

Superflux600 X H-14
H-14L
A-G
A-2
A-3

SUBMERGED ARC WELDING CONSUMABLES
FOR WELDING OF HSB500(600), SM520(570) HIGH TENSILE STEEL
& FIRE-RESISTANT STEEL



❖ Specification

Flux	EN ISO 14174	
Superflux600	S A AB1	
WIRE	AWS A5.17/A5.23	EN ISO 14171 A/B
H-14	A5.17 F7A(P)6-EH14	A S46 4 AB S4
H-14L	A5.23 F6A(P)4-EG-G	B S43A2U AB SU41
A-G	A5.23 F8A(P)6-EG-G	A S46 4 AB S4
A-2	A5.23 F8A(P)2-EA2-A4	B S49A2U AB SU2M3
A-3	A5.23 F8A(P)4-EA3-G	B S57A 4 AB SU4M3

❖ Applications

The flux is with H-14, A-G, A-3 widely used for Multi-layer welding of various kinds of structure such as HSB500(600), SM520(570) and High tensile steel.

With H-14L, A-2 used for Multi-layer welding of Fire-resistant steel, Building, structure such as FR400C and FR490C.

❖ 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 al 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.

❖ Note 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.
4. Preheat the thick plate according to rules if it has heavy restricted stress.



Welding Consumables for Test

❖ Flux

Consumable	Chemical Composition, wt%			
	SiO ₂ +TiO ₂	CaO+MgO	Al ₂ O ₃ +MnO	CaF ₂
Superflux600	13	32	25	25

Consumable	Particle Size (Mesh)	Type of Flux	B.I	H ₂ O _{1000℃} /CO ₂ (%)
Superflux600	10 x 48	Agglomerated/ Fluoride basic	1.9	0.05/1.0

❖ Electrode

Consumables	Dia.	Chemical Composition, wt%					
	mm (in)	C	Si	Mn	P	S	Mo
H-14	4.0(5/32)	0.12	0.03	1.93	0.016	0.009	-
AWS A5.17 EH14		0.10-0.20	≤0.10	1.70-2.20	≤0.030	≤0.030	-
H-14L	4.0(5/32)	0.05	0.05	1.98	0.017	0.005	0.01
AWS A5.23 EG		Not specified					
EN ISO 14171 B SU41		≤0.20	≤0.15	1.60-2.30	≤0.025	≤0.025	≤0.15
A-G	4.0(5/32)	0.12	0.05	1.97	0.018	0.005	-
AWS A5.23 EG		Not specified					
EN ISO 14171A S4		0.07-0.15	≤0.15	1.75-2.25	≤0.025	≤0.025	-
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
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
EN ISO 14171-B SU4M3		≤0.17	≤0.25	1.60-2.30	≤0.025	≤0.025	0.40-0.65

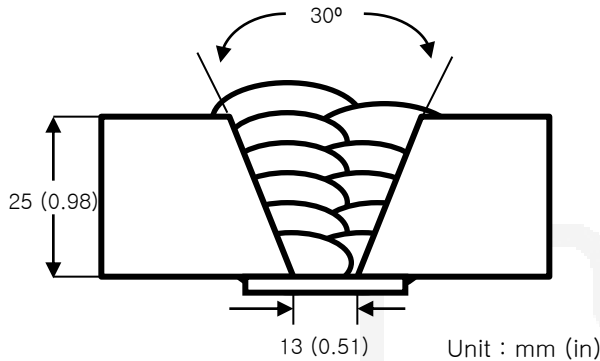
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	: AH 36
Particle size	: 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)	: <150 (302)
Polarity	: AC

❖ 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°C (-60°F)
Superflux600 /H-14	As-Welded	516 (74.8)	558 (80.9)	30.6	189 (139)
	620°C X1hr	456 (66.1)	528 (76.6)	32.6	179 (132)
AWS A5.17 F7A(P)6-EH14	-	≥ 400	480~660	≥ 22	≥ 27J at -51°C

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S
Superflux600/H-14	0.105	0.20	1.45	0.022	0.007

