HYUNDAI WELDING

Rev. 00

S-777MXT X H-14
M-12K
A-2
B-2
B-3

SUBMERGED ARC WELDING CONSUMABLES FOR WELDING OF THIN PLATE FOR HIGH TENSILE STEEL AND BOILERS

HYUNDAI WELDING CO., LTD.

S-777MXT

❖ Specification

Flux	JIS Z3352	EN ISO 14174	KS B ISO 14174
S-777MXT	S A AR 1	S A AR 1	S A AR 1

Wire	AWS A5.17/A5.23	EN ISO 14171
H-14	A5.17 F7A0-EH14	S4
M-12K	A5.17 F7A(P)Z-EM12K	S2Si
A-2	A5.23 F8PZ-EA2-A2	S2Mo
B-2	A5.23 F9AZ-EB2-B2 A5.23 F8PZ-EB2-B2	
B-3	A5.23 F8PZ-EB3-B3	

❖ Applications

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

B-2 (B-3, H-14) is Single-layer welding of 1.25%Cr-0.5% (2.25%Cr-1.0%, Carbon steel) 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.

❖ Note on Usage

1. Dry the flux at 300~350℃(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.
4. Use welding current and speed as low as possible at the first layer of groove to avoid cracking.

Welding Consumables for Test

❖ Flux

Consumable	Chemical Composition, wt%		
	$Al_2O_3+Fe_2O_3$	TiO_2+MnO	SiO_2+CaO
S-777MXT	55	25	15

Consumable	Particle Size (Mesh)	Type of Flux	B.I	H2O(1000℃)/ CO2(%)
S-777MXT	10 x 48	Agglomerated	0.5	0.01/0.05

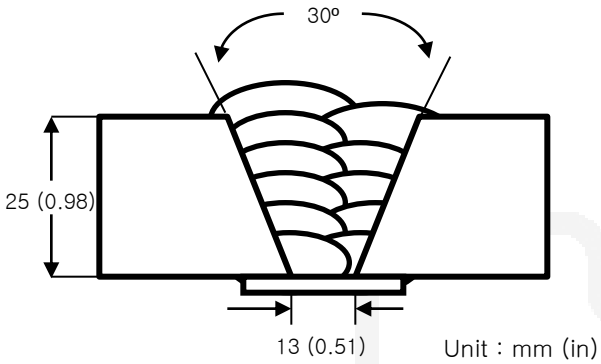
❖ Electrode

Consumables	Dia.	Chemical Composition, wt%						
	mm (in)	C	Si	Mn	P	S	Cr	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	-	-
M-12K	4.0(5/32)	0.09	0.20	1.02	0.016	0.006	-	-
AWS A5.17 EM12K		0.05-0.15	0.10-0.35	0.80-1.25	≤0.030	≤0.030	-	-
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
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)	0.07	0.25	0.56	0.014	0.005	2.31	0.90
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

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	SS 400
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 (%)	0℃ (32°F)	-18℃ (0°F)
S-777MXT X H-14	As-welded	530 (76.9)	570 (82.7)	32	70 (52)	40 (30)
AWS A5.17 F7A0-EH14	-	≥400	490~660	≥ 22	≥27J at -18℃	

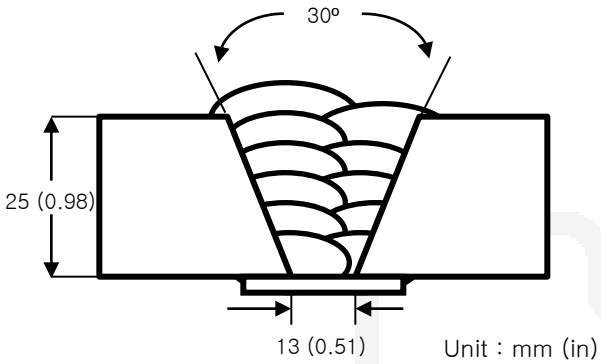
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S
S-777MXT X H-14	0.06	0.60	1.18	0.028	0.015

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	SS 400
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 (%)	0℃ (32°F)	-18℃ (0°F)
S-777MXT X M-12K	As-welded	513 (74.4)	558 (80.9)	28.6	33 (24)	14 (10)
	620℃x1hr	460 (66.7)	544 (78.9)	32.0	60 (44)	43 (32)
AWS A5.17 F7A(P)Z-EM12K	-	≥400	490~660	≥ 22	-	

