HYUNDAI WELDING

Rev. 01

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

SUBMERGED ARC WELDING CONSUMABLES
FOR WELDING OF HIGH TENSILE STEEL

HYUNDAI WELDING CO., LTD.

Superflux 55ULT

❖ Specification

Flux	JIS Z3352	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
H-14	A5.17 F7A(P)8-EH14	S 46 6 FB S4
A-G	A5.23 F8A(P)8-EG-G	
A-3	A5.23 F8A6-EA3-G A5.23 F8TA8-EA3	

❖ 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

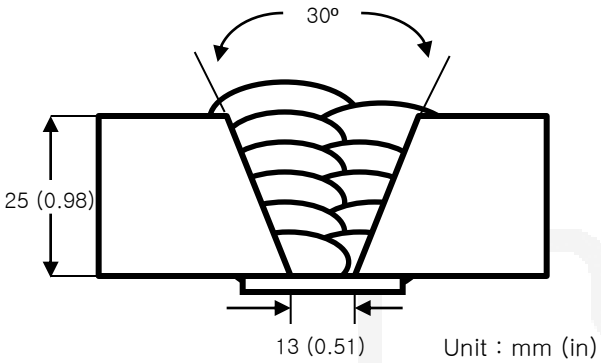
❖ Electrode

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	
EN ISO 14171-A S4		0.07-0.15	≤0.15	1.75-2.25	≤0.025	≤0.025	0.50
A-G	4.0(5/32)	0.12	0.05	1.98	0.017	0.005	0.021
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	:	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 (%)	-62℃ (-80°F)
Superflux 55ULT /H-14	As-welded	589 (85.4)	605 (87.7)	28.8	150 (111)
	620℃ X 1hr	542 (79.0)	581 (84.2)	31.4	132 (97)
AWS A5.17 F7A(P)8-EH14	-	≥400	480~660	≥22	≥27J at -62℃

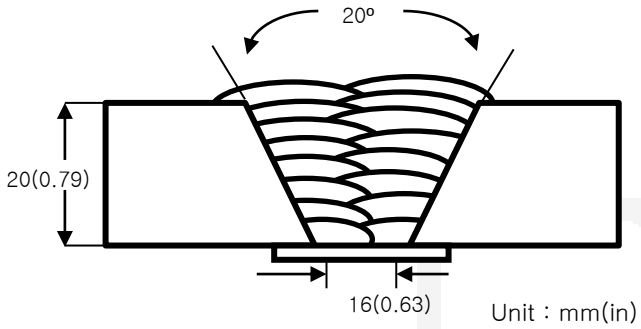
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S
Superflux 55ULT /H-14	0.100	0.23	1.47	0.020	0.010

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by EN ISO Rules



Base metal	:	A 36
Particle size	:	10 X 48
Flux type	:	Agglomerated
Amp./ Volt./CPM	:	580 / 30 / 55
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

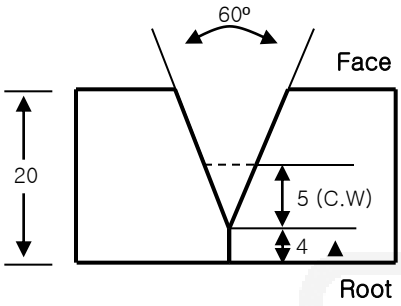
Consumables	PWHT Condition	Tensile Test			CVN Impact Test J (ft·lbs)
		YS MPa(ksi)	TS MPa(ksi)	EL (%)	-60℃ (-76°F)
Superflux55ULT / H-14	As-welded	551 (79.9)	591 (85.7)	29.7	120 (89)
ENI ISO 14171-A S 46 6 FB S4		≥460	530~680	≥ 20	≥47J at -60℃
ABS 5Y40M		≥460	510~690	≥22	≥34J at -60℃

❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S
Superflux 55ULT /H-14	0.098	0.21	1.51	0.019	0.008

Mechanical Properties & Chemical Composition of Two-run weld

❖ Welding Conditions



Unit : mm

[Joint Preparation & Layer Details]

Base metal : EH36
Cut wire EA3
Particle size : 10 X 48
Flux type : Agglomerated
Pre-Heat(℃) : R.T .
Interpass Temp. ℃ (℉) : <150 (302)

Consumables	Position	Pass	Polarity	Welding Condition		
				Amp.	Volt.	Cpm.
Superflux55ULT /H-14	Face	1	AC	750	33	40
		2		700	32	45
		3		650	33	40
		4		650	34	45
	Root	5		700	34	40

❖ Mechanical Properties of All weld metal

Consumables	Tensile Test			CVN Impact Test J (ft·lbs)	
	YS MPa(ksi)	TS MPa(ksi)	EL (%)	Position	-40℃ (-40°F)
Superflux55ULT /H-14	532 (77.1)	595 (86.3)	26.4	Face	196(145)
				Root	189(139)