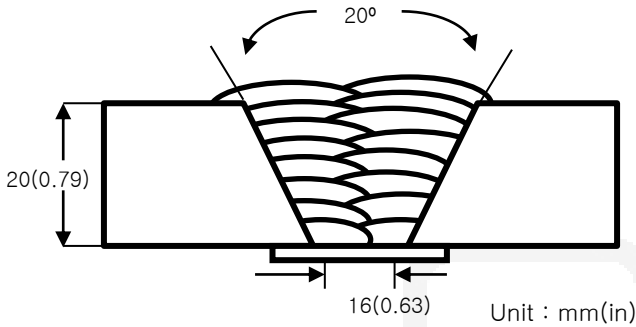
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by ISO Spec.



[Joint Preparation & Layer Details]

Base metal	: FR400C
Particle size	: 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)	: <150 (302)
Polarity	: DC+

❖ Mechanical Properties of All weld metal

Consumables	Tensile Test				CVN Impact Test J (ft·lbs)
	RT			600°C	
	YS MPa(ksi)	TS MPa(ksi)	EL (%)	YS MPa(ksi)	-20°C (-4°F)
Superflux600 /H-14L	443 (64.2)	509 (73.8)	32.8	174 (25.2)	140 (103)
EN ISO 14171 B S43A 2U AB SU41	≥ 330	430~600	≥ 20	-	≥ 47J at -20°C
Base metal FR400C	≥ 235	400~510	≥ 22	≥ 157	≥ 47J at 0°C

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S
Superflux600 /H-14L	0.07	0.29	1.47	0.028	0.005

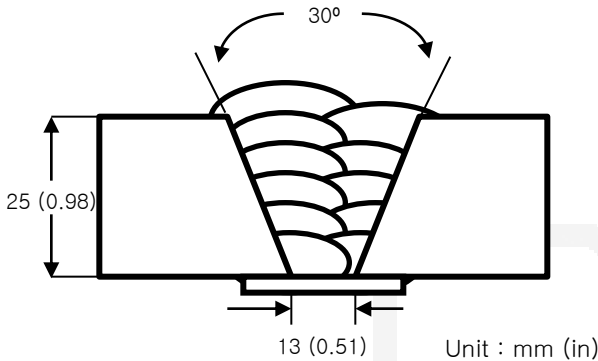
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	: AH 36
Particle size	: 12 X 60 (ASME)
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)	: <150 (302)
Polarity	: AC

❖ 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°C (-60°F)
Superflux600 /A-G	As-Welded	528 (76.6)	602 (87.3)	27.0	101 (75)
	620°C X1hr	475 (68.9)	575 (83.4)	30.0	78 (58)
AWS A5.23 F8A(P)6-EG-G	-	≥470	550~690	≥20	≥27J at -51°C

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S
Superflux600 /A-G	0.09	0.23	1.58	0.020	0.005

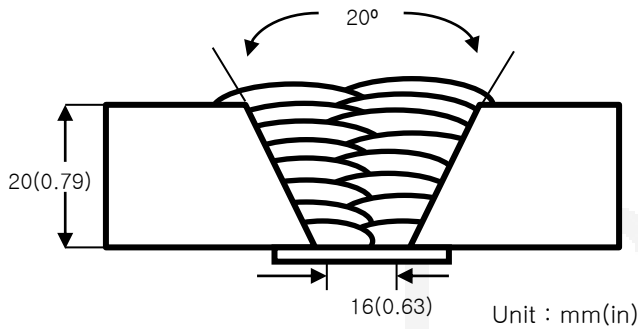
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by EN ISO Spec.



