-1,4 IIYMSH10 1,6	4YSH10 1,2-1,4 3YSH10 1,6	KSW54G(C)H10 1,2-1,4 KSW53G(C)H10 1,6
Supercored71MAG (80%Ar+20%CO ₂)	YFW-A502R	E71T-1M /-9M	1,6	All V-Down		3SAH10, 3YSA 1,2-1,6	3S, 3YSH10 1,2-1,6	SA3M, SA3YMH-H A3M,A3YM 1,2-1,6	IIYMSH10 1,2-1,6	3YH10S 1,2-1,6	
Supercored70MXH (CO ₂)	YFW-C50DM	E70T-1C	2,0	F,H-Fil	RSW53G(C)HH RAW53MG(C)HH 1,4-2,0	3SAH5, 3YSA 1,4-2,0	3YSH5 1,4-2,0	A3YM, SA3YMH-H 1,4-2,0	IIYMSH5 1,4-2,0	3YH5S 1,4-2,0	KSW53G(C)H5 KAW53MG(C)H5 1,4-2,0
Supercored110 (CO ₂)		E111T1-GC	1,2	All V-Down	AWS A5.29 E111T1-GC H4 (-40℃) 1,2						
Supercored70NS (80%Ar+20%CO ₂)	YFW-A50DM	E70C-6M	1,6	F,H-Fil		3SAH5, 3YSA 0,9-1,6	3S, 3YSH5 0,9-1,6	SA3M, SA3YMH-H 0,9-1,6	IIYMSH5 0,9-1,6	3YH5S 0,9-1,6	
Supercored70B (80%Ar+20%CO ₂)	YFW-A502B	E71T-5MJ	2,0	All		3YSAH5 1,0-2,0	3S,3YSH5 1,0-2,0	SA3YMH-H 1,0-2,0	IIYMSH5 1,0-2,0	3YH5S 1,0-2,0	
Supercored70B/ CBM8061 (80%Ar+20%CO ₂)			2,0	F,V			3S,3YS 1,0-2,0				
Supercored70SB (CO ₂)	YFW-C502B	E71T-5C	1,6	F,V	3YSG(C) H5 1,2-1,6	3SA3YSAH5 1,2-1,6	3YSH5 1,2-1,6	SA3YMH-H 1,2-1,6	IIYMSH5 1,2-1,6	3YH5S 1,2-1,6	KSW53G(C) H5 1,2-1,6

Classification			Max Dia. (mm)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
Supercored70SB/ CBM8061(CO ₂)			1,6	F,V			3YSH5 1,2-1,6				
SC-70H Cored (CO ₂)	YFW- C502M	E70T-1C /9C	2,4	F		3YSAH10 1,6-2,4	3YSH10 1,6-2,4			3YH10S 1,6-2,4	
SC-70T Cored (CO ₂)	YFW- C50DM	E70C-3C	1,2	All		3YSA, 3YSAH10 1,2	3YSH10 1,2	SA3YMH 1,2	IIYMH10 1,2	3YH10S 1,2	
SC-70T Cored (80%Ar+20%CO ₂)	YFW- C50DM	E70C-6M	1,6	All			3YSH5 1,2-1,6	SA3YHHH 1,2-1,6	IIYMH5 1,2-1,6	3YH5S 1,2-1,6	
SC-71MSR (80%Ar+20%CO ₂)		E71T-12MJ	1,2	All V-Down		4Y400SAH5 1,2	4Y40SH5 1,2	SA4Y40M HHH 1,2	IVY40MSH5 1,2		
SC-71SR		E71T-1C/-9CJ -12CJ	1,6	All V-Down		4Y400SAH5 1,2-1,6	4Y40SH5 1,2-1,6	SA4Y40HHH 1,2-1,6	IVY40MSH5 1,2-1,6	4Y40H5S 1,2-1,6	
Supercored81MAG (80%Ar+20%CO ₂)		E81T1-Ni1M	1,2	All V-Down		5Y400SAH5 1,2	5Y40SH5 1,2	SA5Y40M HHH 1,2	VY40MSH5 1,2		
Supercored81-K2 (CO ₂)	YFL- C506R	E81T1-K2C	1,6	All V-Down	4Y40SGC1H5 1,2-1,6	5Y400SAH5 1,2-1,6	5Y40SH5 1,2-1,6	SA5Y40M HHH 1,2-1,6	VY40MSH5 NV2-4L, 4-4L 1,2-1,6	6Y40H5S 1,2-1,6	KSM54Y40G(C)H5 1,2-1,6
SC-80K2 (CO ₂)		E80T1-K2C	1,4	H-F	RSW54Y40M(G) HHH 1,2-1,4	5Y400SAH5 1,2-1,4	4Y40SH5 1,2-1,4	SA5Y40M HHH 1,2-1,4	VY40MSH5 NV4-4L 1,2-1,4	6Y40H5S 1,2-1,4	KAW54Y40G(C) 1,2-1,4
SC-80K2*SC-80K2 (CO ₂)		E80T1-K2C	1,4	H-F	RSW54Y40M(G) 1,2-1,4		4Y40MH5 1,2-1,4	SA5Y40 HHH 1,2-1,4	VY40MSH5 NV4-4L 1,2-1,4	6Y40H5S 1,2-1,4	KAW54Y40G(C) 1,2-1,4
SC-91K2 Cored (CO ₂)		E91T1-K2C	1,2	All V-Down		AWS A5,29 E91T1-K2C (-40°C) 1,2					
SC-EG2 / CBM600(CO ₂)		EG70T-2	1,6	V	REW3,REW53 1,6	3,3YH10 1,6	3,3Y 1,6	AV3, AV3Y 1,6	IIY 1,6	3YV 1,6	KEW53 1,6
SC-EG3 / BS-SG (CO ₂)			1,6	V-up	4Y40VH5 1,6	5Y400H5 1,6	4Y40H5 1,6	AV5Y40HHH 1,6	VY40H5 NV2-4L, NV4-4L 1,6	6Y40H5V 1,6	KEW54 Y40G(C)H5 1,6
SF-71MC (CO ₂)		E71T-1/-12C	1,6	All V-Down		3YSA H10 1,2-1,6	3YS H10 1,2-1,6				

APPENDIX

Classification			Max Dia. (mm)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
SF-71MC (75%Ar+25%CO ₂)		E71T-1M /-12M	1,6	All V-Down		3YSAH10 1,2-1,6	3YSH10 1,2-1,6				
SC-71LHM Cored (80%Ar+20%CO ₂)		E71T-1M /-9M	1,6	All V-Down		3YSAH5 1,2-1,6	3YSH5 1,2-1,6	SA3YHHH 1,2-1,6	IIIVM5H5 1,2-1,6	3YH5S 1,2-1,6	
SC-71HJ (CO ₂)	YFW-C50R	E71T-9C	1,4	All V-Down	4Y40SG(C1)H10 1,2-1,4	4Y40SAH10 1,2-1,4	4Y40SH10 1,2-1,4	SA4Y40HH 1,2-1,4	IVY40MSH10 1,2-1,4	4Y40H10 1,2-1,4	KSW54Y40G(C) H10 1,2-1,4
SC-71LH (CO ₂)	YFW-C502R	E71T-9C	1,6	All V-Down		3Y400SAH5 1,2-1,6	3Y40SH5 1,2-1,6	SA3Y40HHH 1,2-1,6	IIIV40MSH5 1,2-1,6		KSW53Y40G(C) H5 1,2-1,6
SC-70ML (80%Ar+20%CO ₂)	YFW-A50DM	E70C-6M	1,6	F.V H-Fil		4Y400SAH5 1,2-1,6	4Y40SH5 1,2-1,6	SA4Y40M HHH 1,2-1,6	IVY40MSH5 1,2-1,6	4Y40H5S 1,2-1,6	
SW-2209 Cored (80%Ar+20%CO ₂)		E2209T1-4	1,6	All				UP (-20℃) 1,2	Duplex S/S 1,2		
SW-308L Cored (CO ₂)	TS308L -FB1	E308LT1-1	1,6	All		AWS A5.22 E308LT1-1 1,2-1,6	304L (-120℃) 1,2-1,6	UP (KV-120℃) 1,2-1,6	308L (-120℃) 0,9-1,6		KW308LG(C) 1,2-1,6
SW-308LT (CO ₂)	TS308L -FB1	E308LT1-1	1,2	All		AWS A5.22 E308LT1-1 (-196℃) 1,2					
SW-308LT (75%Ar+25%CO ₂)	TS308L -FB1	E308LT1-4	1,2	All		AWS A5.22 E308LT1-4 (-196℃) 1,2					
SW-309L Cored (CO ₂)	TS309L -FB1	E309LT1-1	1,6	All	RW309LG(C) 1,2-1,6	AWS A5.22 E309LT1-1 1,2-1,6	SS/CmN 1,2-1,6	309L (KV-20℃) 1,2-1,6	309L 1,2-1,6	4332S 1,2-1,6	KW309LG(C) 1,2-1,6
SW-309MoL Cored (CO ₂)		E309LMoT1-1		1,6	All				309MoL (-20℃) 1,2-1,6	4459S 1,2-1,6	KW309MoLG(C) 1,2-1,6
SW-309MoL Cored (80%Ar+20%CO ₂)		E309LMoT1-4		1,6	All				309MoL (-20℃) 1,2-1,6		

Classification			Max Dia. (mm)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
SW-316L Cored (CO.)	TS316L -FB1	E316LT-1	1,6	All	RW316LG(C) 1,2-1,6	AWS A5,22 E316LT-1 0,9-1,6	316L 1,2-1,6	316L (-60℃) 1,2-1,6	316L 1,2-1,6	4435S 0,9-1,6	KW316LG(C) 1,2-1,6
SW-316L Cored (80%Ar+20%CO.)	TS316L -FB1	E316LT-4	1,6	All		AWS A5,22 E316LT-4 0,9-1,6					
Supercored 309L (80%Ar+20%CO.)		E309LT0-4	1,6	Down-hand				309L 0,9-1,6	309L (-20℃) 0,9-1,6	4432S 0,9-1,6	
Supercored 309MoL (80%Ar+20%CO.)		E309LMoT0-4	1,6	Down-hand				309LMo 0,9-1,6	309MoL (-20℃) 0,9-1,6	4459S 0,9-1,6	
Supercored 316L (80%Ar+20%CO.)		E316LT0-4	1,6	Down-hand				316L 0,9-1,6	316L (-20℃) 0,9-1,6	4435S 0,9-1,6	
H-14/S-705EF /IRN/S-22	-	-	6,4	F	2SMR, 2YSMR 2,0-6,4	2,2Y 2,0-6,4	2A,2YA 2,0-6,4	A2M,A2YM 2,0-6,4	IIYM 2,0-6,4	2YM 2,0-6,4	KAW2, KAW52 -SMP 2,0-6,4
H-14/S-705EF /CW/CBM-G22	-	-	6,4	F	2SR, 2YSR 3YSMR 2,0-6,4	2,2Y, 3Y 2,0-6,4	2A,2YA,3YA 2,0-6,4	A2M, A2YM, A3YM 2,0-6,4	IIYM III YM 2,0-6,4	2YM, 3YM 2,0-6,4	KAW52SP, KAW53-SMP 2,0-6,4
L-8/S-707	S502-H	F7A4-EL8	6,4	F	3TM, 3YTM 1,6-6,4	3TM, 3YTM 1,6-6,4	3TM, 3YTM 1,6-6,4	A3TM, A3YTM 2,4-6,4	IIITYM 2,4-6,4	3YTM 2,4-6,4	KAW3TM, KAW53TM 2,4-6,4
2XL-8/S-707	-	F7A4-EL8	6,4	F			3TM, 3YTM 1,6-6,4				
L-8/S-707/IRN/S-22	-	-	6,4	F	2SMR, 2YSMR 2,4-6,4	2,2Y 2,4-6,4	2A,2YA 2,4-6,4	A2M A2YM 2,4-6,4	IIYM 2,4-6,4	2YM 2,4-6,4	KAW2M, KAW52M 2,4-6,4
H-14/S-707TP	S502-H	F7A6-EH14 F7P6-EH14	6,4	F	3M, 3YM 2,0-6,4	3M, 3YM 2,0-6,4	3M, 3YM 2,0-6,4	A3M, A3YM 2,0-6,4	IIIIYM 2,0-6,4	3YM 2,0-6,4	KAW3M, KAW53M 2,0-6,4
M-12K/S-717	S502-H	F7A6-EM12K F7P6-EM12K	6,4	F	3M, 3YM 2,4-6,4	3M, 3YM 2,4-6,4	3YM 2,4-6,4	A3, A3YM 2,0-6,4	IIIIYM 2,0-6,4	3YM 2,0-6,4	KAW53M 2,0-6,4