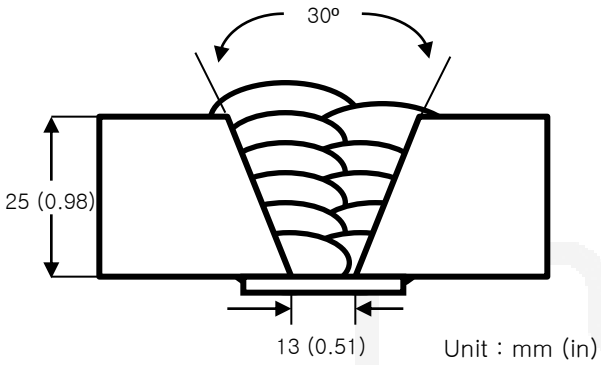
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
Superflux 55ULT /H-14	0.09	0.25	1.54	0.012	0.010	0.04

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	SM570
Particle size	:	10 X 48 (ASME)
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(ksi)	TS MPa(ksi)	EL (%)	-62℃ (-80°F)
Superflux55ULT X A-G	As-welded	584 (84.7)	612 (88.7)	27.7	123 (91)
	620℃X1hr	562 (81.5)	592 (85.8)	28.9	97 (72)
AWS A5.23 F8A(P)8-EG-G		≥470	550~690	≥ 20	≥27J at -62℃

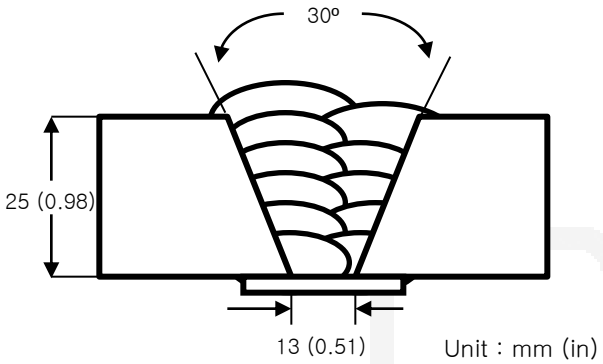
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
Superflux55ULT X A-G	0.100	0.26	1.57	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	:	SM570
Particle size	:	10 X 48 (ASME)
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 (Joule)	
		YS MPa(ksi)	TS MPa(ksi)	EL (%)	-40℃ (-40°F)	-51℃ (-60°F)
Superflux55ULT X A-3	**As-welded**	573 (83.1)	651 (94.4)	24.3	83 (61)	70 (52)
AWS A5.23 F8A6-EA3-G		**≥470**	**550~690**	**≥ 20**	**≥27J at -51℃**	

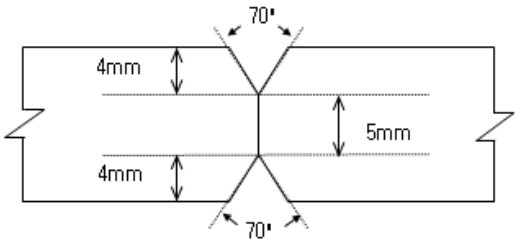
❖ Chemical Analysis of All weld metal(wt%)

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



Unit : mm

[Joint Preparation & Layer Details]

Base metal	:	SA516 Gr.70 13t (0.51in)
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(ksi)	TS MPa(ksi)	EL (%)	-62℃ (-80°F)
Superflux55ULT X A-3	AC	530 (76.9)	625 (90.6)	27.2	121 (89)
	DC+	515 (74.7)	628 (91.1)	29.2	71 (52)
AWS A5.23 F8TA8-EA3		≥470	≥550	≥ 20	≥27J at -62℃

Diffusible Hydrogen Content

❖ Welding Conditions

Method by JIS Z3118

wire	:	H-14	**Amps(A) / Volts(V)**	:	625/30
Diameter(mm)	:	4.0(5/32)	**Stick-Out(mm)**	:	30
Flow Rate(ℓ /min.)	:	-	**Welding Speed**	:	60 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

Approvals

❖ AUTHORIZED APPROVAL DETAILS

Consumables	KR	ABS	LR	BV	DNV	GL	NK
Superflux55ULT / H-14	5Y40MH5 1.2~6.4	5Y400M H5 4YT 1.2~6.4	4YT, 4Y40M H5 1.2~6.4	A5Y40M HHH, A4YT 1.2~6.4	VY40M H5, IVYT 1.2~6.4	6Y40H5M, 4YT 1.2~6.4	KAW54T, KAW54Y40MH5 1.2~6.4
Superflux55ULT / H-14/CW	-	4Y400M 1.2~6.4	4YM, 4YsrM 1.2~6.4	A4YM 1.2~6.4	IVYM 1.2~6.4	4YTM 1.2~6.4	-
Superflux55ULT / A-G					VY42TM H5 1.2~6.4		
Superflux55ULT / A-3	-	5Y40M H5 5YT, 4Y40T 3.2~4.8	5Y40, 4Y40, 4Y, 5YT 3.2~4.8	A5Y40M H5 A5YT, A4Y40T 3.2~4.8	VY40M(H5), VYT, IVY40T 3.2~4.8	-	-