

Superflux787 X A-2

A-2TiB

A-3

B-2

B-3

SUBMERGED ARC WELDING CONSUMABLES
FOR WELDING OF 0.5%Mo & Cr-Mo HEAT RESISTANT STEELS STEEL



❖ Specification

Flux	JIS Z3352	EN ISO 14174	KS B ISO 14174
Superflux787	S A FB 1	S A FB 1	S A FB 1
Wire	AWS A5.23	EN ISO 14171-A (24598)	
A-2	A5.23 F8A(P)6-EA2-A2	S 46 4 FB S2Mo	
A-2TiB	A5.23 F8TA(P)8-EA2TiB	S2MoTiB	
A-3	A5.23 F8A6-EA3-A3 A5.23 F8P4-EA3-A3	S4Mo	
B-2	A5.23 F8P2-EB2-B2	SCrMo1	
B-3	A5.23 F9PZ-EB3-B3	SCrMo2	

❖ Applications

Single and multi-layer welding of 0.5% Mo Steel and High tensile steel various kinds of structure such as ship buildings, offshore structures, Machinery and pressure vessels.
1.25%Cr-0.5%, 2.25%Cr-1.0%Mo heat resistant steels used for boilers

❖ Characteristics on Usage

High-basic bonded type flux having High Tensile strength and good impact value at low temperature. Because of insensitivity to rust, scale, primer on the surface to be welded, it has excellent X-ray characteristics and slag removal.

❖ Note on Usage

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



Welding Consumables for Test

❖ Flux

Consumable	Chemical Composition, wt%		
	MgO+MnO	CaF ₂ +CaO	Al ₂ O ₃ +SiO ₂
Superflux787	35	35	30

Consumable	Particle size(mesh)	Type of Flux	Basicity index	H ₂ O(1000℃)/CO ₂ (%)
Superflux787	10 × 48	Agglomerated	2.7	0.05/0.50

❖ Electrode

Consumables	Dia. mm (in)	Chemical Composition, wt%								
		C	Si	Mn	P	S	Cr	Mo	Ti	B
A-2	4.0(5/32)	0.09	0.15	1.00	0.015	0.005	-	0.48	-	-
AWS A5.23 EA2		0.05 -0.17	≤0.20	0.95 -1.35	≤0.025	≤0.025	-	0.45- 0.65	-	-
EN ISO 14171-A S2Mo		0.07 -0.15	0.05- 0.25	0.80 -1.30	≤0.025	≤0.025	-	0.45- 0.65	-	-
A-2TiB	4.0(5/32)	0.06	0.25	1.21	0.009	0.002	-	0.53	0.14	0.012
AWS A5.23 EA2TiB		0.05 -0.17	≤0.35	0.95 -1.35	≤0.025	≤0.025	-	0.45- 0.65	0.05 -0.30	0.005 -0.030
A-3	4.0(5/32)	0.08	0.04	1.85	0.019	0.007	-	0.50	-	-
AWS A5.23 EA3		0.05 -0.17	≤0.20	1.65 -2.20	≤0.025	≤0.025	-	0.45- 0.65	-	-
B-2	4.0(5/32)	0.08	0.16	0.67	0.008	0.002	1.37	0.51	-	-
AWS A5.23 EB2		0.07 -0.15	0.05 -0.30	0.45 -1.00	≤0.025	≤0.025	1.00 -1.75	0.45 -0.65	-	-
B-3	4.0(5/32)	0.06	0.24	0.55	0.009	0.004	2.35	1.01	-	-
AWS A5.23 EB3		0.05 -0.15	0.05 -0.30	0.40 -0.80	≤0.025	≤0.025	2.25 -3.00	0.90 -1.10	-	-

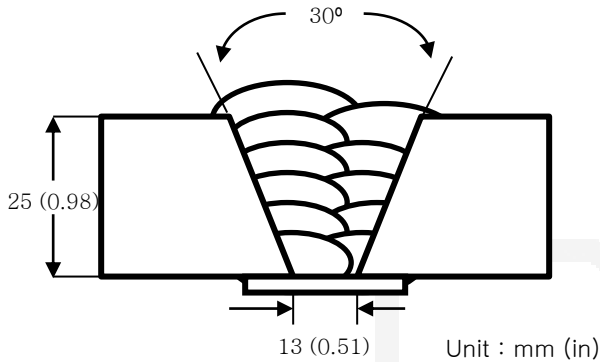
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Rules



[Joint Preparation & Layer Details]