APPENDIX

Classification			Max Dia. (mm)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
L-8/S-727	S502-H	F7A2-EL8	6,4	F	2TM, 2YTM 2,4-6,4	2TM, 2YTM 2,4-6,4	2TM, 2YTM 2,4-6,4	A2TM, A2YTM 2,4-6,4	IIYTM 2,4-6,4	2YTM 2,4-6,4	KAW2TM, KAW52TM 2,4-6,4
L-12/S-727	S502-H	F7A2-EL12	6,4	F		2TM, 2YTM 1,6-6,4	2YMH5 1,6-6,4				
H-14/S-737	S502-H	F7A4-EH14 F7P4-EH14	6,4	F	3M, 3YM 2,0-6,4	3M,3YM 2,0-6,4	3M,3YM 2,0-6,4		IIITYM 2,0-6,4	3YM 2,0-6,4	
H-14/S-777MX	S502-H	F7AZ-EH14	6,4	F	2M, 2YM 1,6-6,4	2M,2YM 1,6-6,4	2M,2YM 1,6-6,4	A2M A2YM 1,6-6,4	IIYM 1,6-6,4	2YM 1,6-6,4	KAW2M, KAW52M 1,6-6,4
2XH-14/S-777MX	-	F7AZ-EH14	6,4	F		2M,2YM 1,6-6,4	2M,2YM 1,6-6,4	A2M A2YM 1,6-6,4	IIYM 1,6-6,4	2YM 1,6-6,4	KAW2M, KAW52M 1,6-6,4
H-14/S-777MXH	S502-H	F7A2-EH14 F7P2-EH14	6,4	F	3M, 3YM 2T, 2YT 1,2-6,4	3M,3YM 2T,2YT 1,2-6,4	3M,3YM 2T,2YT 1,2-6,4	A3M,A3YM A2T,A2YT 1,2-6,4	IIYTH10 IIITYMH10 1,2-6,4	3YM 2YT 1,2-6,4	KAW3M, KAW53M KAW2T, KAW52T 1,2-6,4
2XH-14/S-777MXH	S502-H	F7A2-EH14 F7P2-EH14	3,2	F		3YM 1,2-3,2	3M,3YM 1,2-3,2	A3YM 1,2-3,2		3YM 1,2-3,2	
H-14/S-787TB	S502-H	F7A8-EH14 F7P8-EH14	6,4	F	3T,3YT 4Y40M(-60℃) 1,2-6,4	3T,3YT 5Y40M 1,2-6,4	3YT 5Y40M 1,2-6,4	A3T,A3YT A5Y40M 1,2-6,4	VY40MH10 NV4-4L IIITYT,VYT 1,2-5,0	6Y40M 3YT 1,2-6,4	KAWL3TM KAW54Y40M 1,2-6,4
2XH-14/S-787TB	S502-H	F7A8-EH14 F7P8-EH14	6,4	F		3T,3YT 5Y40M 1,2-6,4	3YT 5Y40M 1,2-6,4		VY40MH10 NV4-4L IIITYT,VYT 1,2-5,0	6Y40M 3YT 1,2-6,4	
L-8/Superflux70H	S502-H	F7A0-EL8 F7P0-EL8		F		AWS A5.17 F7A0-EL8 F7P0-EL8 1,6-6,4					
H-14/Superflux787	S502-H	F7A8-EH14 F7P8-EH14	6,4	F	4YM 1,2-6,4	3M,4YM 1,6-6,4	3M,4YM 1,6-6,4	A4YM 1,2-6,4	IVYM 1,6-6,4	4YM 1,2-6,4	KAW54M 1,2-6,4
H-14L/Superflux787	S502-H	F7A8-EG-G	6,4	F		3M,4YM 1,6-6,4					
YS-316L /Superflux300S	-	-	5,0	F		AWS A5.9 ER316L(Wire) (-60℃) 1,6-5,0		UP (KV-60℃) 1,6-5,0			

Classification			Max Dia. (mm)	Welding Position	Register of shipping & size(mm)						
Brand Name	KS	AWS			KR	ABS	LR	BV	DNV	GL	NK
H-14 /Superflux55ULT	S502-H	F7A8-EH14 F7P8-EH14	6,4	F	4Y40MH5 (-60℃) 12-64	5Y400MH5 4YT 12-64	4Y40MH5 4YT 12-64	A5Y40MH5HH A4YT 12-64	VY40MH5 IVYT 12-64	6Y40H5M 4YT 12-64	KAW54T, KAW54Y40MH5 12-64
2XH-14 /Superflux55ULT	S502-H	F7A8-EH14 F7P8-EH14	6,4	F	4YT 12-64	5Y400MH5 4YT 12-64	4YT, 4Y40MH5 12-64	A5Y40MH5HH A4YT 12-64	VY40MH5 IVYT 12-64	6Y40H5M, 4YT 12-64	KAW54T, KAW54Y40MH5 12-64
H-14 /Superflux55LP		F7A8-EH14	6,4	F		5Y400MH10 12-64	4Y40MH10 12-64	A5Y40MH5H 12-64	VY40MH10 NV4-4L 12-64	6Y40MH10 12-64	
H-14/S-707T	S502-H	F7A6-EH14 F7P6-EH14	6,4	F	3T,3YT 4YM 12-64	4YM,3T, 3YT 12-64	4YM,3T, 3YT 12-64	A4YM,A3T A3YT 12-64	IVYM, IIITYT 12-64	4YM, 3YT 12-64	KAW54M KAW53T 12-64
2XH-14/S-707T	S502-H	F7A6-EH14 F7P6-EH14	6,4	F	3T,3YT 4YM 12-64	4YM,3T, 3YT 12-64	4YM,3T, 3YT 12-64	A4YM,A3T A3YT 12-64	IVYM, IIITYT 12-64	4YM, 3YT 12-64	KAW54M KAW53T 12-64
H-14/S-707T /CW/CBM-G22			6,4	F	3YSR 2,0-64	3Y 2,0-64	3Y 2,0-64	A3YU 2,0-64	IIITYM 2,0-64	3Y 2,0-64	
A-3/S-787TB			4,8	F	L3TH10 3,2-4,8	5YT H10 3,2-4,8	4YTH10 (-60℃) 3,2-4,8	A5YT HH 3,2-4,8	VYT H10 NV4-4L 3,2-4,8		KAWL3TH10 3,2-4,8
2XA-3/S-787TB			4,8	F		5YT H10 3,2-4,8	4YTH10 (-60℃) 3,2-4,8	A5YT HH 3,2-4,8	VYT H10 NV4-4L 3,2-4,8		KAWL3TH10 3,2-4,8
A-3/Superflux55LP			4,8	F		5YT H10 3,2-4,8	4YTH10 (-60℃) 3,2-4,8	A5YT HH 3,2-4,8	VYT H10 NV4-4L 3,2-4,8	6YT H10 3,2-4,8	
H-14/S-460Y		F8P8-EH14	6,4	F	5Y46MH5 12-64	5Y460MH5 12-64	5Y46H5 12-64	A5Y46MH5HH 12-64	VY46MH5 12-64	6Y46MH5 12-64	KAW5Y46MH5 KAW63Y47MH5 12-64
YS-2209 /Superflux209			6,4	F				Duplex S/S 2,4-3,2			
Supercored81-k2MAG (80%Ar+20%CO ₂)		E81T1-K217	1,2	All V-DOW		5Y400SAH5 1,2	5Y40SH5 1,2	SA5Y40M 1,2	VY40MSH5 1,2	6Y40SH5 1,2	
H-14/S-705HF/IRN BS-3W			6,4	F	3Y-SR 2,0-64	3Y 2,0-64	3YA 2,0-64	A3YM 2,0-64	IIITYM 2,0-64	3Y 2,0-64	KAW55SP 2,0-64
H-14/S-705HF/CW/ CBM-G22			6,4	F	3Y-SMR	3Y 2,0-64	3YA 2,0-64	A3YM 2,0-64	IIITYM(25mm) 2,0-64	3YM 2,0-64	KAW53-SMP 2,0-64

APPENDIX

HARDNESS CONVERSION TABLE

Vickers Hardness (DPH)	Brinell hardness 10mm Ball 3,000kg load		Rockwell Hardness		Shore Hardness	Tensile Strength (kgf/mm ²) (approx)
	Standard Ball	Tungsten Carbide Ball	B scale	C scale		
940	-	-	-	68,0	97	-
920	-	-	-	67,5	96	-
900	-	-	-	67,0	95	-
880	-	767	-	66,4	93	-
860	-	757	-	65,9	92	-
840	-	745	-	65,3	91	-
820	-	733	-	64,7	90	-
800	-	722	-	64,0	88	-
780	-	710	-	63,5	87	-
760	-	698	-	62,6	86	-
740	-	684	-	61,8	84	-
720	-	670	-	61,0	83	-
700	-	656	-	60,1	81	-
690	-	647	-	59,7	-	-
680	-	638	-	59,2	80	-
670	-	630	-	58,8	-	227
660	-	620	-	58,3	79	224
650	-	611	-	57,8	-	220
640	-	601	-	57,3	77	217
630	-	591	-	56,8	-	213
620	-	582	-	56,3	75	210
610	-	573	-	55,7	-	206
600	-	564	-	55,2	74	203
590	-	554	-	54,7	-	199
580	-	545	-	54,1	72	196
570	-	535	-	53,6	-	192
560	-	525	-	53,0	71	189
550	505	517	-	52,3	-	185
540	496	507	-	51,7	69	182
530	488	497	-	51,1	-	178
520	480	488	-	50,5	67	175
510	473	479	-	49,8	-	171
500	465	471	-	49,0	66	168
490	456	460	-	48,4	-	164
480	448	452	-	47,7	64	161
470	441	442	-	46,9	-	157
460	433	433	-	46,1	62	154
450	425	425	-	45,3	-	150
440	415	415	-	44,5	59	147
430	405	405	-	43,6	-	143
420	397	397	-	42,7	57	140

HARDNESS CONVERSION TABLE

Vickers Hardness (DPH)	Brinell hardness 10mm Ball 3,000kg load		Rockwell Hardness		Shore Hardness	Tensile Strength (kgf/mm ²) (approx)
	Standard Ball	Tungsten Carbide Ball	B scale	C scale		
410	388	388	-	41,8	-	137
400	379	379	-	40,8	55	133
390	369	369	-	39,8	-	130
380	360	360	(110,0)	38,8	52	126
370	350	350	-	37,7	-	123
360	341	341	(109,0)	36,5	50	119
350	331	331	-	35,5	-	116
340	322	322	(108,0)	34,4	47	113
330	313	313	-	33,3	-	109
320	303	303	(107,0)	32,2	45	106
310	294	294	-	31,0	-	102
300	284	284	(105,5)	29,8	42	99
295	280	280	-	29,2	-	97,8
290	275	275	(104,5)	28,5	41	95,2
285	270	270	-	27,8	-	94,1
280	265	266	(103,5)	27,1	40	92,0
275	261	261	-	26,4	-	90,6
270	256	256	(102,0)	25,6	38	88,6
265	252	252	-	24,8	-	87,2
260	247	248	(101,2)	24,0	37	85,1
255	243	243	-	23,1	-	83,7
250	238	238	99,5	22,2	36	81,0
245	233	233	-	21,3	-	80,1
240	228	228	98,1	20,3	34	78,0
230	219	219	96,7	(18,0)	33	74,5
220	209	209	95,0	(15,7)	32	71,0
210	200	200	93,6	(13,4)	30	68,2
190	181	181	89,5	(8,5)	28	61,8
180	171	171	87,1	(6,0)	26	59,0
170	162	162	85,0	(0,3)	25	55,5
160	152	152	81,7	(0,0)	24	52,7
150	143	143	78,7	-	22	49,9
140	133	133	75,0	-	21	46,4
130	124	124	71,2	-	20	43,6
120	114	114	66,7	-	-	40,1
110	105	105	62,3	-	-	-
105	95	95	56,2	-	-	-
95	90	90	52,2	-	-	-
90	86	86	48,0	-	-	-
85	81	81	41,0	-	-	-

