

ST-50G

Mild Steel & 490 MPa high tensile steels

Conformances

AWS	A5.18/ ASME SFA5.18 ER70S-G
JIS	Z3316 YGT50
EN	ISO 636-A-W3Si1
KR	3YSG
ABS	AWS A5.18 ER70S-G
LR	3, 3YH15
BV	UP(-20°C)
NK	IIIYM
DNV	3Y
GL	KSW53G
CCS	3YS

Applications

- Pressure vessels
- Nuclear reactors
- Rail road car
- Shipbuilding
- Pipeline

Features

- Good impact value at low temperature
- Good bead appearance
- Good performance

Welding Position



1G 2F 3G 4G
(PA) (PB) (PF-PG) (PE)

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	PVC TUVE
mm (in)	5kg (11lbs)
1.2 (0.045)	✓
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn		
0.07	0.83	1.43		

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
As welded with 100% Ar	460 (66,700)	530 (76,900)	27	-20 (-4)	170 (125)

ST-50.6

Mild Steel & 490 MPa high tensile steels



Conformances

AWS A5.18/ ASME SFA5.18 ER70S-6
 JIS Z3316 YGT50
 EN ISO 636-A-W3Si1
 TÜV ISO 636-A-W42 5 W3Si1
 ABS AWS A5.18 ER70S-6(-30)
 CWB CSA W48 B-G 49A 3 C G6
 CE

Applications

- Pressure vessels
- Nuclear reactors
- Rail road car
- Shipbuilding
- Pipeline

Features

- Good impact value at low temperature
- Good bead appearance
- Good performance

Welding Position



1G 2F 3G 4G
 (PA) (PB) (PF-PG) (PE)

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	PVC TUVE
mm (in)	5kg (11lbs)
1.2 (0.045)	✓
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn		
0.07	0.85	1.5		

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
As welded with 100% Ar	450 (65,300)	520 (75,500)	28	-20 (-4)	180 (132)

SWAW

SAW

GMAW

GTAW

FCAW

Non-FERROUS

APPENDIX

ST-50.3

Mild Steel & 490 MPa high tensile steels

Conformances

AWS A5.18/ ASME SFA5.18 ER70S-3

EN ISO 636-A-W2Si

ABS AWS A5.18 ER70S-3(-50)

Applications

- Pressure vessels
- Nuclear reactors
- Rail road car
- Shipbuilding
- Pipeline

Features

- Good impact value at low temperature
- Good bead appearance
- Good performance

Welding Position



1G 2F 3G 4G
(PA) (PB) (PF-PG) (PE)

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	PVC TUVE
mm (in)	5kg (11lbs)
1.2 (0.045)	✓
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn		
0.07	0.65	1.15		

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
As welded with 100% Ar	495 (71,800)	565 (81,950)	26	-20 (-4)	170 (125)

ST-72

Mild Steel & 490 MPa high tensile steels

Conformances

AWS A5.18/ ASME SFA5.18 ER70S-2

JIS Z3316 YGT50

Applications

- Pressure vessels
- Shipbuilding

Features

- Good performance in all position
- One-side welding (tube)
- Ar 100% gas

Welding Position



1G 2F 3G 4G
(PA) (PB) (PF-PG) (PE)

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	PVC TUVE
mm (in)	5kg (11lbs)
1.2 (0.045)	✓
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Ti	Zr	Al
0.05	0.52	1.15	0.07	0.05	0.06

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
As welded with 100% Ar	500 (72,500)	580 (84,200)	29	-30 (-22)	180 (132)

SMW

SAW

GMAW

GTAW

FCAW

Non-FERROUS

APPENDIX

ST-1N

Mild Steel & 490 MPa high tensile steels

Conformances

AWS A5.28/ ASME SFA5.28 ER80S-Ni1
 ABS AWS A5.28 ER80S-Ni1(-50)
 CWB AWS A5.28 ER80S-Ni1(-50 Degree)