- Base metal** : AH36(Buttering)
- Particle size(mesh)** : 10 X 48
- Flux type** : Agglomerated
- Stick-Out mm (in)** : 30 (1.18)
- Pre-Heat °C (°F)** : R.T .
- Interpass Temp. °C (°F)** : <164(327)
- Polarity** : DC+

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft.-lbs)	
		YS MPa(ksi)	TS MPa(ksi)	EL (%)	-40°C (-40°F)	-51°C (-60°F)
Superflux787 X A-2	As welded	599 (86.9)	619 (89.8)	28.4	102 (75)	81 (60)
	620°Cx1hr	551 (79.9)	584 (84.7)	29.8	115 (85)	92 (68)
AWS A5.23 F8A(P)6-EA2-A2		≥ 470	550~690	≥ 20	≥ 27J at -51°C	

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
Superflux787 X A-2	0.08	0.25	1.14	0.020	0.002	0.41
AWS A5.23 A2	≤ 0.15	≤ 0.80	≤ 1.40	≤ 0.030	≤ 0.030	0.40-0.65

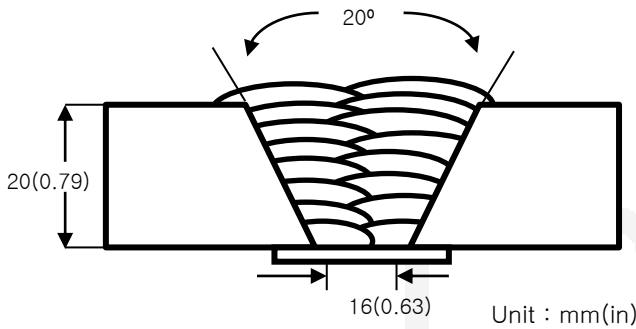
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by EN ISO Rules



[Joint Preparation & Layer Details]

Base metal	: SM570
Particle size(mesh)	: 10 X 48
Flux type	: Agglomerated
Amp./ Volt./CPM	: 580 / 30 / 55
Stick-Out mm (in)	: 30 (1.18)
Pre-Heat °C (°F)	: R.T .
Interpass Temp. °C (°F)	: <164(327)
Polarity	: DC+

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft·lbs)
		YS MPa(ksi)	TS MPa(ksi)	EL (%)	-40°C (-40°F)
Superflux787 X A-2	As welded	593 (86.0)	623 (90.3)	28.1	83 (61)
ENI ISO 14171-A S 46 4 FB S2Mo		≥460	530~680	≥ 20	≥47J at -40°C

❖ Chemical Analysis of All weld metal(wt%)

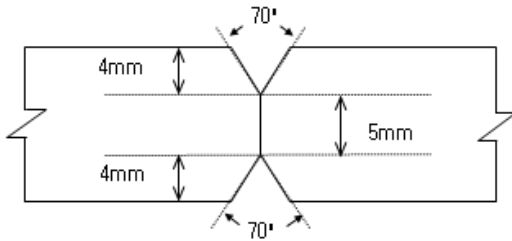
Consumables	C	Si	Mn	P	S	Mo
Superflux787 X A-2	0.08	0.23	1.16	0.019	0.001	0.42



Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Rules



Unit : mm

[Joint Preparation & Layer Details]

Base metal	:	SA516 Gr.70 13t(0.51in)
Particle size	:	10 X 48
Flux type	:	Agglomerated
Polarity	:	L(DC+), T(AC)
Welding conditions		
- Face (24.7kJ/cm)	:	900A/32V/125CPM 650A/35V
- Root (26.3kJ/cm)	:	950A/32V/125CPM 680A/36V

❖ Mechanical Properties of All weld metal

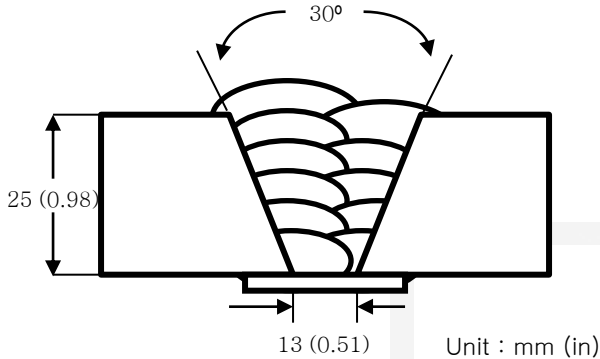
Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft·lbs)	
		YS MPa(ksi)	TS MPa(ksi)	EL (%)	-51℃ (-60°F)	-62℃ (-80°F)
Superflux787 X A-2TiB	As welded	576 (83.5)	657 (95.3)	24.8	109 (80)	68 (50)
	620℃x1hr	558 (80.9)	639 (92.7)	26.2	102 (75)	62 (46)
AWS A5.23 F8TA(P)8-EA2TiB		≥ 470	≥ 550	≥ 20	≥ 27J at -62℃	



Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Rules



[Joint Preparation & Layer Details]

Base metal	: SM570
Particle size(mesh)	: 10 X 48
Flux type	: Agglomerated
Amp./ Volt./CPM	: 550 / 30 / 40
Stick-Out mm (in)	: 30 (1.18)
Pre-Heat °C (°F)	: R.T .
Interpass Temp. °C (°F)	: <164(327)
Polarity	: DC+

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft.-lbs)	
		YS MPa(ksi)	TS MPa(ksi)	EL (%)	-40°C (-40°F)	-51°C (-60°F)
Superflux787 X A-3	As welded	570 (82.7)	641 (92.9)	26.8	86 (63)	52 (38)
	620°Cx1hr	552 (80.0)	628 (91.1)	28.8	50 (37)	33 (24)
AWS A5.23 F8A6-EA3-A3 AWS A5.23 F8P4-EA3-A3		≥ 470	550 ~690	≥ 20	≥ 27J at -51°C ≥ 27J at -40°C	

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
Superflux787 X A-3	0.07	0.20	1.70	0.024	0.002	0.49
AWS A5.23 A3	≤ 0.15	≤ 0.80	≤ 2.10	≤ 0.030	≤ 0.030	0.40- 0.65

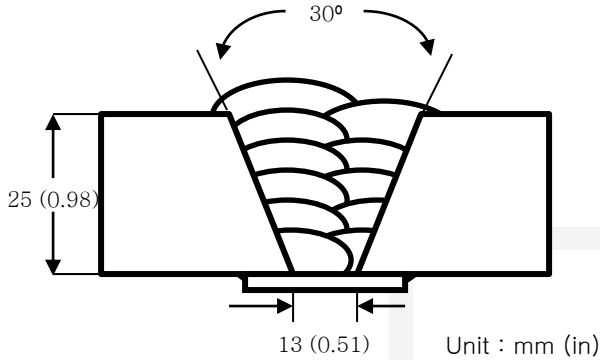
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Rules



[Joint Preparation & Layer Details]

Base metal	: AH36 (Buttering)
Particle size	: 12 X 60
Flux type	: Agglomerated
Amp./ Volt./CPM	: 550 / 30 / 40
Stick-Out mm (in)	: 30 (1.18)
Pre-Heat °C (°F)	: R.T .
Interpass Temp. °C (°F)	: >135 (275)
Polarity	: DC+

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft·lbs)	
		YS MPa(ksi)	TS MPa(ksi)	EL (%)	-18°C (0°F)	-29°C (-20°F)
Superflux787 X B-2	690°Cx1hr	535 (77.6)	593 (86.0)	27.4	120 (89)	87 (64)
AWS A5.23 F8P2-EB2-B2	690°Cx1hr	≥ 470	550 ~690	≥ 20	≥ 27J at -29°C	

❖ Chemical Analysis of All weld metal(wt%)

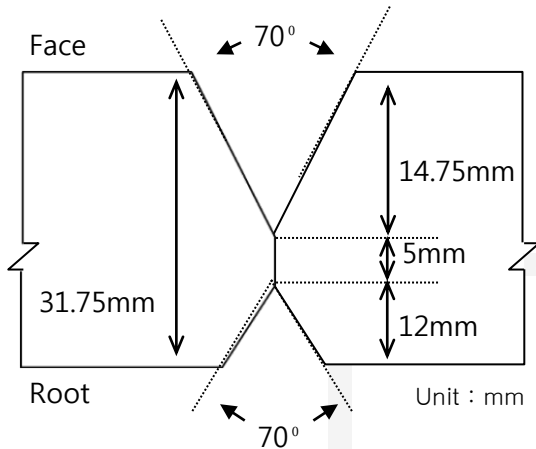
Consumables	C	Si	Mn	P	S	Cr	Mo	Cu
Superflux787 X B-2	0.09	0.35	0.99	0.022	0.007	1.21	0.50	0.18
AWS A5.23 B2	0.05-0.15	≤0.80	≤1.20	≤0.030	≤0.030	1.00-1.50	0.40-0.65	≤0.35

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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions



