HYUNDAI WELDING

Rev. 06

Superflux55ULT X H-14
X A-G
X A-3

SUBMERGED ARC WELDING CONSUMABLES
FOR WELDING OF HIGH TENSILE STEEL

2024.03

HYUNDAI WELDING CO., LTD.

Superflux 55ULT

❖ Specification

Flux	JIS Z 3352	EN ISO 14174	KS B ISO 14174
Superflux55ULT	S A FB 1	S A FB 1	S A FB 1

Wire	AWS A5.17/A5.23	EN ISO 14171-A	JIS Z 3351
H-14	A5.17 F7A(P)8-EH14	S 46 6 FB S4	YS-S6
A-G	A5.23 F8A(P)8-EG-G	S 46 6 FB S4	-
A-3	A5.23 F8A6-EA3-G A5.23 F8TA8-EA3		YS-M5

❖ Applications

The flux is widely used for 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 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.

❖ Note on Usage

1. Dry the flux at 300~350℃ 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_2O_3+MnO	CaF_2
Superflux 55ULT	20	40	20	15

Consumable	Particle Size (Mesh)	Type of Flux	B.I	$H2O_{1000℃}$/ CO2(%)
Superflux 55ULT	10 × 48	Agglomerated/ Fluoride basic	2.3	0.06/2.0

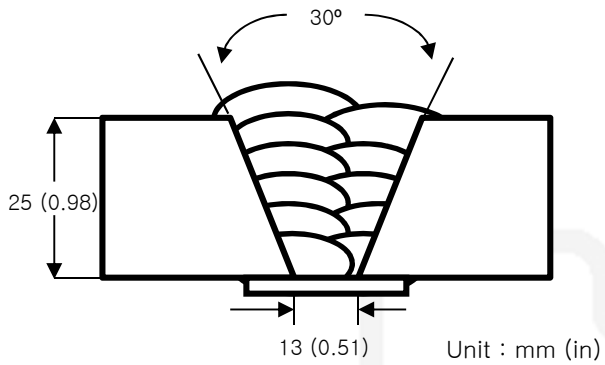
❖ Electrode

Consumable	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	-
A-G	4.0(5/32)	0.12	0.05	2.01	0.017	0.005	-
AWS A5.23 EG		Not specified					
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

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	A36
Particle size	:	10 x 48
Flux type	:	Agglomerated
Amp./ Volt./cpm	:	550 / 30 / 40
Stick-Out mm (in)	:	30 (1.18)
Pre-Heat ℃(°F)	:	R.T .
Interpass Temp. ℃ (°F)	:	<150 (302)
Polarity	:	DC+

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft·lbs)
		YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	-60℃ (-80°F)
Superflux 55ULT /H-14	As-welded	550 (80,000)	620 (90,000)	30	120 (88)
	620℃ X 1hr	520 (75,000)	610 (88,000)	32	110 (81)
AWS A5.17 F7A(P)8-EH14	-	≥400(58,000)	490~660 (70,00~95,000)	≥22	≥27J at -62℃

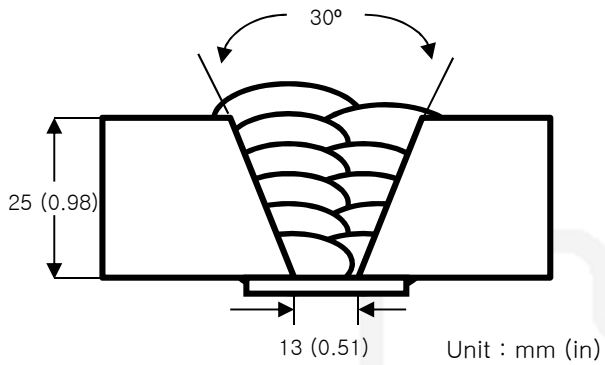
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S
Superflux 55ULT /H-14	0.07	0.40	1.55	0.018	0.003