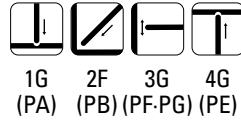
Applications

- Offshore
- Power plant
- Petrochemical
- Chemical industry

Features

- Good impact value at low temperature (1% Ni)
- Back bead pipe applicable
- Good performance
- Meets NACE Standard

Welding Position



Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	PVC TUVE
mm (in)	5kg (11lbs)
1.2 (0.045)	✓
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	P	S	Ni	Cu
0.088	0.62	1.15	0.011	0.010	0.93	0.08

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft.lbs)
As welded with 100% Ar	594 (86,000)	671 (97,300)	32.3	-45 (-49)	59 (43)
PWHT	568 (82,400)	645 (93,500)	34.0	-45 (-49)	108 (79)

ST-80CM

Heat resistance – low alloy steel

Conformances

AWS A5.28/ ASME SFA5.28 ER80S-G
 JIS Z3317 YG1CM-A / JIS Z3316 YGT1CM
 EN ISO 14341-B S2M3

Applications

- Pressure vessels
- Offshore
- Machinery
- Chemical industry

Features

- MIG welding for boiler steam pipe of steam power generation and 1.0~1.25%Cr-0.5%Mo heat resisting steel using for refining oil & chemical industrial machine tool.
- Excellent TS and impact value in a high temperature after heat treatment.

Welding Position



1G 2F
(PA) (PB)

Current

DC +

Shielding Gas

100% Ar
 Ar + 2% O₂

Diameter / Packaging

Diameter	Spool			Pac		
	5kg (11lbs)	15kg (33lbs)	20kg (44lbs)	250kg (551lbs)	300kg (661lbs)	350kg (771lbs)
0.8 (0.033)	✓	✓	✓	✓	✓	✓
0.9 (0.035)	✓	✓	✓	✓	✓	✓
1.0 (0.040)	✓	✓	✓	✓	✓	✓
1.2 (0.045)	✓	✓	✓	✓	✓	✓
1.4 (0.052)	✓	✓	✓	✓	✓	✓
1.6 (1/16)	✓	✓	✓	✓	✓	✓

SMW

SAW

GMW

GTAW

FCW

Non-FERROUS

APPENDIX

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Mo
0.09	0.67	1.02	1.19	0.45

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft.lbs)	PWHT
As welded with 100% Ar	630 (91,500)	28	0 (32) -20 (-4)	290 (215) 280 (207)	690°C * 1Hr

Typical Operating Procedures

Diameter, Polarity Shielding Gas	CTWD mm(in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)
0.9mm (0.035in), DC +					
100% CO ₂ Gas	12 (1/2)	2.5 (100)	18	80	0.7 (1.6)
		3.8 (150)	19	120	1.1 (2.4)
		6.4 (250)	21	175	1.8 (4.0)
Mixed Gas (Ar+CO ₂)	19 (3/4)	8.9 (350)	23	195	2.7 (6.0)
		12.7 (500)	29	230	3.6 (8.0)
		15.2 (600)	30	275	4.4 (9.6)
1.0mm (0.040in), DC +					
100% CO ₂ Gas	12 (1/2)	2.5 (100)	18	80	0.7 (1.6)
		3.8 (150)	19	120	1.1 (2.4)
		6.4 (250)	21	175	1.8 (4.0)
Mixed Gas (Ar+CO ₂)	19 (3/4)	8.9 (350)	23	195	2.7 (6.0)
		12.7 (500)	29	230	3.6 (8.0)
		15.2 (600)	30	275	4.4 (9.6)
1.2mm (0.045in), DC +					
100% CO ₂ Gas	12 (1/2)	2.5 (100)	18	80	0.7 (1.6)
		3.8 (150)	19	120	1.1 (2.4)
		6.4 (250)	21	175	1.8 (4.0)
Mixed Gas (Ar+CO ₂)	19 (3/4)	8.9 (350)	23	195	2.7 (6.0)
		12.7 (500)	29	230	3.6 (8.0)
		15.2 (600)	30	275	4.4 (9.6)