[Joint Preparation & Layer Details]

Base metal	: SM520
Particle size	: 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)	: <150 (302)
Polarity	: AC

❖ Mechanical Properties of All weld metal

Consumables	Tensile Test			CVN Impact Test J (ft·lbs)
	YS MPa(ksi)	TS MPa(ksi)	EL (%)	-40°C (-40°F)
Superflux600 /A-G	502 (72.8)	581 (84.2)	28.0	103 (76)
EN ISO 14171-A S46 4 AB S4	≥ 460	530~680	≥ 20	≥ 27J at -40°C

❖ Chemical Analysis of All weld metal(wt%)

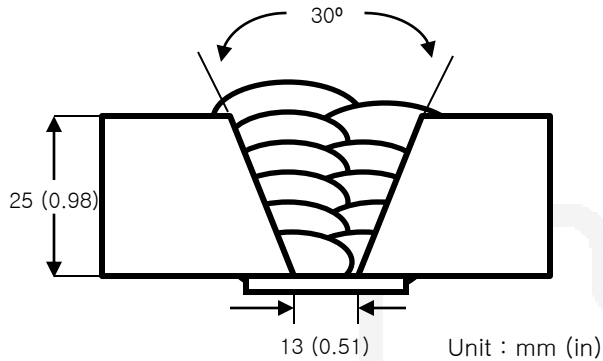
Consumables	C	Si	Mn	P	S
Superflux600 /A-G	0.09	0.20	1.59	0.019	0.006



Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	: AH 36 (buttering)
Particle size	: 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)	: <150 (302)
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)
Superflux600 /A-2	As-Welded	568 (82.4)	615 (89.2)	27.4	145 (107)
	620°Cx1hr	523 (75.8)	605 (87.7)	29.2	178 (131)
AWS A5.23 F8A(P)4-EA2-A4	-	≥470	550~690	≥20	≥27J at -40°C

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
Superflux600/A-2	0.068	0.26	1.43	0.019	0.009	0.46
AWS A5.23 A4	≤0.15	≤0.80	≤1.60	≤0.030	≤0.030	0.40-0.65

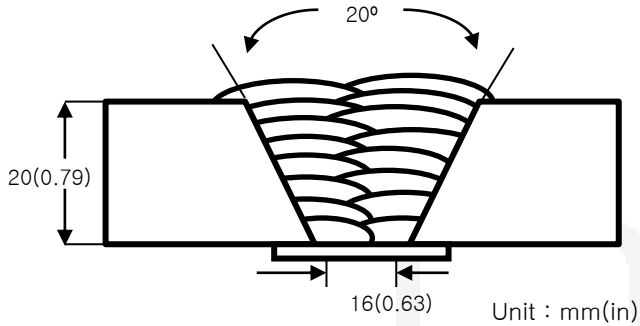
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by ISO Spec.



[Joint Preparation & Layer Details]

Base metal	: FR490C
Particle size	: 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)	: <150 (302)
Polarity	: DC+

❖ Mechanical Properties of All weld metal

Consumables	Tensile Test				CVN Impact Test J (ft·lbs)
	RT			600 °C	
	YS MPa(ksi)	TS MPa(ksi)	EL (%)	YS MPa(ksi)	-20 °C (-4 °F)
Superflux600 /A-2	532 (77.1)	596 (86.4)	29.1	258 (37.4)	105 (77)
EN ISO 14171 B S49A 2U AB SU2M3	≥ 390	490~670	≥ 18	-	≥ 47J at -20 °C
Base metal FR490C	≥ 315	490~610	≥ 21	≥ 210	≥ 47J at 0 °C

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
Superflux600 /A-2	0.08	0.33	0.98	0.020	0.004	0.40

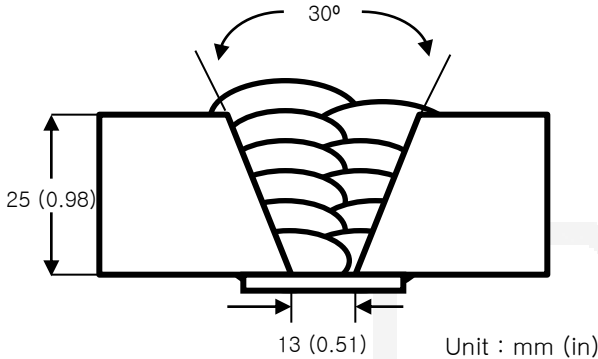
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	: AH 36 (buttering)
Particle size	: 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)	: <150 (302)
Polarity	: AC