APPENDIX

LIST OF DRYING CONDITIONS

Classification	Type of the Coating	HYUNDAI Brand Name	Maximum Moisture Content for Drying(%)	Temperature (°C)	Drying Time (min)
For Mild Steels	Ilmenite Type	S-4301,I	3,0	70~100	30~60
	High Cellulose Type	S-6010,D, S-6011,D	6,0	70~100	30~60
	Rutile	S-6013,LF, S-6013,V	3,0	70~100	30~60
	Iron Powder Type	S-7014,F, S-7024,F S-6027,LF	2,0	70~100	30~60
	Low Hydrogen Type	S-7016,M, S-7016,O	0,5	300~350	60
For High Tensile Steels	Low Hydrogen Type	S-7016,H, S-7016,G S-7016,LF S-7016,LS S-7048,V	0,5	300~350	60
		S-8016,G, S-9016,G S-10016,G, S-11016,G	0,5	350~400	60
	Iron Powder low Hydrogen Type	S-7018,G, S-7028,F S-8018,G, S-7018,I S-9018,M, S-11018,M	0,5	350~400	60
For Low Alloy & Heat Resistant Steels	Low Hydrogen Type	S-7016,A1, S-8016,B1 S-8016,C1, S-8016,B2 S-8016,C2, S-8016,C3 S-9016,B3, S-8016,B5	0,5	350~400	60
	Iron Powder low Hydrogen Type	S-7018,A1, S-8018,B2 S-8018,C1, S-8018,C3 S-9018,B3, S-11018,M	0,5	350~400	60
	High Cellulose Type	S-7010,A1	6,0	70~100	30~60
For Hardfacing Applications	Titania Type	S-240A,R, S-350A,R	3,0	70~100	60
	Low Hydrogen Type	S-260A,B, S-350B,B S-450B,B S-500B,B, S-600B,B, S-700B,B S-13MN,B	0,5	350~400	60
For Stainless Steels	Lime-Titania Type	S-308L,16N,S308Mo,16,S-308,16N S-309L,16,S-309Mo,16,S-309,16N S-316L,16N, S-347,16, S-316,16N S-312,16,S-310,16	0,5	300~350	60
For Cast Iron	Graphite Type	S-NCI, S-FCF	1,5	80~120	30~60
Submerged Flux	Bonded Type	S-707, S-717, S-727 S-737, S-777, S-777MXT S-717ULT, S-787TB S-777MX, S-777MXH	0,1	300~350	60

STRESS CONVERSION TABLE(1)

(lbs/in² → kgf/mm²)

lbs/in ²	0,000	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
Kgf/mm ²	Kgf/mm ²	Kgf/mm ²	Kgf/mm ²	Kgf/mm ²	Kgf/mm ²	Kgf/mm ²	Kgf/mm ²	Kgf/mm ²	Kgf/mm ²	Kgf/mm ²
0,000	0,000	0,703	1,406	2,109	2,812	3,515	4,218	4,922	5,625	6,328
10,000	7,031	7,734	8,437	9,140	9,843	10,546	11,249	11,952	12,665	13,359
20,000	14,063	14,765	15,468	16,171	16,874	17,577	18,280	18,983	19,686	20,398
30,000	21,092	21,796	22,499	23,202	23,905	24,608	25,311	26,014	26,717	27,420
40,000	28,123	28,826	29,529	30,233	30,936	31,639	32,342	33,045	33,748	34,451
50,000	35,154	35,857	36,560	37,263	37,966	38,669	39,373	40,076	40,779	41,482
60,000	42,185	42,888	43,591	44,294	44,997	45,700	46,403	47,106	47,810	48,513
70,000	49,216	49,919	50,622	51,325	52,028	52,731	53,434	54,137	54,840	55,543
80,000	56,247	56,950	57,653	58,356	59,059	59,762	60,465	61,168	61,871	62,574
90,000	63,277	63,980	64,683	65,387	66,090	66,793	67,496	68,199	68,902	69,605
100,000	70,308	71,011	71,714	72,417	73,120	73,824	74,527	75,230	75,933	76,635
110,000	77,339	78,042	78,745	79,448	80,151	80,854	81,557	82,261	82,964	83,667
120,000	84,370	85,073	85,776	86,479	87,182	87,885	88,588	89,291	89,994	90,698
130,000	91,401	92,104	92,807	93,510	94,213	94,916	95,619	96,322	97,025	97,728
140,000	98,431	99,134	99,838	100,541	101,244	101,947	102,650	103,353	104,056	104,759
150,000	105,462	106,165	106,868	107,571	108,275	108,978	109,681	110,384	111,087	111,790
160,000	112,493	113,196	113,899	114,502	115,305	116,008	116,712	117,415	118,118	118,821
170,000	119,524	120,227	120,930	121,633	122,336	123,039	123,742	124,445	125,148	125,852
180,000	123,555	127,258	127,961	128,664	129,367	130,773	130,070	131,476	132,179	132,882
190,000	133,585	134,289	134,992	135,695	136,398	137,101	137,804	138,507	139,210	139,913
200,000	140,161	141,319	142,022	142,726	143,429	144,132	144,835	145,538	146,241	146,944
210,000	147,647	148,350	149,058	149,756	150,459	151,166	151,866	152,569	153,272	153,975
220,000	154,678	155,381	156,084	156,787	157,490	158,193	158,896	159,599	160,303	161,006
230,000	161,709	162,412	163,115	163,818	164,521	165,224	165,927	166,630	167,333	168,036
240,000	168,740	169,443	170,146	170,849	171,552	172,255	172,958	173,661	174,364	175,067
250,000	175,770	176,473	177,177	177,880	178,583	179,286	179,989	180,692	181,395	182,098

lbs/in ²	100	200	300	400	500	600	700	800	900
Kgf/mm ²	0,0703	0,1406	0,2109	0,2812	0,3512	0,4218	0,4918	0,5625	0,6328

APPENDIX

STRESS CONVERSION TABLE(2)

(kgf/mm² → MPa)
Conversion Factor : 1kgf/mm² = 9.80665MPa

kgf/mm ²	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	kgf/mm ²
MPa											
-		0.9807	1.9613	2.9420	3.9227	4.9033	5.8840	6.8647	7.8453	8.826	-
1	9.8067	10.787	11.768	12.749	13.729	14.710	15.691	16.671	17.652	18.633	1
2	19.613	20.594	21.575	22.555	23.536	24.517	25.497	26.478	27.459	28.439	2
3	29.420	30.401	31.381	32.362	33.343	34.323	35.304	36.285	37.265	38.246	3
4	39.227	40.207	41.188	42.169	43.149	44.130	45.111	46.091	47.072	48.053	4
5	49.033	50.014	50.995	51.975	52.956	53.937	54.917	55.898	56.879	57.859	5
6	58.840	59.821	60.801	61.763	62.763	63.743	64.724	65.705	66.685	67.666	6
7	68.647	69.627	70.608	71.589	72.569	73.550	74.531	75.511	76.492	77.473	7
8	78.453	79.434	80.415	81.395	82.376	83.357	84.337	85.318	86.299	87.279	8
9	88.260	89.241	90.221	91.202	92.138	93.163	94.144	95.125	96.105	97.086	9
10	98.067	99.047	100.03	101.01	101.99	102.97	103.95	104.63	105.91	106.89	10
11	107.87	108.85	109.83	110.82	111.80	112.78	113.76	114.74	115.72	116.70	11
12	117.68	118.66	119.64	120.62	121.60	122.58	123.56	124.54	125.53	126.51	12
13	127.49	128.47	129.45	130.43	131.41	132.39	133.37	134.35	135.33	136.31	13
14	137.29	138.27	139.25	140.24	141.22	142.20	143.18	144.16	145.14	146.12	14
15	147.10	148.08	149.06	150.04	151.02	152.00	152.98	135.96	154.95	155.93	15
16	156.91	157.89	158.87	159.85	160.83	161.81	162.79	163.77	164.75	165.73	16
17	166.71	167.69	168.67	169.66	170.64	171.62	172.60	173.58	174.56	175.54	17
18	176.52	177.50	178.48	179.46	180.44	181.42	182.40	183.38	184.37	185.35	18
19	186.33	187.31	188.29	189.27	190.25	191.23	192.21	193.19	194.17	195.15	19
20	196.13	197.11	198.09	199.07	200.06	201.04	202.02	203.00	203.98	204.96	20
21	205.94	206.92	207.90	208.88	209.96	210.84	211.82	212.80	213.78	214.77	21
22	215.75	216.73	217.71	218.69	219.69	220.65	221.63	222.61	223.59	224.57	22
23	225.55	226.53	227.51	228.49	229.48	230.46	231.44	232.42	233.40	234.77	23
24	235.36	236.34	237.32	238.30	239.28	240.26	241.24	242.22	243.20	244.19	24
25	245.17	246.15	247.13	248.11	249.09	250.07	251.05	252.03	253.01	253.99	25
26	254.97	255.95	256.93	257.91	258.90	259.88	260.86	261.84	262.82	263.80	26
27	264.78	265.76	266.74	267.72	268.70	269.68	270.66	271.64	272.62	273.61	27
28	274.59	275.59	276.55	277.53	278.51	279.49	280.47	281.45	282.43	283.41	28
29	284.39	285.39	286.35	287.33	288.32	289.30	290.28	291.28	292.24	293.22	29
30	294.20	295.18	296.16	297.14	298.12	299.10	300.08	301.06	302.04	303.03	30
31	304.01	304.99	305.97	306.95	307.93	308.91	309.89	310.87	311.85	312.83	31
32	313.81	314.79	315.77	316.75	317.74	318.72	319.70	320.68	321.66	322.64	32
33	323.62	324.60	325.58	326.56	327.54	328.52	329.50	330.48	331.46	332.45	33
34	333.63	334.41	335.39	336.37	337.35	338.33	339.31	340.29	341.27	342.25	34
35	343.23	344.21	345.19	346.17	347.16	348.14	349.12	350.10	351.08	352.06	35
36	353.04	354.02	355.00	355.98	356.96	357.94	358.92	359.90	360.88	361.87	36
37	362.85	363.83	364.81	365.79	366.77	367.75	368.73	369.71	370.69	370.67	37
38	372.65	373.63	374.61	375.59	376.58	377.56	378.54	379.52	380.50	381.48	38
39	382.46	383.44	384.42	385.40	386.38	387.36	388.34	389.32	390.30	391.29	39
40	392.27	393.25	394.23	395.21	396.19	397.17	398.15	399.13	400.11	401.09	40
41	402.07	403.05	404.03	405.01	406.00	406.98	407.96	408.94	409.92	410.90	41
42	411.88	412.86	413.84	414.82	415.80	416.78	417.76	418.74	419.72	420.71	42
43	421.69	422.67	423.65	424.63	425.61	426.59	427.57	428.55	429.53	430.51	43
44	431.49	432.47	433.45	434.43	435.42	436.40	437.38	438.35	439.34	440.32	44
45	441.30	442.28	443.26	444.24	445.22	446.20	447.18	448.16	449.14	450.13	45
46	451.11	452.09	453.07	454.05	455.03	456.01	456.99	457.97	458.95	459.93	46
47	460.91	461.89	462.87	463.85	464.84	465.82	466.80	467.97	468.76	469.74	47
48	470.72	471.70	472.68	473.66	474.64	475.62	476.60	477.58	478.56	479.55	48
49	480.53	481.54	482.49	483.47	484.45	485.43	486.41	487.39	488.37	489.35	49

