HYUNDAI WELDING

Rev. 07

SMT-2594

AWS A5.9 ER2594
EN ISO 14343 W 25 9 4 N L

2019.09

HYUNDAI WELDING CO., LTD.

SMT-2594

❖ Specification

AWS A5.9	ER2594
EN ISO 14343	W 25 9 4 N L

❖ Applications

Superduplex alloys such as 2507 and Zeron 100, superduplex casting alloys (ASTM A890).

❖ Characteristics on Usage

1.Weld metal has 30~60% ferrite contents

2. Due to the high chromium contents, corrosion resistance is excellent in most environments(chloride enviroment)

3. Superior pitting resistance(PREN ≥40)

❖ Shielding gas

100% Ar

❖ Polarity

GTAW : DC-

❖ Packing

SMT-2594	TIG	Size	2.4mm X 1000mm (3/32in X 39.4in)
		Weight	5kg (11lbs)

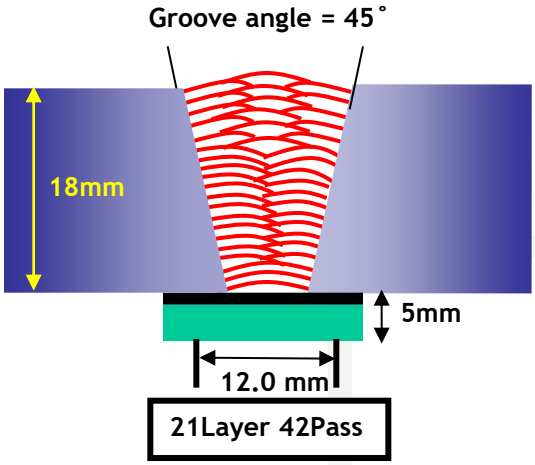
❖ Approval

ABS

1. Mechanical Properties & Chemical Composition of All-Weld Metal (GTAW)

❖ Welding Conditions

Method by AWS Spec.



Size(mm)	:	2.4mm
Shielding gas	:	100% Ar
Flow(ℓ /min.)	:	15~20
Ampere/Voltage	:	150~160A/13~14V
Speed(cm/min.)	:	12.4~14.1
Heat input(KJ/cm)	:	5.0~15.0

Base metal: UNS S32750

1-2 Chemical composition of the wire (wt%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu	N
0.011	0.41	0.53	0.019	0.001	9.13	25.27	3.86	0.21	0.257
≤0.03	≤1.0	≤2.5	≤0.03	≤0.02	8.0 ~10.5	24.0 ~27.0	2.5 ~4.5	≤1.5	0.2 ~0.3
AWS A5.9 ER2594									

1-3 Chemical composition of All weld metal (wt%)

C	Si	Mn	P	S	Ni	Cr	Mo	Cu	N2	PREN
0.014	0.41	0.52	0.021	0.004	8.82	25.52	3.74	0.08	0.20	41.06

* PREN = Cr + 3.3×Mo + 16×N

1-4 Radiographic Test

Consumable	Specification	Accepted	Rejected
SMT-2594	AWS A5.4	O	

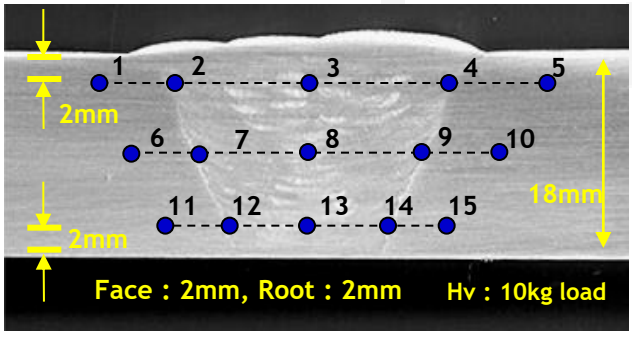
1. Mechanical Properties & Chemical Composition of All Weld Metal (GTAW)