❖ 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)
Superflux600 /A-3	As-welded	611 (88.6)	661 (95.8)	26.2	161 (119)
	620°C X 1hr	568 (82.4)	615 (89.2)	27.4	145 (107)
AWS A5.23 F8A(P)4-EA3-G	-	≥470	550~690	≥20	≥27J at -40°C

❖ Chemical Analysis of All weld metal(wt%)

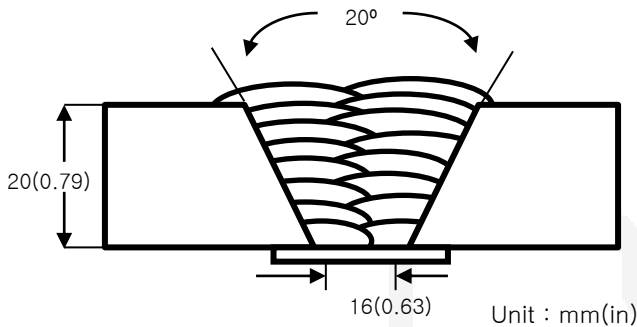
Consumables	C	Si	Mn	P	S	Mo
Superflux600/A-3	0.084	0.23	1.53	0.019	0.009	0.43



Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by EN ISO Spec.



[Joint Preparation & Layer Details]

Base metal	: SM570
Particle size	: 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)	: <150 (302)
Polarity	: DC(+)

❖ Mechanical Properties of All weld metal

Consumables	Tensile Test			CVN Impact Test J (ft·lbs)
	YS MPa(ksi)	TS MPa(ksi)	EL (%)	-40 °C (-40 °F)
Superflux600 /A-3	602 (87.3)	641 (92.9)	28.1	92 (68)
EN ISO 14171-B S57A 4 AB SU4M3	≥ 490	570~770	≥ 17	≥ 27J at -40 °C

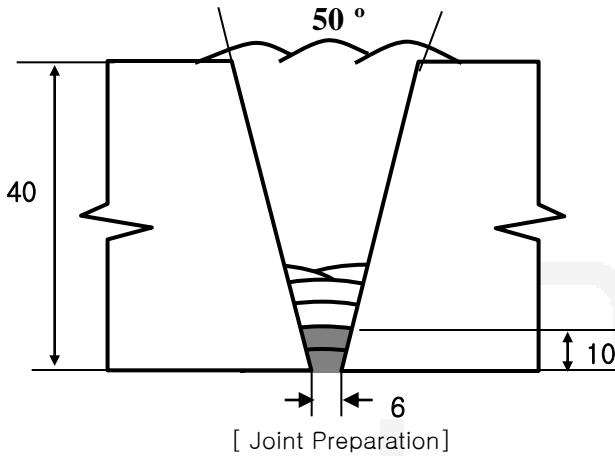
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
Superflux600/A-3	0.072	0.24	1.44	0.018	0.009	0.47



Butt Welding Test

❖ Welding Conditions



Base metal	: SM520C 40mmt
Particle size	: 12 X 60 (ASME)
Flux type	: Agglomerated
Wire size (mm)	: 4.0
Stick-Out(mm)	: 30
Pre-Heat(°C)	: R.T .

❖ Welding Conditions

Pass No.	W/D Process	Filler Metal		Current Type/ Polarity	Welding Parameter			Interpass Temp. (°C)
		AWS Class	Size (mm)		Ampere (A)	Voltage (V)	Speed (CPM)	
1	FCAW	E81T1-K2	1.2	DCRP	230	28	21	< 200
2	FCAW	E81T1-K2	1.2	DCRP	300	31	25	
3	SAW	EH14	4.0	DCRP	600	32	50	
4	SAW	EH14	4.0	DCRP	600	62	40	
5-6	SAW	EH14	4.0	DCRP	600	32	45	
7-8	SAW	EH14	4.0	DCRP	600	32	40	
9-12	SAW	EH14	4.0	DCRP	700	34	40	
13-16	SAW	EH14	4.0	DCRP	700	34	38	
17-22	SAW	EH14	4.0	DCRP	800	36	35	