(kgf/mm² → MPa)
Conversion Factor : 1kgf/mm² = 9.80665 MPa

kgf/mm ²	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	kgf/mm ²
MPa											
50	490.33	491.31	492.29	493.27	494.26	495.24	496.22	497.20	498.18	499.16	50
51	500.14	501.12	502.10	503.08	504.06	505.04	506.02	507.00	507.98	508.97	51
52	509.95	510.93	511.91	512.89	513.85	514.85	515.83	516.81	517.79	518.77	52
53	519.75	520.73	521.71	522.69	523.68	524.66	525.64	526.62	527.60	528.58	53
54	529.56	530.54	531.52	532.50	533.48	534.46	535.44	536.42	537.40	538.39	54
55	539.37	540.35	541.33	542.31	543.29	544.27	545.25	546.23	547.21	548.19	55
56	549.17	550.15	551.13	552.11	553.10	554.08	555.06	556.04	557.02	558.00	56
57	558.98	559.96	560.94	561.92	562.90	563.88	564.83	565.84	566.82	567.81	57
58	568.79	569.77	570.75	571.73	572.71	573.69	574.67	575.65	576.63	577.61	58
59	578.59	579.57	580.55	581.53	582.52	583.50	584.48	585.46	586.44	587.42	59
60	588.40	589.38	590.35	591.34	592.32	593.30	594.28	595.26	596.24	597.22	60
61	598.21	599.19	600.17	601.15	602.13	603.11	604.06	605.07	606.56	607.06	61
62	608.01	608.99	609.67	610.95	611.93	612.92	613.90	614.88	615.56	616.84	62
63	617.82	618.80	619.78	620.76	621.74	622.72	623.70	624.68	625.66	626.64	63
64	627.63	628.61	629.59	630.57	631.55	632.53	633.51	634.49	635.47	636.45	64
65	637.43	638.41	639.39	640.37	641.35	642.34	643.32	644.30	645.28	646.26	65
66	647.24	648.22	649.20	650.18	651.16	652.14	653.12	654.10	655.08	656.06	66
67	657.05	658.03	659.01	659.99	660.97	661.95	662.93	663.91	664.89	665.87	67
68	666.85	667.83	668.81	669.79	670.77	671.76	672.74	673.72	674.70	675.68	68
69	676.66	677.64	678.62	679.60	680.58	681.56	682.54	683.52	684.50	685.48	69
70	686.47	687.45	688.43	689.41	690.39	691.37	692.16	693.33	694.31	695.29	70
71	696.27	697.25	698.23	699.21	700.19	701.18	702.16	703.14	704.12	705.10	71
72	706.08	707.06	708.04	709.025	710.00	710.98	711.96	712.94	713.92	714.90	72
73	715.89	716.87	717.85	718.83	719.81	720.79	721.77	722.75	723.73	724.71	73
74	725.69	726.67	727.65	728.63	729.61	730.60	731.58	732.56	733.73	734.52	74
75	735.50	736.48	737.46	738.44	739.42	740.40	741.38	742.36	743.34	744.32	75
76	745.31	746.29	747.27	748.25	749.23	750.21	751.19	752.17	753.15	754.13	76
77	755.11	756.09	757.07	758.05	759.03	760.02	761.00	761.98	762.96	763.94	77
78	764.92	765.90	766.88	767.86	768.84	769.82	770.80	771.78	772.76	773.74	78
79	774.73	775.71	776.69	777.67	778.65	779.63	780.61	781.59	782.57	783.55	79
80	784.53	785.51	786.49	787.47	788.26	789.44	790.42	791.40	792.38	793.36	80
81	794.34	795.32	796.30	797.27	798.26	799.24	800.22	801.20	802.18	803.16	81
82	804.15	805.13	806.11	807.09	808.07	809.05	810.03	811.01	811.99	812.97	82
83	813.95	814.93	815.91	816.89	817.87	818.86	819.84	820.82	821.80	822.78	83
84	823.76	824.74	825.72	826.70	827.68	828.66	829.64	830.62	831.60	832.75	84
85	833.57	834.55	835.53	836.51	837.49	838.47	839.45	840.43	841.41	842.39	85
86	843.37	844.35	845.33	846.31	847.29	848.28	849.26	850.24	851.22	852.20	86
87	853.18	854.16	855.14	856.12	857.10	858.08	859.06	860.04	861.02	862.00	87
88	862.99	863.97	864.95	865.93	866.91	867.89	868.87	869.85	870.83	871.81	88
89	872.79	873.77	874.75	875.73	876.71	877.70	878.48	879.66	880.64	881.62	89
90	882.41	883.58	884.56	885.54	886.52	887.50	888.48	889.49	890.44	891.42	90
91	892.41	893.93	894.37	895.35	896.33	897.31	898.29	899.27	900.25	901.23	91
92	902.21	903.19	904.17	905.15	906.13	907.12	908.10	909.08	910.06	911.04	92
93	912.02	913.00	913.98	914.96	915.94	916.92	917.90	918.88	919.86	920.84	93
94	921.83	922.81	923.79	924.77	925.75	926.13	927.11	928.69	929.67	930.65	94
95	913.63	932.61	933.59	934.57	935.55	936.54	937.52	938.50	939.48	940.46	95
96	941.44	942.42	943.40	944.38	945.36	946.34	947.32	948.30	949.28	950.26	96
97	951.25	952.23	953.22	954.19	955.17	956.15	957.13	958.11	959.09	960.07	97
98	891.05	962.03	963.01	963.99	964.97	965.96	966.94	967.92	968.90	969.88	98
99	970.86	971.84	972.82	973.80	974.78	975.76	976.74	977.72	978.70	979.68	99

STRESS CONVERSION TABLE(3)

(MPa → kgf/mm²)
Conversion Factor :1 MPa =0.10197kgf/mm²

MPa	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	MPa
kgf/mm ²											
-	-	0.1020	0.2039	0.3059	0.4079	0.5099	0.6118	0.7138	0.8158	0.9177	
10	1.0197	1.1217	1.12237	1.3256	1.3276	1.5296	1.6315	1.7335	1.8355	1.9375	10
20	2.0394	2.1417	2.2434	2.3453	2.4473	2.5493	2.6543	2.7532	2.8552	2.9572	20
30	3.0591	3.1611	3.2631	3.3651	3.4670	3.5690	3.6710	3.7729	3.8749	3.9769	30
40	4.0789	4.1808	4.2828	4.3848	4.4868	4.5887	4.6907	4.7927	4.8946	4.9966	40
50	5.0936	5.2006	5.3025	5.4045	5.5065	5.6084	5.7104	5.8124	5.9144	6.0163	50
60	6.1183	6.2203	6.3222	6.4242	6.5262	6.6282	6.7301	6.8321	6.9341	7.0363	60
70	7.1380	7.2400	7.3420	7.4439	7.5499	7.6479	7.7498	7.8518	7.9538	8.0558	70
80	8.1577	8.2597	8.3617	8.4636	8.5656	8.6676	8.7696	8.8715	8.9735	9.0755	80
90	9.1774	9.2794	9.3814	9.4834	9.5853	9.6873	9.7893	9.8912	9.9932	10.095	90
100	10.197	10.290	10.401	10.503	10.605	10.707	10.809	10.911	11.013	11.115	100
110	11.217	11.319	11.421	11.523	11.625	11.727	11.829	11.931	12.033	12.135	110
120	12.237	12.399	12.441	12.543	12.644	12.764	12.848	12.950	13.052	13.154	120
130	13.256	13.358	13.460	13.562	13.644	13.766	13.868	13.970	14.072	14.174	130
140	14.276	14.378	14.480	14.582	14.674	14.786	14.888	14.990	15.092	15.194	140
150	15.296	15.398	15.500	15.602	15.704	15.806	15.908	16.010	16.112	16.213	150
160	16.315	16.417	16.519	16.621	16.723	16.825	16.927	17.029	17.131	17.233	160
170	17.335	17.437	17.539	17.641	17.743	17.845	17.947	18.049	18.151	18.253	170
180	18.355	18.457	18.559	18.661	18.763	18.865	18.967	19.069	19.171	19.273	180
190	19.375	19.477	19.579	19.681	19.782	19.884	19.986	20.088	20.190	20.292	190
200	20.394	20.496	20.598	20.700	20.802	20.904	21.006	21.108	21.210	21.312	200
210	21.44	21.516	21.618	21.720	21.822	21.924	22.026	22.128	22.230	22.332	210
220	22.434	22.536	22.638	22.740	22.842	22.944	23.046	23.148	23.250	23.352	220
230	23.453	23.555	23.657	23.759	23.861	23.963	24.065	24.167	24.269	24.371	230
240	24.473	24.575	24.677	24.779	24.881	24.983	25.085	25.187	25.289	25.391	240
250	25.493	25.595	25.697	25.799	25.901	26.003	26.015	26.207	26.309	26.411	250
260	26.513	26.614	26.717	26.899	26.921	27.022	27.124	27.223	27.328	27.430	260
270	27.532	27.634	27.736	27.838	27.940	27.042	28.144	28.246	28.348	28.450	270
280	28.552	28.654	28.756	28.858	28.960	29.062	29.164	29.266	29.368	29.470	280
290	29.572	29.674	29.776	29.878	29.980	30.082	30.184	30.286	30.388	30.490	290
300	30.591	30.693	30.795	30.897	30.999	31.101	31.203	31.305	31.407	31.509	300
310	31.611	31.713	31.815	31.917	32.019	32.121	32.223	32.325	32.427	32.529	310
320	32.631	32.733	32.835	32.937	33.039	33.141	33.243	33.345	33.447	33.549	320
330	33.651	33.753	33.855	33.957	33.059	34.160	34.262	34.364	34.466	34.568	330
340	34.670	34.772	34.874	34.976	34.078	35.180	35.282	35.384	35.486	35.588	340
350	35.690	35.792	35.894	35.996	36.098	36.200	36.302	36.404	36.406	36.608	350
360	36.710	36.812	36.914	37.016	37.118	37.220	37.322	37.424	37.526	37.628	360
370	37.729	37.831	37.933	38.035	38.137	38.239	38.341	38.443	38.545	38.647	370
380	38.749	38.851	38.953	39.055	39.157	39.259	39.361	39.463	39.565	39.667	380
390	39.769	39.871	39.973	40.075	40.177	40.279	40.381	40.483	40.585	40.687	390
400	40.789	40.891	40.993	41.095	41.197	41.299	41.400	41.502	41.604	41.706	400
410	41.808	41.910	42.012	42.114	42.216	42.318	42.420	42.522	42.624	42.726	410
420	42.848	42.930	43.032	43.134	43.236	43.338	43.440	43.542	43.644	43.746	420
430	43.848	44.950	44.052	44.154	44.256	44.358	44.460	44.562	44.664	44.766	430
440	44.868	44.969	45.071	45.173	45.275	45.377	45.479	45.581	45.683	45.785	440
450	45.88	45.989	46.091	46.193	46.295	46.397	46.499	46.601	46.703	46.805	450
460	46.907	47.009	47.111	47.213	47.315	47.417	47.519	47.621	47.723	47.825	460
470	47.927	48.029	48.131	48.233	48.335	48.437	48.538	48.640	48.742	48.844	470
480	48.946	49.048	49.150	49.253	49.355	49.456	49.558	49.660	49.762	49.864	480
490	49.966	50.068	50.170	50.272	50.374	50.476	50.578	50.680	50.782	50.884	490