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	A36
Particle size	:	10 x 48
Flux type	:	Agglomerated
Amp./ Volt./cpm	:	550 / 30 / 40
Stick-Out mm (in)	:	30 (1.18)
Pre-Heat ℃(°F)	:	R.T .
Interpass Temp. ℃ (°F)	:	<150 (302)
Polarity	:	AC

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft·lbs)
		YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	-60℃ (-80°F)
Superflux 55ULT /H-14	As-welded	540 (78,000)	610 (88,000)	30	180 (132)
	620℃ X 1hr	520 (75,000)	600 (87,000)	32	160 (118)
AWS A5.17 F7A(P)8-EH14	-	≥400(58,000)	490~660 (70,00~95,000)	≥22	≥27J at -62℃

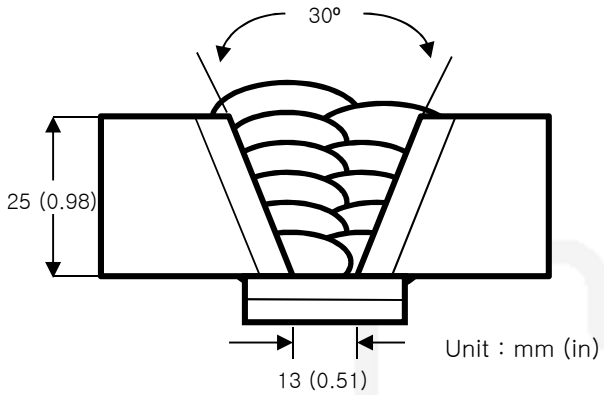
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S
Superflux 55ULT /H-14	0.08	0.25	1.50	0.018	0.002

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	A36
Particle size	:	10 X 48
Flux type	:	Agglomerated
Amp./ Volt./cpm	:	550 / 30 / 40
Stick-Out mm (in)	:	30 (1.18)
Pre-Heat ℃(℉)	:	R.T .
Interpass Temp. ℃ (℉)	:	<150 (302)
Polarity	:	AC

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft·lbs)
		YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	-60℃ (-80°F)
Superflux55ULT X A-G	As-welded	540 (78,000)	610 (88,000)	30	180 (132)
	620℃X1hr	520 (75,000)	600 (87,000)	32	160 (118)
AWS A5.23 F8A(P)8-EG-G		≥470(≥68,000)	550~690 (80,000~100,000)	≥ 20	≥27J at -62℃

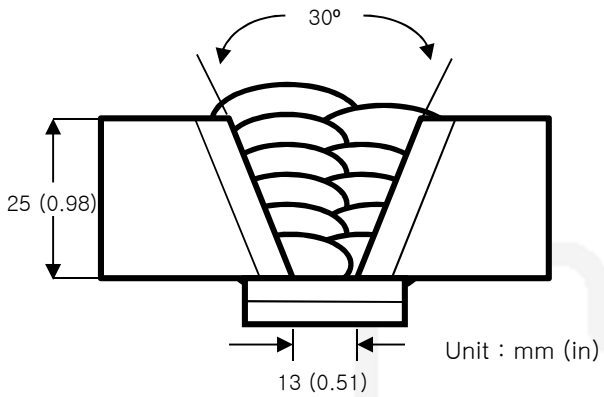
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
Superflux55ULT X A-G	0.08	0.25	1.55	0.021	0.010	0.002

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	A36 (Buttering A-3)
Particle size	:	10 X 48
Flux type	:	Agglomerated
Amp./ Volt./cpm	:	550 / 30 / 40
Stick-Out mm (in)	:	30 (1.18)
Pre-Heat ℃(℉)	:	R.T .
Interpass Temp. ℃ (℉)	:	<150 (302)
Polarity	:	AC