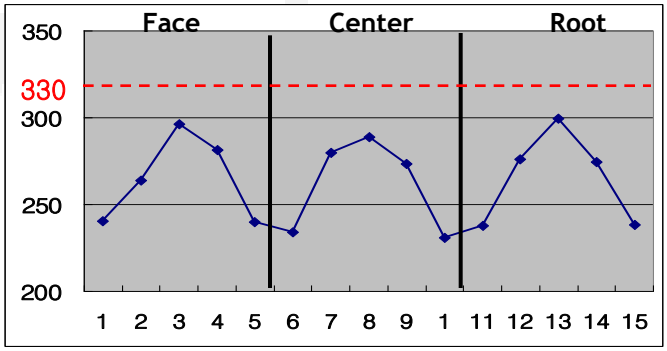
1-5 Mechanical properties of All-weld metal

Tensile Test Results.		
T.S. MPa (ksi)		El (%)
889 (129)		28.6
AWS A5.4 E2594	≥760	≥15

CVN Impact test Joule (ft·lbs)				
℃ (°F)	X1	X2	X3	Avg.
−50 (−58)	300 (221)	274 (202)	291 (215)	288.3 (212.6)

1-6 Vickers hardness test(H_V10)





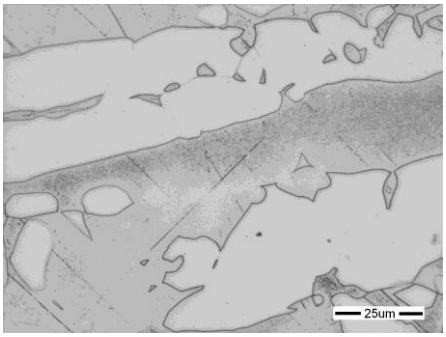
H_V10 Vickers hardness test							
1	2	3	4	5	6	7	8
240.5	263.9	296.3	281.6	239.7	234.1	279.8	289.0
9	10	11	12	13	14	15	
273.6	230.9	237.6	276.3	299.3	274.4	238.3	

1. Mechanical Properties & Chemical Composition of All Weld Metal (GTAW)

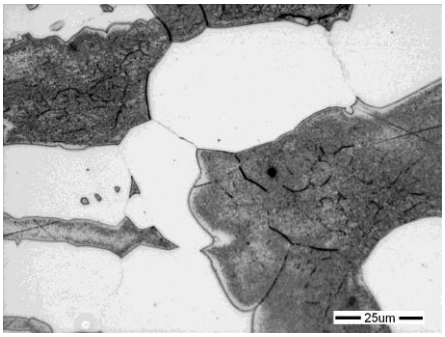
1-7 Ferrite content of weld metal

Consumable	Shaeffler	WRC(1992)	FERITSCOPE MP-30	ASTM E562
SMT-2594	80.3	66.9	49.4	57.4

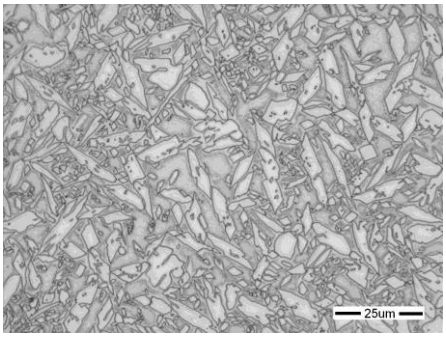
* FERITSCOPE MP-30 (FISCHER , Germany)