(MPa $\rightarrow$ kgf/mm²)
Conversion Factor :1 MPa =0.10197kgf/mm²

MPa	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	MPa
kgf/mm ²											
500	50,986	51,088	51,190	51,292	51,394	51,496	51,598	51,700	51,802	51,904	500
510	52,006	52,107	52,209	52,311	52,413	52,515	52,617	52,719	52,821	52,923	510
520	53,025	53,127	53,229	53,33	53,433	53,535	53,637	53,739	53,841	53,943	520
530	54,025	54,147	54,249	54,351	54,453	54,555	54,657	54,759	54,861	54,963	530
540	55,265	55,167	55,269	55,371	55,473	55,575	55,677	55,778	55,880	55,982	540
550	56,084	56,186	56,288	56,390	56,492	56,594	56,696	56,798	56,900	57,002	550
560	57,104	57,206	57,308	57,410	57,512	57,614	57,716	57,818	57,920	58,022	560
570	58,124	58,226	58,328	58,430	58,532	58,634	58,736	58,838	58,940	59,042	570
580	59,144	59,246	59,347	59,449	59,551	59,653	59,755	59,857	59,959	60,061	580
590	60,163	60,265	60,367	60,469	60,571	60,673	60,775	60,877	60,979	61,081	590
600	61,183	61,285	61,387	61,489	61,591	61,693	61,795	61,897	61,999	62,101	600
610	62,203	62,305	62,407	62,509	62,611	62,713	62,815	62,916	63,018	63,120	610
620	63,222	63,324	63,426	63,528	63,630	63,732	63,834	63,936	64,038	64,140	620
630	64,242	64,344	64,446	64,548	64,650	64,752	64,854	64,956	65,058	65,160	630
640	65,262	65,364	65,466	65,568	65,670	65,772	65,874	65,976	66,078	66,180	640
650	66,282	66,384	66,485	66,587	66,689	66,791	66,893	66,995	67,097	67,199	650
660	67,301	67,403	67,404	67,607	67,709	67,811	67,913	68,15	68,117	68,219	660
670	68,321	68,432	68,525	68,627	68,729	68,831	68,933	68,035	69,137	69,239	670
680	69,341	69,443	69,545	69,647	69,749	69,851	69,953	70,055	70,156	70,258	680
690	70,360	70,462	70,564	70,666	70,768	70,870	70,972	71,074	71,176	71,278	690
700	71,380	71,482	71,584	71,686	71,788	71,890	71,992	72,094	72,196	72,298	700
710	72,400	72,402	72,604	72,706	72,808	72,910	73,012	73,114	73,216	73,318	710
720	73,420	73,522	73,624	73,726	73,827	73,929	74,031	74,133	74,235	74,337	720
730	74,439	74,541	74,643	74,745	74,847	74,949	75,051	75,153	75,255	75,357	730
740	75,459	75,561	75,663	75,765	75,867	75,969	76,071	76,173	76,275	76,377	740
750	76,479	76,581	76,682	76,785	76,887	76,989	77,081	77,193	77,294	77,396	750
760	77,498	77,600	77,702	77,804	77,906	78,008	78,110	78,212	78,314	78,416	760
770	78,578	78,620	78,722	78,824	78,926	79,028	79,130	78,232	79,334	79,436	770
780	79,538	79,640	79,742	79,844	79,946	80,048	80,150	80,252	80,354	80,456	780
790	80,558	80,660	80,762	80,863	80,965	81,067	81,169	81,271	81,373	81,475	790
800	81,577	81,679	81,762	81,833	81,985	82,087	82,189	82,291	82,393	82,495	800
810	82,597	82,699	82,801	82,903	83,005	83,107	83,209	83,311	83,413	83,515	810
820	83,617	83,719	83,821	83,923	84,025	84,127	84,229	84,331	84,433	84,534	820
830	84,636	84,738	84,840	84,942	85,044	85,146	85,248	85,350	85,452	85,554	830
840	85,656	85,758	85,860	85,962	86,064	86,166	86,268	86,370	86,472	86,574	840
850	86,676	86,778	86,880	86,982	87,084	87,186	87,288	87,390	87,492	87,594	850
860	87,696	87,798	87,900	88,002	88,103	88,205	88,307	88,409	88,511	88,613	860
870	88,715	88,817	88,919	89,021	89,123	89,225	89,327	89,429	89,531	89,633	870
880	89,735	89,837	89,939	90,041	90,143	90,245	90,347	90,447	90,551	90,653	880
890	90,755	90,857	90,959	91,061	91,163	91,265	91,367	91,469	91,571	91,673	890
900	91,774	91,876	91,978	92,080	92,182	92,284	92,386	92,488	92,590	92,692	900
910	92,794	92,896	92,998	93,100	93,202	93,304	93,406	93,508	93,610	93,712	910
920	93,814	93,916	93,100	94,120	94,222	94,324	94,426	94,528	94,630	94,732	920
930	94,834	94,936	94,140	95,160	95,241	95,343	95,445	95,547	95,649	95,751	930
940	95,853	95,955	96,159	96,159	96,261	96,363	96,465	96,567	96,669	96,771	940
950	96,873	96,975	97,179	97,179	97,281	97,383	97,485	97,589	97,689	97,791	950
960	97,893	97,995	98,301	98,199	98,301	98,403	98,505	98,607	98,709	98,811	960
970	98,912	99,014	99,218	99,218	99,320	99,422	99,524	99,626	99,728	99,830	970
980	99,932	100,03	100,24	100,24	100,34	100,44	100,52	100,62	100,72	100,82	980
990	100,95	101,05	101,16	101,26	101,36	101,46	101,56	101,64	101,77	101,87	990

IMPACT VALUE CONVERSION TABLE

(ft · lbs → kgf · m)
Conversion Factor : 1ft · lbs = 0.138255 kg · m

ft · lbs	0	1	2	3	4	5	6	7	8	9	ft · lbs
	Kgm	Kgm	Kgm	Kgm	Kgm	Kgm	Kgm	Kgm	Kgm	Kgm	Kgm
0	0,000	0,138	0,276	0,415	0,553	0,691	0,830	0,968	1,106	1,244	0
10	1,383	1,521	1,659	1,797	1,936	2,074	2,212	2,350	2,489	2,627	10
20	2,765	2,903	3,042	3,180	3,318	3,456	3,595	3,733	3,871	4,009	20
30	4,148	4,286	4,424	4,562	4,701	4,839	4,977	5,116	5,254	5,392	30
40	5,530	5,667	5,807	5,945	6,083	6,222	6,360	6,498	6,636	6,774	40
50	6,913	7,051	7,189	7,328	7,466	7,604	7,742	7,881	8,019	8,157	50
60	8,295	8,434	8,572	8,710	8,848	8,987	9,125	9,263	9,401	9,540	60
70	9,678	9,816	9,955	10,093	10,231	10,369	10,508	10,646	10,784	10,922	70
80	11,061	11,199	11,337	11,475	11,614	11,752	11,890	12,028	12,167	12,305	80
90	12,443	12,581	12,720	12,858	12,996	13,134	13,273	13,411	13,549	13,687	90
100	13,826	13,964	14,105	14,540	14,379	14,517	14,655	14,794	14,932	15,070	100
110	15,208	15,347	15,482	15,623	15,761	15,900	16,038	16,176	16,314	16,453	110
120	16,591	16,729	16,867	17,006	17,144	17,282	17,420	17,559	17,697	17,835	120

IMPACT VALUE CONVERSION TABLE(1)

(kgf · m → N · m or J)

Conversion Factor : 1kgf · m = 9.80665 N · m (or J)

kgf · m	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
N.m [or Joule]										
1	-	0.9807	1.9613	2.9420	3.9227	4.9033	5.8840	6.8647	7.8453	8.8260
2	9.8066	10.787	11.768	12.749	13.729	14.710	15.691	16.671	17.652	18.633
3	19.613	20.594	21.575	22.555	23.534	24.517	25.497	26.478	27.652	28.439
4	29.420	30.401	31.381	32.362	33.343	34.323	35.304	36.285	37.265	38.246
5	39.229	40.207	41.188	42.169	43.149	44.130	45.111	46.091	47.072	48.053
6	49.033	50.014	50.995	51.975	52.956	53.937	54.917	55.898	56.879	57.859
7	58.844	59.821	60.801	61.728	62.763	63.743	64.724	65.705	66.685	67.666
8	68.647	69.627	70.608	71.589	72.569	73.550	74.531	75.511	76.492	77.473
9	78.453	79.434	80.415	81.395	82.376	83.357	84.337	85.318	86.299	87.279
10	88.260	89.241	90.221	91.202	92.183	93.163	94.144	95.125	96.105	97.086
11	98.066	99.047	100.03	101.01	101.99	102.97	103.95	104.93	105.91	106.89
12	107.87	108.85	109.83	110.82	111.80	112.78	113.76	114.74	115.72	116.70
13	117.68	118.66	119.64	120.62	121.60	122.58	123.56	124.54	125.53	126.51
14	127.49	128.47	129.45	130.43	131.41	132.39	133.37	134.35	135.33	136.31
15	137.29	138.27	139.25	140.24	141.22	142.20	143.18	144.16	145.14	146.12
16	147.10	148.08	149.06	150.04	151.02	152.00	152.98	153.96	154.95	155.93
17	156.91	157.89	158.87	159.85	160.83	161.81	162.72	163.77	164.75	165.73
18	166.71	167.69	168.67	169.66	170.64	171.62	172.60	173.58	174.56	175.54
19	176.52	177.50	178.48	179.46	180.44	181.42	182.40	183.38	184.37	185.35
20	186.33	187.31	188.29	189.27	190.25	191.23	192.21	193.19	194.17	195.15
21	196.13	197.11	198.09	199.07	200.06	201.04	202.02	203.00	203.98	204.96
22	205.94	206.92	207.90	208.88	209.86	210.84	211.82	212.80	213.78	214.77
23	215.75	216.73	217.71	218.69	219.67	220.65	221.63	222.61	223.59	224.57
24	225.55	226.53	227.51	228.49	229.48	230.46	231.44	232.42	233.40	234.38
25	235.36	236.34	237.32	238.30	239.28	240.26	241.24	242.22	243.20	244.19
26	245.17	246.15	247.13	248.11	249.09	250.07	251.05	252.03	253.01	253.99
27	254.97	255.95	256.93	257.91	258.89	259.87	260.47	261.45	262.43	263.80
28	264.78	265.76	266.74	267.72	268.70	269.68	270.66	271.64	272.62	273.61
29	274.59	275.57	276.55	277.53	278.51	279.49	280.49	281.45	282.43	283.41
30	284.39	285.37	286.35	287.33	288.32	289.30	290.28	291.26	292.24	293.22
31	294.20	295.18	296.16	297.14	298.12	299.10	300.08	301.06	302.04	303.03
32	304.01	304.99	305.97	306.95	307.93	308.91	309.89	310.87	311.85	312.83
33	313.81	314.79	315.77	316.75	317.74	318.72	319.70	320.68	321.66	322.64
34	323.62	324.60	325.58	326.56	327.54	328.52	329.50	330.48	331.46	332.45
35	333.43	334.41	335.39	336.37	337.35	338.33	339.31	340.29	341.27	342.25
36	343.32	344.21	345.19	346.17	347.16	348.14	349.12	350.10	350.88	351.87
37	353.04	351.02	355.00	355.98	356.96	357.94	358.92	359.90	360.88	361.87
38	362.85	363.83	364.81	365.79	366.77	367.75	368.73	369.71	370.69	371.67
39	372.35	373.63	374.61	375.59	376.58	377.56	378.54	379.52	380.50	381.48
40	382.46	383.44	384.42	385.40	386.38	387.36	388.34	389.32	390.30	391.29
41	392.27	393.25	394.23	395.21	396.19	397.17	398.15	399.13	400.11	401.09
42	402.07	403.05	404.03	405.01	406.00	406.98	407.96	408.94	409.92	410.90
43	411.88	412.86	413.84	414.82	415.80	416.78	417.76	418.74	419.72	420.71
44	421.69	422.67	423.69	424.63	425.61	426.59	427.57	428.55	429.53	430.51
45	431.49	432.47	433.45	434.43	435.42	436.40	437.38	438.36	439.34	440.32
46	441.30	442.28	443.26	444.24	445.22	446.20	447.18	448.13	449.14	450.13
47	451.11	452.09	453.07	454.05	455.03	456.01	456.99	457.97	458.95	459.93
48	460.91	461.89	462.87	463.85	464.83	465.82	466.80	467.78	468.76	469.74
49	470.72	471.70	472.68	473.66	474.64	475.62	476.60	477.58	478.56	479.55
50	480.53	481.51	482.49	483.47	484.45	485.43	486.41	487.39	488.37	489.35

APPENDIX

IMPACT VALUE CONVERSION TABLE(2)

(kgf · m → N · m or J)