❖ Mechanical Properties of All weld metal

Consumables	PWHT Condition	Tensile Test			CVN Impact Test (Joule)
		YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	-50℃ (-60°F)
Superflux55ULT X A-3	**As-welded**	573 (83,000)	651 (94,000)	24	70 (52)
AWS A5.23 F8A6-EA3-G		**≥470 (≥68,000)**	**550~690 (80,000~100,000)**	**≥ 20**	**≥27J at -51℃**

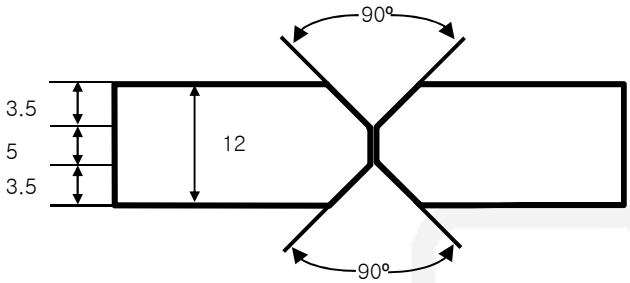
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
Superflux55ULT X A-3	0.09	0.30	1.43	0.022	0.002	0.43

Mechanical Properties for Two-run weld

❖ Welding Conditions

Method by AWS Rules



[Joint Preparation] Unit : mm

[Joint Preparation & Layer Details]

Base metal : SA516 Gr.70

Particle size : 10 X 48

Flux type : Agglomerated

Polarity : AC/DC+

Welding conditions

- Face (22.4kJ/cm) : 560A/30V/45CPM

- Root (25.6kJ/cm) : 620A/31V/45CPM

❖ Mechanical Properties of All weld metal

Consumables	Polarity	Tensile Test			CVN Impact Test (Joule)
		YS MPa(lbs/in²)	TS MPa(lbs/in²)	EL (%)	-60℃ (-80°F)
Superflux55ULT X A-3	AC	530 (77,000)	625 (91,000)	27	121 (89)
	DC+	515 (75,000)	628 (91,000)	29	71 (52)
AWS A5.23 F8TA8-EA3		≥470 (≥68,000)	550 (≥80,000)	≥ 20	≥27J at -62℃

Approvals

❖ AUTHORIZED APPROVAL DETAILS

Consumables	KR	ABS	LR	BV	DNV	NK
Superflux55ULT / H-14	4Y40MH5 1.2~6.4	5Y400M H5 4YT 1.2~6.4	4YT, 5Y40M H5 1.2~6.4	A5Y40M HHH, A5YT 1.2~6.4	VY40M H5, IVYT 1.2~6.4	KAW54T, KAW54Y40MH5 1.2~6.4
Superflux55ULT / H-14/CW	-	4YM 1.2~6.4	4YM, 4YsrM 1.2~6.4	A4YM 1.2~6.4	IVYM 1.2~6.4	-
Superflux55ULT / A-G					VY42TM H5 1.2~6.4	
Superflux55ULT / A-3	5Y40MH5 5YT 4Y40T 3.2~3.8	5Y400M H5 5YT, 4Y40T 3.2~4.8	5Y40M 4Y, 4Y40T 3.2~4.8	A5Y40M H5 A5YT, A4Y40T 3.2~4.8	VY40M(H5), VYT, IVY40T 3.2~4.8	KAW54Y40TM H5 KAW5440MS H5-60T KAWL3TH5 KAWL3TH5-vE34M 3.2~4.8

Diffusible Hydrogen Content

❖ Welding Conditions

Method by JIS Z 3118

wire	:	H-14	**Amps(A) / Volts(V)**	:	575/27
Diameter(mm)	:	4.0(5/32)	**Stick-Out mm (in)**	:	38 (1.50)
Flow Rate(ℓ/min.)	:	-	**Welding Speed**	:	42 cpm
Welding Position	:	1G	**Current Type & Polarity**	:	AC, DC(+)

❖ Result(㎖/100g Weld Metal)

Polarity	X1	X2	X3	X4	Av.
AC	4.74	4.51	4.38	4.41	4.51
DC+	4.52	4.27	4.41	4.39	4.40