Butt Welding Test

❖ Mechanical Properties of All weld metal

Consumables	Type & Polarity	Tensile Test		CVN Impact Test (Joule) At -20°C				
		TS MPa(ksi)	Fracture Location	Notch location	X1	X2	X3	Av.
Superflux600 /H-14	DC+	548 (79.5)	B.M	W/M	76	85	83	81
				F/L	132	169	158	153
		542 (78.6)	B.M	F/L+1	187	181	186	184
				F/L+3	228	229	251	236

❖ Chemical Analysis of All weld metal(wt%)

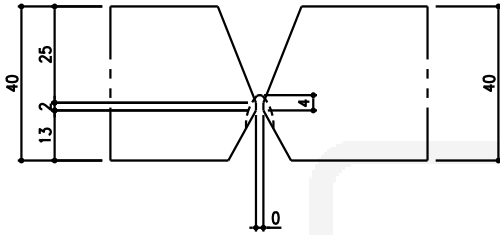
Consumables	C	Si	Mn	P	S
Superflux600/H-14	0.081	0.27	1.53	0.021	0.005

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Butt Welding Test

❖ Welding Conditions



Unit : mm

[Joint Preparation]

Base metal	: HSB600 40mmt
Particle size	: 10 x 48
Flux type	: Agglomerated
Wire size (mm)	: 4.0
Stick-Out(mm)	: 30
Pre-Heat(°C)	: R.T .

❖ Welding Conditions

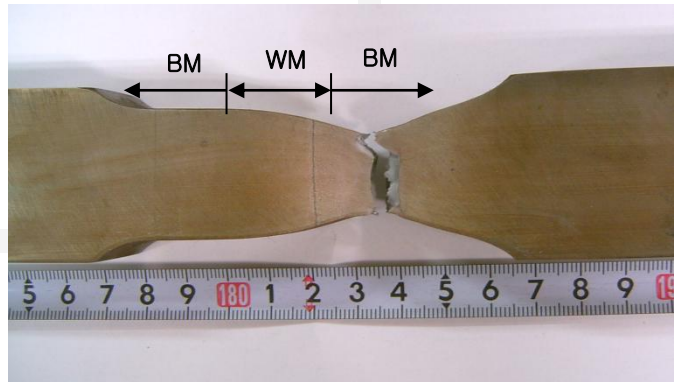
Pass No.	Current	Welding Parameter				Interpass Temp. (°C)	Remark
	Type/ Polarity	Ampere (A)	Voltage (V)	Speed (CPM)	Heat Input (KJ)		
1	DC+	500	28	40	21.0	58	Back Gouging
2	DC+	640	28	40	26.9	130	
3	DC+	640	29	30	37.1	150	
4	DC+	640	29	30	37.1	155	
5	DC+	650	30	25	46.8	145	
Upside down							
6	DC+	520	28	40	21.8	45	
7	DC+	650	29	40	28.3	102	
8	DC+	660	29	35	32.8	154	
9	DC+	660	31	23	53.4	165	



Butt Welding Test

❖ Mechanical Properties of All weld metal

Consumables	Type & Polarity	Tensile Test		CVN Impact Test (Joule)					
		TS MPa(ksi)	Fracture Location	Notch Locat.	Temp.	X1	X2	X3	Av.
Superflux600 /A-3	DC+	641 (92.9)	B.M	W/M	0°C	121	164	173	153
					-20°C	63	170	164	132
				F/L	-20°C	286	304	338	309
		626 (90.8)	B.M	F/L+1	-20°C	345	351	349	348
				F/L+3	-20°C	384	376	365	375



❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Ni	Cr	Mo	N2 (PPM)	O2 (PPM)
Superflux600 /A-3	0.067	0.25	1.52	0.014	0.006	0.067	0.078	0.40	48.5	282.3

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