Base metal	: A387 Gr.11 Cl2
Thickness	: 31.75mm (1.25in)
Amp./ Volt/CPM (1pole)	: 650~800 / 29~30 / 40
Amp./ Volt (Tandem)	: L(DC+) 600 / 32 T(AC)500 / 33 100~120cpm
Interpass Temp. °C (°F)	: <150 (302)
Interpass Temp. °C (°F)	: 200~270(392~518)
Polarity	: DC+, Tandem (DC+/AC)

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test		CVN Impact Test J (ft·lbs)	
		TS MPa(ksi)	Fract.	Location	-29°C (-20°F)
Superflux787 X B-2	710°Cx1hr	583 (84.5)	BM	Face	93 (69)
				1/3t	104 (77)
Requirement	710°Cx1hr	≥515	-	≥27J at -29°C	

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Cr	Mo	Cu
Superflux787 X B-2	0.10	0.41	0.84	0.011	0.003	1.32	0.53	0.13
Requirement						1.00-1.50	0.40-0.65	

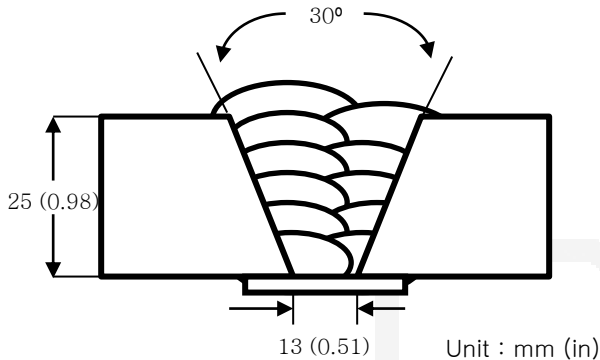
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Rules



[Joint Preparation & Layer Details]

- Base metal** : AH36 (Buttering)
- Particle size** : 12 X 60
- Flux type** : Agglomerated
- Amp./ Volt./CPM** : 550 / 30 / 40
- Stick-Out mm (in)** : 30 (1.18)
- Pre-Heat °C (°F)** : R.T .
- Interpass Temp. °C (°F)** : >135 (275)
- Polarity** : DC+

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft·lbs)	
		YS MPa(ksi)	TS MPa(ksi)	EL (%)	0°C (32°F)	-18°C (0°F)
Superflux787 X B-3	690°Cx1hr	591 (85.7)	672 (97.4)	24.6	50 (37)	39 (29)
AWS A5.23 F9PZ-EB3-B3	690°Cx1hr	≥ 540	620 ~760	≥ 17	-	

❖ Chemical Analysis of All weld metal(wt%)

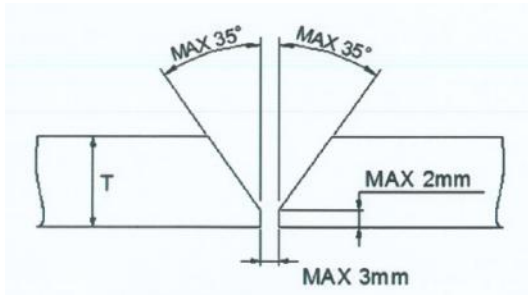
Consumables	C	Si	Mn	P	S	Cr	Mo	Cu
Superflux787 X B-3	0.06	0.31	0.95	0.021	0.009	2.03	0.92	0.19
AWS A5.23 B3	0.05-0.15	≤0.80	≤1.20	≤0.030	≤0.030	2.00-2.50	0.90-1.20	≤0.35

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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions



Unit : mm

[Joint Preparation & Layer Details]

- Base metal** : A387 Gr.22
- Thickness** : 19mm (0.75in)
- Angle** : 70°
- Amp./ Volt./CPM** : 400~500 / 30 / 45~50
- Stick-Out mm (in)** : 30 (1.18)
- Interpass Temp. °C (°F)** : <150 (302)
- Interpass Temp. °C (°F)** : 200~270(392~518)
- Polarity** : DC+

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test	
		TS MPa(ksi)	Fract.
Superflux787X B-3	910°Cx45min+740°Cx1hr	672 (97.4)	BM
Requirement	-	520-690	-

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Cr	Mo	Cu
Superflux787 X B-3	0.06	0.36	0.74	0.021	0.004	2.20	0.93	0.16
Requirement						2.00-2.50	0.90-1.20	

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Class Society Approval

❖ Authorized Approval Details

Consumables	ABS
Superflux787 X A-2	A5.23 F8A2-EA2-A2 1.6~4.8
Superflux787 X A-2TiB	A5.23 F8TA8-EA2TiB 1.6~4.8
Superflux787 X B-2	A5.23 F8P2-EB2-B2 1.6~4.8