Base Metal

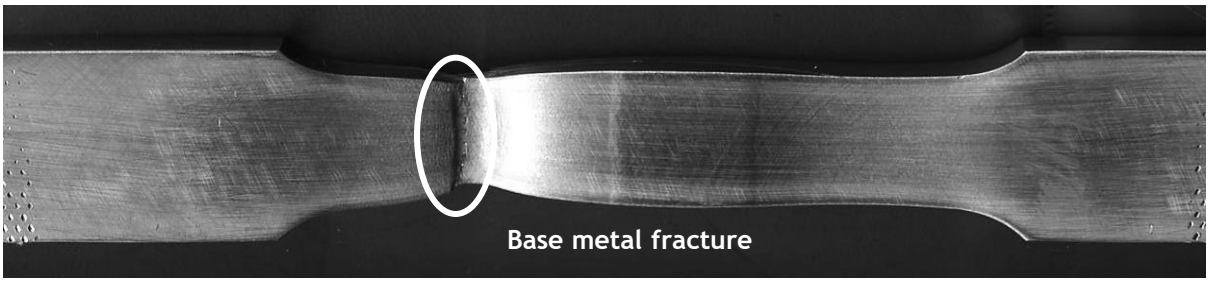


HAZ



Weld Metal

1-8 Mechanical properties of weld metal(Butt welding)

Transeverse tensile test (ASME Sect. IX QW-150), Base metal : UNS S32750	
Flat (1G)	

1. Mechanical Properties of Butt Weld Metal (GTAW)

1-9 Bending test

● Transverse Bending Test (Face & Root)

Face (Non-Crack)

Root (Non-Crack)

1-10 Ferric Chloride Pitting Test (ASTM G48 Method A)

Consumable	Specimen Weight (g)		Weight loss(g)	Remark (Pitting)
	Before	After		
SMT-2594 (1G)	116.0912	116.0910	0.0002	No Pitting

* Temperature : 40℃±2 , Period : 24Hr
(104°F ±35.6, Period : 24Hr)

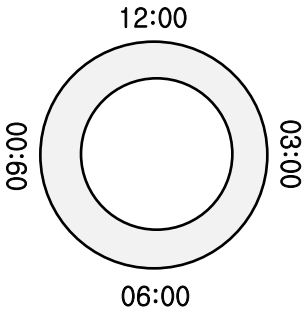
Before

After

2. Mechanical Properties of Pipe Welding Weldment (GTAW)

➢ Welding condition

Base Metal	S32750 (8” x 12.7mmt)		
Joint preparation	Root gap: 3mm , Groove angle : 60°		
Filler Metals	SMT-2594 (ER2594, 2.4mm)		
Welding Current (A)	60~80	80~100	100~120
Welding Voltage (V)	9~11	9~12	9~13
Travel speed (cpm)	3.6~6.4	5.0~8.6	6.5~10.8
Heat Input	5.0 ~ 14.4		



Clock	Front	Back
12:00		
03:00		
06:00		
09:00		

Sincere in our promises HTL

TESTING CERTIFICATE

HYUN TECH Co., Ltd
www.hyun-tech.com
68-1, Saebyeok-ro, Sasang-gu,
Busan, Korea
Tel : 051-328-0356 / Fax : 051-328-0380

Certificate No. :
144664-K05578

Page [1] of [1]

1. Client :
   - Name : HYUNDAI WELDING CO., LTD.
   - Address : 507, Teheran-ro, Gangnam-gu, Seoul, Korea
   - Date of Receipt : 2014. 09. 12
2. Use of Report : Quality Control
3. Test Sample : Duplex STS 2594 (8" X 12.7mmt, ER2594)
4. Date of Test : 2014. 09. 17
5. Test Method used : ASME IX QW-150:2013
6. Testing Environment : Temperature : (20 ± 1) ℃ , Humidity : (54 ± 4) % R.H.
7. Test Results :

Test Name	Unit	Sample No.	Result
Weldment Tensile Strength	MPa	1	866

<< Test & Specimen Description >>
* Tension Test Specimen of Size (mm) : Thickness 12.30 x Width 19.10
- Area : 234.93 mm² / Max. Load : 203 453 N / Fracture at Base Metal / Type of Failure : Ductile

This test report shall be used only within the purpose of its defined usage and also shall not be used for public relation, advertisement.