Conversion Factor : 1kgf · m = 9.80665 N · m (or J)

kgf · m	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	N.m [or Joule]									
50	490.33	491.31	492.29	493.27	494.26	495.24	496.22	497.20	498.18	499.16
51	500.14	501.12	502.10	503.27	504.06	505.04	506.02	507.99	507.98	508.97
52	509.95	510.93	511.91	512.89	513.87	514.85	515.83	516.82	517.79	518.77
53	519.75	520.73	521.71	522.69	523.68	524.66	525.64	526.32	527.64	528.58
54	529.56	530.54	531.52	532.50	533.48	534.46	535.44	536.45	537.64	538.39
55	539.37	540.35	541.33	542.31	543.48	534.46	535.44	536.42	537.64	538.39
56	549.17	550.15	551.13	552.11	553.10	544.27	555.03	556.06	557.02	558.00
57	558.98	559.96	560.94	561.92	562.90	563.88	564.86	565.84	566.82	567.81
58	568.79	569.77	570.75	571.73	572.71	573.69	574.67	575.65	576.63	577.61
59	578.59	579.57	580.55	581.53	582.52	583.50	584.48	585.46	586.44	587.42
60	588.40	589.38	590.36	591.34	592.32	593.30	594.28	595.26	596.24	597.22
61	598.21	599.19	600.17	601.15	602.13	603.11	604.09	605.07	606.05	607.03
62	608.01	608.99	609.97	610.95	611.93	612.92	613.90	614.88	615.86	616.84
63	617.81	618.80	619.78	620.76	621.74	622.72	623.70	624.68	625.66	626.64
64	627.63	628.61	629.59	630.57	631.55	632.53	633.51	634.49	635.47	636.45
65	637.43	638.41	639.39	640.37	641.35	642.34	643.32	644.30	645.28	646.26
66	647.24	648.22	649.20	650.18	651.16	652.14	653.12	654.10	655.08	656.06
67	657.05	658.03	659.01	659.99	660.97	661.95	662.93	663.91	664.89	665.87
68	666.85	667.83	668.81	669.99	670.77	671.76	672.74	673.72	674.70	675.68
69	676.66	677.64	678.62	679.60	680.58	681.56	682.54	683.52	684.50	685.48
70	686.47	687.45	688.43	689.41	690.39	691.37	692.35	693.33	694.31	695.29
71	696.27	697.25	698.23	699.21	700.19	701.18	702.16	703.14	704.12	705.10
72	706.08	707.06	708.04	709.02	710.00	710.98	711.96	712.94	713.92	714.90
73	715.89	716.87	717.85	718.83	719.81	720.79	721.77	722.75	723.73	724.71
74	725.69	726.67	727.65	728.63	729.61	730.60	731.58	732.56	733.54	734.52
75	735.50	736.48	737.46	738.44	739.42	740.40	741.38	742.36	743.34	744.32
76	745.31	746.29	747.27	748.25	749.23	750.21	751.19	752.17	753.15	754.13
77	755.11	756.09	757.07	758.05	759.03	760.02	761.00	761.98	762.96	763.94
78	764.92	765.90	766.88	767.86	768.84	769.82	770.80	771.78	772.76	773.74
78	774.73	775.71	776.69	777.67	778.65	779.63	780.61	781.59	782.57	783.55
80	784.53	785.51	786.49	787.47	788.45	789.44	790.42	791.40	792.38	793.36
81	794.34	795.32	796.30	797.28	798.26	799.24	800.22	801.20	802.18	803.16
82	804.15	805.13	806.11	807.09	808.07	809.05	810.03	811.01	811.99	812.97
83	813.95	814.93	815.91	816.89	817.87	818.86	819.84	820.82	821.80	822.78
84	823.76	824.74	825.72	826.70	827.68	828.66	829.64	830.62	831.60	832.58
85	833.56	834.74	835.53	836.70	837.68	838.66	839.64	840.62	841.60	842.58
86	843.37	844.35	845.72	846.51	847.49	848.47	849.45	850.43	851.41	852.39
87	853.18	854.16	855.14	856.12	857.10	858.08	859.06	860.04	861.02	862.00
88	862.99	863.97	864.95	865.93	866.91	867.89	868.87	869.85	870.83	871.81
89	872.79	873.77	874.75	875.73	876.71	877.70	878.68	879.66	880.64	881.62
90	882.60	883.58	884.56	885.54	886.55	887.50	888.48	889.46	890.44	891.23
91	892.41	893.39	894.37	895.35	896.33	897.31	898.28	899.27	900.25	901.23
92	902.21	903.19	904.17	905.15	906.13	907.12	908.10	909.08	910.06	911.04
93	912.02	913.00	913.98	914.96	915.94	916.92	917.90	918.88	919.86	920.84
94	921.83	922.81	923.79	924.77	925.75	926.73	927.71	928.69	929.67	930.65
95	931.63	932.61	933.59	934.57	935.55	936.54	937.54	938.50	939.48	940.46
96	941.44	942.42	943.40	944.38	945.36	946.34	947.32	948.30	949.28	950.26
97	951.25	952.23	953.21	954.19	955.17	956.15	957.13	958.11	959.09	960.07
98	961.05	962.03	963.01	963.99	964.97	965.96	966.94	967.92	968.90	969.88
99	970.86	971.84	972.82	973.80	974.72	975.76	976.74	977.72	978.70	979.68
100	980.66									

TEMPERATURE CONVERSION TABLE

0~45			46~91			92~450			460~910		
C°		°F	C°		°F	C°		°F	C°		°F
-17.8	0	32	7.7	46	114.8	33.3	92	197.6	238	460	860
-17.2	1	33.8	8.2	47	116.8	33.8	93	199.4	243	470	878
-16.7	2	35.6	8.8	48	118.8	34.4	94	201.2	249	480	896
-16.1	3	37.4	9.3	49	120.2	34.8	95	203.0	254	490	914
-15.6	4	39.2	9.9	50	122.0	35.5	96	204.8	260	500	932
-15.0	5	41.0	10.4	51	123.8	36.1	97	206.6	265	510	950
-14.4	6	42.8	11.1	52	125.8	36.6	98	208.4	271	520	968
-13.9	7	44.6	11.5	53	127.4	37.1	99	210.2	276	530	986
-13.3	8	46.4	12.1	54	129.2	37.7	100	212.0	282	540	1004
-12.8	9	48.2	12.6	55	131.0	38	100	212	288	550	1022
-12.2	10	50.0	13.2	56	132.8	43	110	230	293	560	1040
-11.7	11	51.8	13.7	57	134.6	49	120	248	299	570	1058
-11.1	12	53.6	14.3	58	136.4	54	130	266	304	580	1076
-10.6	13	55.4	14.8	59	138.4	60	140	284	310	590	1094
-10.0	14	57.2	15.6	60	140.0	65	150	302	315	600	1112
-9.4	15	59.0	16.0	61	141.8	71	160	320	321	610	1130
-8.9	16	60.8	16.6	62	143.6	76	170	338	326	620	1148
-8.3	17	62.6	17.1	63	145.4	83	180	356	332	630	1166
-7.7	18	64.4	17.7	64	147.2	88	190	374	338	640	1184
-7.2	19	66.2	18.2	65	149.0	93	200	392	343	650	1202
-6.7	20	68.0	18.8	66	150.8	99	210	410	349	660	1220
-6.1	21	69.8	19.3	67	152.6	100	212	413	354	670	1238
-5.6	22	71.6	19.9	68	154.4	104	220	428	360	680	1256
-5.0	23	73.4	20.4	69	156.2	110	230	446	365	690	1274
-4.4	24	75.2	21.0	70	158.0	115	240	464	371	700	1292
-3.9	25	77.0	21.5	71	159.8	121	250	482	376	710	1310
-3.3	26	78.8	22.2	72	161.6	127	260	500	382	720	1328
-2.8	27	80.6	22.7	73	163.4	132	270	518	387	730	1346
-2.2	28	82.4	23.3	74	165.2	138	280	536	393	740	1364
-1.7	29	84.2	23.8	75	167.0	143	290	554	399	750	1382
-1.1	30	86.0	24.4	76	168.8	149	300	572	404	760	1400
-0.6	31	87.8	25.0	77	170.6	154	310	590	410	770	1418
0	32	89.6	25.5	78	172.4	160	320	608	415	780	1436
0.6	33	91.4	26.2	79	174.2	165	330	626	421	790	1454
1.1	34	93.2	26.8	80	176.0	171	340	644	426	800	1472
1.7	35	95.0	27.3	81	177.8	177	350	662	432	810	1490
2.2	36	96.8	27.7	82	179.6	182	360	680	438	820	1508
3.3	38	100.4	28.8	84	183.2	193	380	716	449	840	1544
3.9	39	102.2	29.3	85	185.0	199	390	734	454	850	1562
4.4	40	104.0	29.9	86	186.8	204	400	752	460	860	1580
5.0	41	105.8	30.4	87	188.6	210	410	770	465	870	1598
5.6	42	107.6	31.0	88	190.4	215	420	788	471	880	1616
6.1	43	109.3	31.5	89	192.2	221	430	806	476	890	1634
6.7	44	111.2	32.1	90	194.0	226	440	824	482	900	1652
7.2	45	113.0	32.6	91	195.8	232	450	842	487	910	1670

APPENDIX

920~1370			1380~1830			1840~2290			2300~2750		
C°		°F	C°		°F	C°		°F	C°		°F
493	920	1688	748	1380	2516	1003	1840	3344	1260	2300	4172
498	930	1706	752	1390	2534	1008	1850	3362	1266	2310	4190
504	940	1724	760	1400	2552	1014	1860	3380	1271	2320	4208
510	950	1742	765	1410	2570	1019	1870	3398	1277	2330	4244
520	970	1778	776	1430	2606	1030	1890	3434	1288	2350	4262
526	980	1796	782	1440	2624	1036	1900	3452	1293	2360	4280
532	990	1814	787	1450	2642	1041	1910	3470	1299	2370	4298
538	1000	1832	793	1460	2660	1047	1920	3488	1304	2380	4316
543	1010	1850	798	1470	2678	1052	1930	3506	1310	2390	4334
549	1020	1868	804	1480	2696	1058	1940	3524	1316	2400	4552
555	1030	1886	809	1490	2714	1063	1950	3542	1321	2410	4370
560	1040	1904	815	1500	2732	1069	1960	3560	1327	2420	4388
565	1050	1922	820	1510	2750	1074	1970	3578	1332	2430	4406
571	1060	1940	827	1520	2768	1080	1980	3596	1338	2440	4424
576	1070	1958	831	1530	2786	1085	1990	3614	1343	2450	4442
582	1080	1976	838	1540	2804	1093	2000	3632	1349	2460	4460
587	1090	1994	842	1550	2822	1099	2010	3650	1354	2470	4478
593	1100	2012	849	1560	2840	1104	2020	3668	1360	2480	4496
604	1120	2048	860	1580	2876	1116	2040	3704	1371	2500	4532
609	1130	2066	864	1590	2894	1124	2050	3722	1377	2510	4550
616	1140	2084	871	1600	2912	1127	2060	3740	1382	2520	4568
620	1150	2102	876	1610	2930	1132	2070	3758	1388	2530	4586
626	1160	2120	882	1620	2948	1138	2080	3776	1393	2540	4604
631	1170	2138	887	1630	2966	1143	2090	3794	1399	2550	4622
637	1180	2156	893	1640	2984	1149	2100	3812	1404	2560	4640
642	1190	2174	898	1650	3002	1154	2110	3830	1410	2570	4658
648	1200	2192	904	1660	3020	1160	2120	3848	1416	2580	4676
653	1210	2210	909	1670	3038	1166	2130	3866	1421	2590	4694
659	1220	2228	915	1680	3056	1171	2140	3884	1427	2600	4712
664	1230	2246	920	1690	3074	1177	2150	3902	1432	2610	4730
670	1240	2264	926	1700	3092	1182	2160	3920	1438	2620	4748
675	1250	2282	934	1710	3110	1188	2170	3938	1443	2630	4766
682	1260	2300	937	1720	3128	1193	2180	3956	1449	2640	4784
686	1270	2318	942	1730	3146	1199	2190	3974	1454	2650	4802
692	1280	2336	948	1740	3164	1204	2200	3992	1460	2660	4820
697	1290	2354	953	1750	3182	1210	2210	4010	1466	2670	4838
704	1300	2372	959	1760	3200	1216	2220	4028	1471	2680	4856
708	1310	2390	964	1770	3218	1221	2230	4046	1477	2690	4874
715	1320	2408	970	1780	3236	1227	2240	4064	1482	2700	4892
719	1330	2426	975	1790	3255	1232	2250	4082	1488	2710	4910
726	1340	2444	981	1800	3272	1238	2260	4100	1493	2720	4928
734	1350	2462	986	1810	3290	1243	2270	4118	1499	2730	4946
737	1360	2480	992	1820	3308	1249	2280	4136	1504	2740	4964
741	1370	2498	997	1830	3326	1254	2290	4154	1510	2750	4982