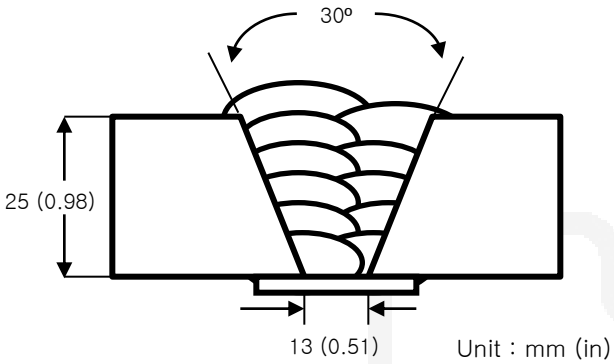
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S
S-777MXT X M-12K	0.061	0.52	0.73	0.024	0.016

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	SA204
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 (%)	0℃ (32°F)
S-777MXT X A-2	620℃x1hr	580 (84.1)	640 (92.8)	28	45 (33)
AWS A5.23 F8PZ-EA2-A2	-	≥470	550~690	≥ 20	Not specified

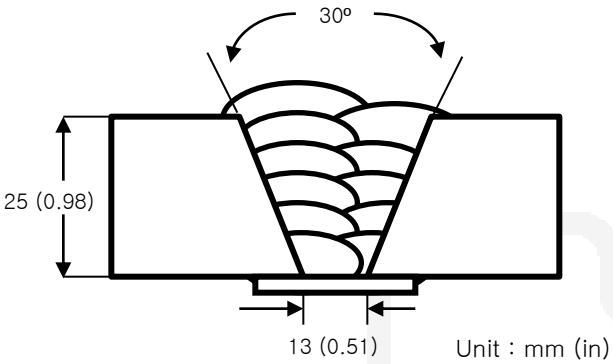
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Mo
S-777MXT X A-2	0.05	0.68	0.75	0.020	0.010	0.46

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	AH36 (Buttering)
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. ℃ (℉)	:	>135 (275)
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 (%)	0℃
S-777MXT X B-2	690℃x1hr	560 (81.2)	640 (92.8)	25	45 (33)
AWS A5.23 F8PZ-EB2-B2	-	≥470	550~690	≥ 20	Not specified

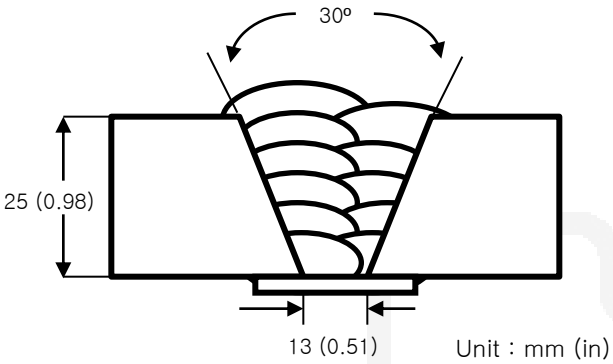
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Cr	Mo
S-777MXT X B-2	0.06	0.60	0.55	0.022	0.015	1.06	0.44

Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Base metal	:	SA387 Grade 22
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)	:	>135 (275)
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 (%)	0℃ (32°F)
S-777MXT X B-3	690℃x1hr	570 (82.7)	660 (95.7)	20	33 (24)
AWS A5.23 F8PZ-EB3-B3	-	≥470	550~690	≥ 20	Not specified

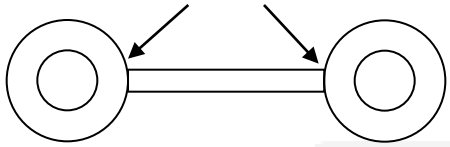
❖ Chemical Analysis of All weld metal(wt%)

Consumables	C	Si	Mn	P	S	Cr	Mo
S-777MXT X B-3	0.07	0.59	0.53	0.018	0.008	2.08	0.95

Fin tube of Boiler

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Wire mm(in)	:	H-14, B-2, B-3 2.4(3/32)
Amp./ Volt./CPM	:	400 / 28 / 100
Stick-Out mm (in)	:	20 (0.79)
Pre-Heat(℃)	:	R.T .
Polarity	:	DC+

Diffusible Hydrogen Content

❖ Welding Conditions

Wire	:	**H-14**	**Amp.(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**	:	DC(+)

❖ Result(㎖/100g Weld Metal)

X1	X2	X3	X4
4.40	**5.03**	**5.37**	**6.14**

Average Hydrogen Content 5.23 *㎖ / 100g Weld Metal*