The test result of this test report only limited in the sample and sample name presented by the client and do not guarantee the all products of the client.

Affirmation	Tested by	Technical Manager
	Name : Kyung-Jin, Jung (Signature)	Name : Bong-Kun, Ma (Signature)

The above test certificate is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2014. 09. 17.

HYUN TECH Co., Ltd. PRESIDENT [SIGNATURE]
Accredited by KOLAS, Republic of KOREA

Sincere in our promises

TESTING CERTIFICATE

HYUN TECH Co., Ltd
www.hyun-tech.com
68-1, Saebyeok-ro, Sasang-gu,
Busan, Korea.
Tel : 051-328-0356 / Fax : 051-328-0380

Certificate No. :
144664-K05579

1. Client :
   - Name : HYUNDAI WELDING CO., LTD.
   - Address : 507, Teheran-ro, Gangnam-gu, Seoul, Korea
   - Date of Receipt : 2014. 09. 12
2. Use of Report : Quality Control
3. Test Sample : Duplex STS 2594 (8" X 12.7mmt, ER2594)
4. Date of Test : 2014. 09. 17
5. Test Method used : ASME IX QW-170:2013
6. Testing Environment : Temperature : (21 ± 1) ℃ , Humidity : (54 ± 4) % R.H.
7. Test Results :

Test Name	Unit	Sample No.	Result
Charpy Impact Test-Absorbed Energy (-46 ℃)	J	1W-1	126
Charpy Impact Test-Absorbed Energy (-46 ℃)	J	1W-2	190
Charpy Impact Test-Absorbed Energy (-46 ℃)	J	1W-3	109 (Average 141)

<< Test & Specimen Description >>
• Impact Test Specimen of Size (mm) : Height 10 x Width 10 x Length 55
- 2 mm "V" Notch / 8 mm Striking Edge

This test report shall be used only within the purpose of its defined usage and also shall not be used for public relation, advertisement.

The test result of this test report only limited in the sample and sample name presented by the client and do not guarantee the all products of the client.

Affirmation	Tested by	Technical Manager
	Name : Jae-Hun, Jeong (Signature)	Name : Bong-Kun, Ma (Signature)

The above test certificate is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2014. 09. 17.

HYUN TECH Co., Ltd. PRESIDENT (SIGNATURE)
Accredited by KOLAS, Republic of KOREA

Sincere in our promises

TESTING CERTIFICATE

HYUN TECH Co., Ltd
www.hyun-tech.com
68-1, Saebyeok-ro, Sasang-gu,
Busan, Korea.
Tel : 051-328-0356 / Fax : 051-328-0380

Certificate No. :
144664-K05580

1. Client :
   - Name : HYUNDAI WELDING CO., LTD.
   - Address : 507, Teheran-ro, Gangnam-gu, Seoul, Korea
   - Date of Receipt : 2014. 09. 12
2. Use of Report : Quality Control
3. Test Sample : Duplex STS 2594 (8" X 12.7mmt, ER2594)
4. Date of Test : 2014. 09. 17
5. Test Method used : ASTM E340 - 13
6. Testing Environment : Temperature : (21 ± 1) ℃ , Humidity : (67 ± 2) % R.H.
7. Test Results :

Test Name	Unit	Sample No.	Result
Macro Etching Test	-	1	See Page #2

This test report shall be used only within the purpose of its defined usage and also shall not be used for public relation, advertisement.

The test result of this test report only limited in the sample and sample name presented by the client and do not guarantee the all products of the client.

Affirmation	Tested by	Technical Manager
	Name : Deuk-Hyuk, Im (Signature)	Name : Bong-Kun, Ma (Signature)

The above test certificate is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2014. 09. 17.