UNIT CONVERSION TABLE OF INCH AND MILIMETER

Conversion Factor : 1 inch=25.4mm

INCH		mm	INCH		mm
1/64	0,015625	0,3937	33/64	0,515625	13,0969
1/32	0,03125	0,7938	17/32	0,53125	13,4938
3/64	0,046875	1,1906	35/65	0,546875	13,8906
1/16	0,0625	1,5875	9/16	0,5625	14,2875
5/64	0,078125	1,9844	37/64	0,578125	14,6844
3/32	0,09375	2,3812	19/32	0,59375	15,0821
7/64	0,109375	2,7781	39/64	0,607375	15,4781
1/8	0,125	3,175	5/8	0,625	15,875
9/64	0,140625	3,5719	41/64	0,640625	16,2719
5/32	0,15625	3,9688	23/32	0,65625	16,6688
11/64	0,171875	4,3656	43/64	0,671875	17,0656
3/16	0,1875	4,7625	11/16	0,6875	17,4625
13/64	0,203125	5,1554	45/64	0,703125	17,8554
7/32	0,21875	5,5562	23/32	0,71875	18,2562
15/64	0,234375	5,9531	47/64	0,734375	18,6531
1/4	0,25	6,35	3/4	0,75	19,05
17/64	0,265625	6,7459	49/64	0,785625	19,4469
9/32	0,28125	7,1438	25/32	0,75125	19,8438
19/64	0,296875	7,5406	51/64	0,796895	20,2406
5/16	0,3125	7,9375	13/16	0,8125	20,6375
21/64	0,328125	8,3344	53/64	0,828125	21,0344
11/32	0,34375	8,7312	27/32	0,74375	21,4312
23/64	0,359375	9,1281	55/64	0,859375	21,8241
3/8	0,375	9,525	7/8	0,875	22,225
25/64	0,390625	9,9219	57/64	0,890625	22,6219
13/32	0,40625	10,3188	29/32	0,90625	23,0188
27/64	0,421875	10,7156	59/64	0,921875	23,4156
7/16	0,4375	11,112	15/16	0,9375	23,8125
29/64	0,453125	11,5094	61/64	0,953125	24,2094
15/32	0,46875	11,9062	31/32	0,96875	24,6082
31/64	0,484375	12,3031	63/64	0,984375	25,0031
1/2	0,5	12,7	1	1	25,4

LENGTH

Meter	Inch	Feet	Yard	Mile
0,30303	11,9305	0,994211	0,331403	0,000188
1,81818	71,5832	5,96527	1,98842	0,001129
3927,27	154619	12884,9	4294,99	2,44033
1	39,3707	3,28089	1,09363	0,000621
0,025399	1	0,08333	0,027777	0,000015
0,030494	12	1	0,333333	0,00189
0,914383	36	3	1	0,00568
1609,31	63360	5280	1760	1

WEIGHT

Gram	Kilogram	Ounce	Pound	Long Ton	Short Ton
3750	5,75	132,28	8,2672	0,00375	0,004133
600	0,6	21,1647	1,32279	0,0006	0,000661
1	0,001	0,03527	0,0022	0,000001	0,000001
1000	1	35,273	2,20459	0,001	0,001102
28,3495	0,02835	1	0,0525	0,000028	0,000031
453,592	0,45359	16	1	0,00045	0,0005
1016047	36	35840	2240	1	1,12
907178	63360	32000	2000	0,892857	1

APPENDIX

HYUNDAI BALL PAC (FCW/Solid Wire)

HYUNDAI BALL PAC is a new and improved version of our original Pail Pack.

Our patented 'marble' system, acts as a 'non-static' resistance on top of the wire, The marbles add weight on the wire to ensure that only one strand, at a time, is picked up.

With the shape and weight of the 'marbles', the wire pulls up and out of the Ball Pac consistently and without the normal static resistance found with other systems.

Our wire is pulled out with minimum resistance and seamless feedability is the end result.

Hyundai hard wires are 'pre-tensioned' before being put into the Ball Pac. Meaning, our wire has little to no cast and helix when coming out of the Ball Pac and the 'straightness' of the wire will give more accurate and consistent starts and weld tracking. This is most ideal for robotic applications.

As the wire has no cast, you can decrease the tip diameter by one size ("Except in the case of .052"). This will ensure that the wire is in constant contact with the tip (better current transfer) and will increase the accuracy of the weld.

Another major factor in the quality and consistency of Hyundai hard wire is the method of coppercoating the wire. Hyundai Welding is one of the few companies in the world, who are currently using the Electronic Coating process. With this State-of-the-Art coating process, the user will experience the following benefits

- 1) Better Feedability : due to the 'even' coating of copper, feedability is more consistent.
Resulting in lower feed resistance.
- 2) Copper Flaking : since wire is coated electronically, the adherence of the copper on the wire is 100% as the coating is evenly applied thus, rendering 'copper-flaking' obsolete.
No more clogged or damaged liners.
- 3) Current Transfer : the current transfer will be more consistent due to the 'evenness' of the copper coating
- 4) Less Fume : with the even and consistent copper coating, there are less fumes than conventional chemically-coated wires on the market today.

1. Characteristics of Product

- 1) Excellent feeding.
Minimizing friction as it possesses a device developed for the prevention of twisted and tangled wire, thus, resulting in a smooth feeding action and stable arc, which facilitates welding.
- 2) Makes good tracking on a welding seam.
Wire is set to be elastically twisted in the pail, so wire is pulled out straight, without rotation of the pail.
- 3) Improved welding efficiency.
The large-packaged wire can save time in change wire, which is effective, particularly, for robotic and other automatic welding.
- 4) pressure device system, deformation in "stacked" state with anti-tangling pressure device system, deformation of the wound wire is greatly minimized or, as in most cases, has now become obsolete.

2. Type of Product

Packing Weight \ Classification	Solid Wire	FCW
150KG(330lbs)	0.9 $\varnothing$ (.035in), 1.0 $\varnothing$ (.039in)	1.2 $\varnothing$ (.045in)
200KG(440lbs),250KG(551lbs)	1.2 $\varnothing$ (.045in), 1.4 $\varnothing$ (.052in)	1.4 $\varnothing$ (.052in)
300KG(661lbs),350KG(772lbs)	1.4 $\varnothing$ (.052in), 1.6 $\varnothing$ (1/16in)	1.6 $\varnothing$ (1/16in)
400KG(882lbs),420KG(926lbs)		

3. Size of Drum and Feeder

Packing Weight \ Classification		150/200/250/300kg (331/441/551/661 lbs) Type	350/400/420kg (772/882/926 lbs) Type
DRUM	Outer dia.mm(in)	510(20.1)	660(26)
	Height mm(in)	810(31.9)	810(31.9)
	Weight kg(lbs)	10(22)	15(33)
CAP	Outer dia. mm(in)	510(20.1)	660(26)
	Height mm(in)	300(11.8)	500(19.7)
FLEXIBLE CABLE	Outer dia. mm(in)	11(0.43)	11(0.43)
	Length(m)	1,2,3,4,5	1,2,3,4,5
CABLE FIXER		FLEXIBLE CABLE FIXING	

4. Caution

- 1) Keep in dry and moisture-free location.
- 2) Move on a pallet when moving individually, keep it standing up right, using the ring attached to container with the lid closed.
- 3) Severe impact can deform wire shape and cause poor feeding.
- 4) Laying down or tilting can entangle wire in container, which hinders usage.
- 5) Flexible cable needs periodic cleaning.
- 6) Make sure you use all the balls found inside.
- 7) Do not spill the glass balls on the floor to prevent from falling down.

APPENDIX

PAK SERIES



HYUNDAI BALL PAC is a new and improved version of our original Pail pack. Our patented 'marble' system, acts as a 'non-static' resistance on top of the wire. The marble add weight on the wire to ensure that only one strand, at a time, is picked up. With the shape and weight of the 'marbles', the wire pulls up and out of the Ball Pac consistently and without the normal static resistance found with other drum systems. Our wire is pulled out with minimum resistance and seamless feedability is the end result.



Easy to check the remaining wire as no drum is installed inside the pak. Designed as a pressing plate by step method which minimizes the wire feeding resistance, also adopted a practical design to prevent tangling during wire feeding. Likewise by removing the drum and using a light-weighted pressing plate, the light weighted pak could be launched. Therefore it is easy to carry and handle. It will be more likely to find out its convenience with advantages as this item made the best use of our ball pak type, which our company feels proud of.



E-Pak is basically a paper drum. Every part of E-Pak is made of paper. So it is totally recyclable. It is light weight, and therefore easy to transfer in operation. Non-toxic adhesive is used for E-Pak. It's totally harmless to operators. Resulting from our continuous efforts on product development, E-Pak guarantees its durability of Packaging during operation. After use, however, all parts are easy to detach and compress for easier storage and transfer. It provides a perfect solution for your environmental management.

Product Packing Type

S : Solid Wires F : Flux Cored Wires

Type		Type Unit Weight(kg)					
		150	200	250	300	350	400
Dia. (mm)	0.9	S	S	S			
	1.0	S	S	S	S		
	1.2	F	F	S	S		
	1.4	F	F	S	S/F	S	
	1.6				S/F	S	S

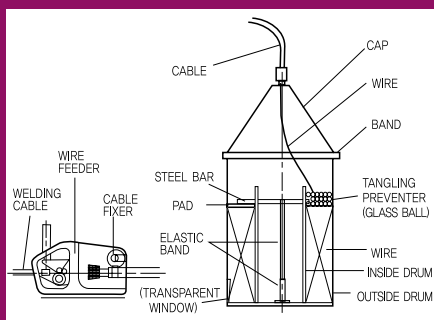


PATENT No. US5746380 (U.S.A)
AU681988 (AUSTRALIA)
135931 (KOREA)
UTILITY MODEL No. 3040923 (JAPAN)
ZL962185353 (CHINA)

How TO USE

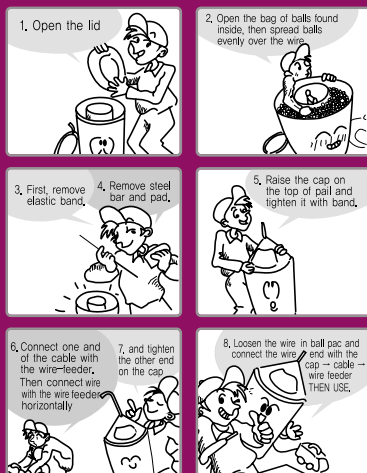
IMPORTANT

- Use all the balls packed inside.
- Only use the balls for their intended purpose.
- Do not put balls in mouth or roll them on the floor.
- Be careful not to drop balls on the floor, serious injuries can result.



USE

• Before use – When installing



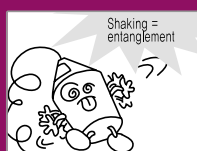
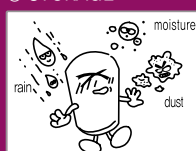
CAUTION

1. STORAGE
2. TRANSFER
3. USE CAP
4. CABLE ESTABLISH
5. CLEANING

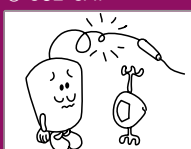
② TRANSFER



① STORAGE



③ USE CAP



④ CABLE ESTABLISH



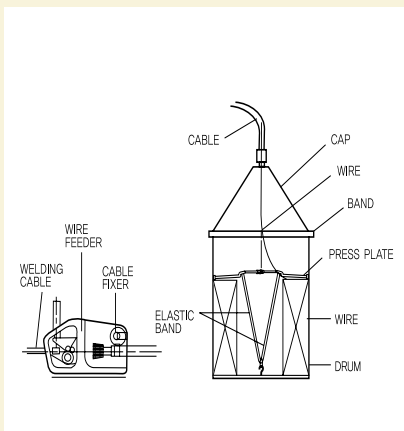
⑤ CLEANING



❖ CUSTOMER SERVICE TEL. : SEOUL (82-2)6230-6051~62



HOW TO USE



USE

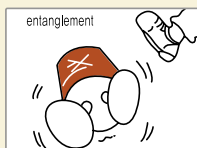
• Before use – When installing



CAUTION

1. STORAGE
2. TRANSFER
3. USE CAP
4. CABLE ESTABLISH
5. CLEANING

② TRANSFER



① STORAGE



③ USE CAP



④ CABLE ESTABLISH



⑤ CLEANING



❖ CUSTOMER SERVICE TEL. : SEOUL (82-2)6230-6051~62



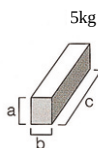
HYUNDAI Standard Packing

I . Covered Electrodes

- 1- ① Covered Electrodes for Carbon Steels
- ② Covered Electrodes for High Tensile Steels
- ③ Covered Electrodes for Low Alloy Steels
- ④ Covered Electrodes for Hardfacing

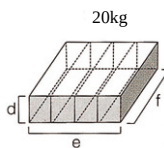
5kg packet (4EA) / 20kg carton (50EA) / 1,000kg wooden pallet

Standard Size



Packet Size(mm)

a	78
b	40~65
c	304~554



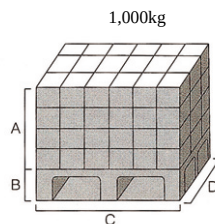
Carton Size(mm)

d	82
e	180~275
f	312~562

Pallet Size(mm)

	$l \leq 450$	$l > 450$
A	130, 160	400
B	130	130, 160
C	1,150	1,130
D	930	980

* l = Electrode length



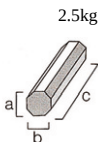
- 2 - ※ $l > 450$: S-7028.F, S-7028.W, S-6027.LF

10kg Packet (2EA) / 20kg carton (50EA) / 1,000kg wooden Pallet

- 3 - ① Covered Electrodes for Stainless Steels
- ② Covered Electrodes for Cast Iron & Nickel Based Materials

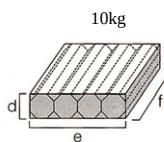
2.5kg hermetically sealed P.V.C Box(4EA) / 10kg carton (90EA) / 900kg wooden pallet

Hermetically sealed P.V.C Box



Packet Size(mm)

l	300mm	350mm
a	79	73
b	79	73
c	340	390



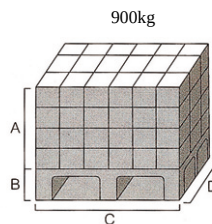
Carton Size(mm)

l	300mm	350mm
d	86	80
e	335	310
f	360	410

Pallet Size(mm)

l	300mm	350mm
A	860	800
B	130, 160	130, 160
C	1,070	1,210
D	1,010	950

* l = Electrode length



4 - Vaccum packing

1.5kg aluminim vaccum packet(10EA) / 15kg Corton Box



1.5kg packet Size(mm)

l	350mm	400mm	450mm
a	150	150	150
b	450	500	550

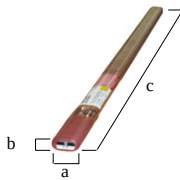


15kg carton Size(mm)

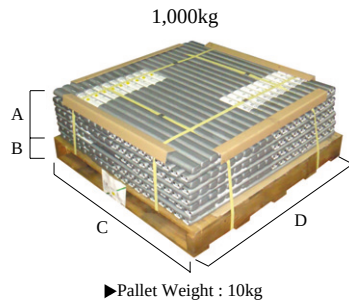
l	350mm	400mm	450mm
c	142	142	142
d	175	175	175
e	420	470	520

II . TIG Wire

5kg PVC tube (200EA)/ 1,000kg wooden Pallet



Tube Size(mm)		Pallet Size(mm)	
a	48	A	280
b	31	B	130, 160
c	1,010	C	1,070
		D	1,070



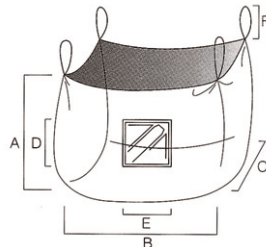
III . Compound Flux

(for Covered Electrodes, Submerged Arc Flux)

500kg / 1,000kg

Bag Size(mm)		500kg	1,000kg
A	600	700	
B	800	930	
C	800	930	
D	210	230	
E	160	160	
F	400	0	40

*Bag Material : PP Cloth Lami



HYUNDAI Standard Packing

IV. Spool

1 - MIG Solid Wire

15kg Plastic spool / (60EA) / 900kg wooden Pallet

15kg Plastic spool / (72EA) / 1,080kg wooden Pallet

20kg Plastic spool / (60EA) / 1,200kg wooden Pallet

2 - Stainless MIG Wire

12.5kg Plastic spool / (72EA) / 900kg wooden Pallet

3 - FCW

12.5kg Plastic spool / (60EA) / 750kg wooden Pallet

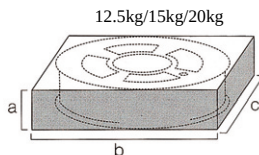
15kg Plastic spool / (60EA) / 900kg wooden Pallet

15kg Plastic spool / (72EA) / 1,280kg wooden Pallet

20kg Plastic spool / (60EA) / 1,200kg wooden Pallet

Box Size(mm)

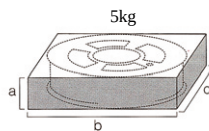
a	110
b	270~280
c	270~280



5kg Plastic spool (200EA) / 1,000kg wooden pallet

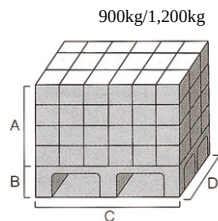
Box Size(mm)

a	64
b	210
c	215



Pallet Size(mm)

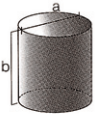
	12.5kg/20kg spool	15kg spool	5kg spool
A	550	550~660	640
B	130, 160	130, 160	130, 160
C	1,200	1,130	1,130
D	900	850	850



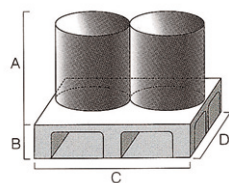
V. Pail Pack

① 510 type

100kg ~ 300kg (510 type) / wooden pallet

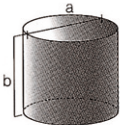


Pac Size(mm)		Pallet Size(mm)	
a	510	A	820
b	810	B	130
		C	1,070
		D	550

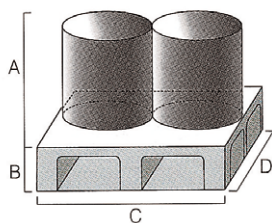


② 570 type

150kg ~ 300kg (570 type) / wooden pallet

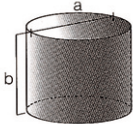


Ball Pac Size(mm)		Pallet Size(mm)	
a	570	A	590~820
b	575~810	B	130, 160
		C	1,150
		D	580

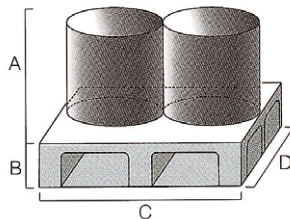


③ 660 type

350kg ~ 420kg (660 type) / wooden pallet



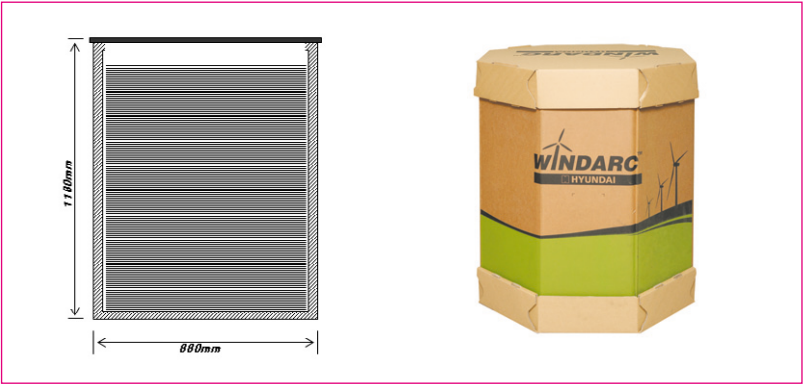
Ball Pac Size(mm)		Pallet Size(mm)	
a	660	A	820~880
b	810~870	B	130, 160
		C	1,340
		D	670





HYUNDAI Standard Packing

④ Submerged Wire 1,000kg Paper Pack



⑤ Cap & Cable

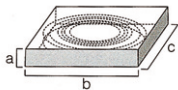
Cap & Cable Size(mm)

	Cap		Cable	
	150-300kg Type	350-420kg Type	150/200/250kg Type	300/350kg Type
A	300	500		
B	510	660		
C			1,2,3,4,5(m)	1,2,3,4,5(m)
D			10(mm)	10(mm)

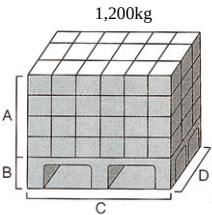
VI. Submerged Wire & Flux

1 - Submerged Wire

25kg coil / (48EA) / 1,200kg wooden pallet



Box Size(mm)		Pallet Size(mm)	
a	80	A	640
b	430	B	130, 160
c	430	C	1,300
		D	900

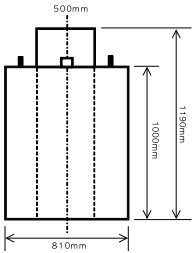


2 - Submerged Wire Coil

	(mm)		
	A	B	C
25kg	305/315	410/420	75
30kg	305	400	95
75kg	630	740	90/100
100kg	630	760	90/100
150kg	630	790	90
300kg	630	820	210
500kg	630	910	210
1000kg	630	1,140	210



	(mm)	
	Width	Hight
1,000kg	810	1,000

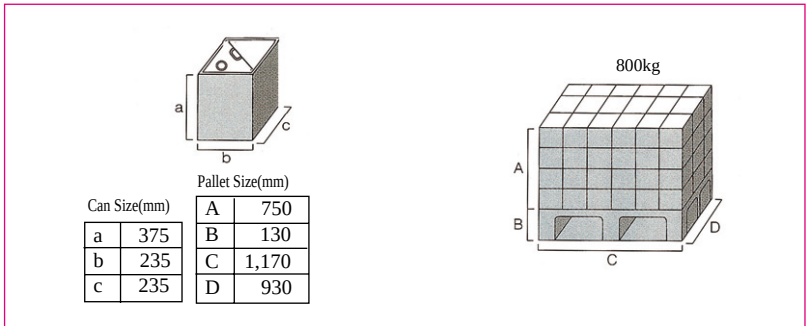




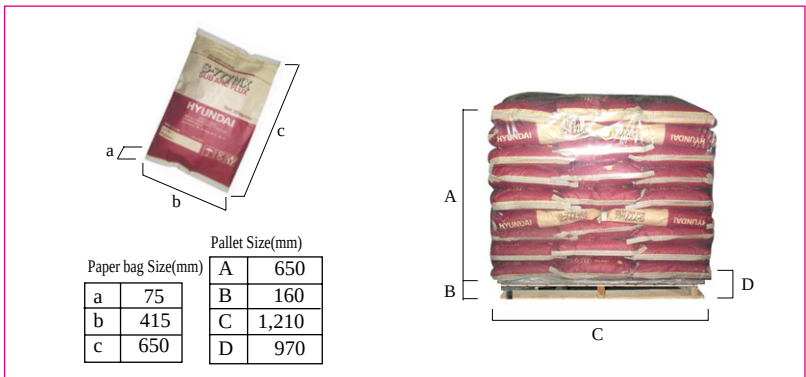
HYUNDAI Standard Packing

3 - Submerged Flux

20kg Tin Can / (40EA) / 800kg wooden pallet



20kg Paper bag (50EA) / 1,000kg wooden pallet



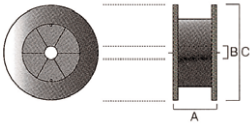
4 - Plastic spool

(mm)

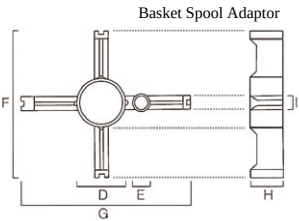
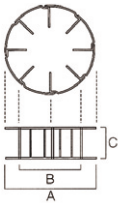
Material	A	B	C	USAGE
HIPS	55-56	52	199-200	FCW / Solid Wire 5kg
HIPS	100-101	52-53	293-295	FCW 12.5kg
HIPS	100-101	52-53	269-270	FCW 25kg / Solid Wire 15~20kg
HIPS	101-103	52-53	283-285	FCW 20kg

►HIPS : HIGH IMPACT POLYSTYRENE

Spool Design



※ - Basket Spool (15kg)



Spool Size(mm)

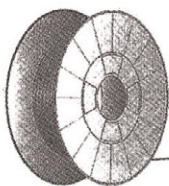
A	B	C	D	E	F	G	H	I	USAGE
298~500	180~182	98	55	13	180	220	97	18	FCW 15kg / Solid wire 15~20kg



HYUNDAI Standard Packing

VII. Length of Wire

Description	Diameter	Weight(kg)	Length(m)
Solid Wire	0.8	20	5,470
	0.9	20	4,285
	1.0	20	3,445
	1.2	20	2,370
	1.4	20	1,730
	1.6	20	1320
FCW	1.2	15	2,080
	1.4	15	1,520
	1.6	15	1,155
Submerged Wire	2.0	25	1,045
	2.4	25	720
	3.2	25	400
	4.0	25	255
	4.8	25	175
	5.0	25	165
	6.4	25	100



YOUR WELDING PARTNER!



HYUNDAI
W E L D I N G

1ST EDITION	1989.	9.
2ND EDITION	1998.	11.
3RD EDITION	1999.	1.
4TH EDITION	2001.	8.
5TH EDITION	2003.	2.
6TH EDITION	2004.	9.
7TH EDITION	2005.	8.
8TH EDITION	2006.	12.
9TH EDITION	2008.	1.
10TH EDITION	2009.	1.
11TH EDITION	2010.	4.
12TH EDITION	2011.	6.





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