HYUN TECH Co., Ltd. PRESIDENT (SIGNATURE)
Accredited by KOLAS, Republic of KOREA

Sincere in our promises

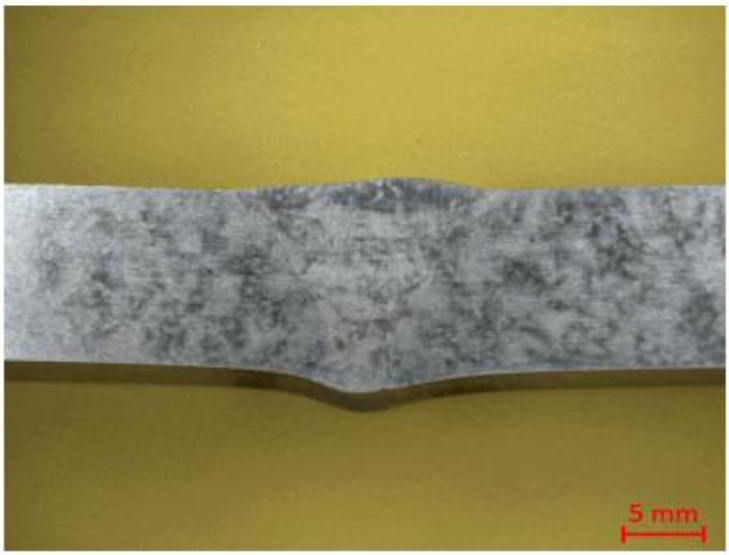
TESTING CERTIFICATE

HYUN TECH Co., Ltd
www.hyun-tech.com
68-1, Saebyeok-ro, Sasang-gu,
Busan, Korea.
Tel : 051-328-0356 / Fax : 051-328-0380

Certificate No. :
144664-K05580

* MacroEtching (ASTM E340) / Specimen Preparation (ASTM E3)
Location : Transverse section to the direction of Welding (Base Metal + Heat Affect Zone + Weld)
Measurement Magnification : x 5
Reference Magnification : x 3
Etching Condition : ASTM E340 / Nitric acid + Hydrochloric acid + Water (1:2:1 Mixture)

[Photograph of Macroetching]



Test Sample
Duplex STS 2594 (8" X 12.7mmt, ER2594)

HYUN TECH Co., Ltd.

Sincere in our promises

TESTING CERTIFICATE

HYUN TECH Co., Ltd
www.hyun-tech.com
68-1, Saebyeok-ro, Sasang-gu,
Busan, Korea.
Tel : 051-328-0356 / Fax : 051-328-0380

Certificate No. :
144664-K05581

1. Client :
   - Name : HYUNDAI WELDING CO., LTD.
   - Address : 507, Teheran-ro, Gangnam-gu, Seoul, Korea
   - Date of Receipt : 2014. 09. 12
2. Use of Report : Quality Control
3. Test Sample : Duplex STS 2594 (8" X 12.7mmt, ER2594)
4. Date of Test : 2014. 09. 16 ~ 2014. 09. 17
5. Test Method used : ASTM G48 – 11 Method "A"
6. Testing Environment : Temperature : (22 ± 3) ℃ , Humidity : (53 ± 7) % R.H.
7. Test Results :

Test Name	Unit	Sample No.	Result
Ferric Chloride Pitting Test-Weight Loss	g	1	0.006 4
Ferric Chloride Pitting Test-Visible Pitting	–	1	Not Defected

<< Test & Specimen Description >>
Measurement Magnification : x 20
Temperature of Test (℃) : 40
Time of Test (h) : 24
Weight (g) : Before (50.193 0) , After (50.186 6)

This test report shall be used only within the purpose of its defined usage and also shall not be used for public relation, advertisement.

The test result of this test report only limited in the sample and sample name presented by the client and do not guarantee the all products of the client.

Affirmation	Tested by	Technical Manager
	Name : Chang-Hun, Song (Signature)	Name : Bong-Kun, Ma (Signature)

The above test certificate is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2014. 09. 17.

HYUN TECH Co., Ltd. PRESIDENT (SIGNATURE)
Accredited by KOLAS, Republic of KOREA