ST-308

Stainless steel

Conformances

AWS A5.9/ ASME SFA5.9 ER308
JIS Z3321 YS308
EN ISO 14343-A W 19 9
KR RY308G
ABS AWS A5.9 ER308
DNV 308

Applications

- Structural fabrication
- Petrochemical
- Oil and textile industries
- Nuclear reactor

Features

- Good resistance to crack and corrosion
- High efficiency

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	✓
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni
0.05	0.38	1.75	19.8	10.1

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft.-lbs)
610 (88,500)	40	0 (32)	130 (95)

SMW

SAW

GMW

GTAW

FCW

Non-FERROUS

APPENDIX

ST-308L

Low carbon 18%Cr-8%Ni steel

Conformances

AWS	A5.9/ ASME SFA5.9 ER308L
JIS	Z3321 YS308L
EN	ISO 14343-A W 19 9L
KR	RY308L (-196°C ≥29 J)
ABS	AWS A5.9 ER308L
LR	304L (-196°C)
BV	UP (KV -196°C)
DNV	308L (-196°C)
NK	KY308L
CCS	304L

Applications

- Structural fabrication
- Petrochemical
- Oil and textile industries
- Nuclear reactor

Features

- Good resistance to crack and corrosion
- High efficiency

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	✓
1.2 (0.045)	✓
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni
0.02	0.36	1.70	20.0	10.3

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
600 (87,000)	41	0 (32)	110 (81)

ST-309

22%Cr-12%Ni steel, 18%Cr-8%Ni clad steel, STS-CrMo, STS-Carbon steel

Conformances

AWS A5.9/ ASME SFA5.9 ER309
 JIS Z3321 YS309
 EN ISO 14343-A W 23 12
 ABS AWS A5.9 ER309

Applications

- Structural fabrication
- Petrochemical
- Oil and textile industries
- Nuclear reactor

Features

- Good resistance to crack and heat
- High efficiency

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni
0.07	0.38	1.88	24.4	12.8

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
620 (90,000)	38	0 (32)	130 (96)

SMW

SAW

GMW

GTAW

FCW

Non-FERROUS

APPENDIX

ST-309L

22%Cr-12%Ni steel, 18%Cr-8%Ni clad steel, STS-CrMo, STS-Carbon steel

Conformances

AWS A5.9/ ASME SFA5.9 ER309L
JIS Z3321 YS309L
EN ISO 14343-A W 23 12L
ABS AWS A5.9 ER309L
LR SS/CMn
BV 309L
DNV 309L
NK KY309L
CCS 309L

Applications

- Structural fabrication
- Petrochemical
- Oil and textile industries
- Nuclear reactor

Features

- Good resistance to crack and heat
- High efficiency

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	✓
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni
0.03	0.40	1.74	24.2	12.6

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
600 (87,000)	38	0 (32)	150 (110)

ST-309MoL

Dissimilar metals such as stainless steels and carbon steels

Conformances

AWS A5.9/ ASME SFA5.9 ER309LMo

JIS Z3321 YS309LMo

EN ISO 14343-A W 23 12 2L

Applications

- STS clad steel (316, 316L)

Features

- Good resistance to corrosion and heat
- Good arc stability and bead wetting

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni	Mo
0.02	0.35	1.8	23.2	13.7	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
650 (94,200)	32

SWAW

SAW

GMAW

GTAW

FCAW

Non-FERROUS

APPENDIX

ST-310

25%Cr-20%Ni STS

Conformances

AWS A5.9/ ASME SFA5.9 ER310

JIS Z3321 YS310

EN ISO 14343-A W 25 20

Applications

- STS clad steel

Features

- Good resistance to corrosion and heat
- Good arc stability and bead wetting

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni
0.09	0.35	1.90	26.8	20.9

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
610 (88,500)	41	0 (32)	110 (81)

ST-312

29%Cr-9%Ni STS, joining of dissimilar-metal

Conformances

AWS A5.9/ ASME SFA5.9 ER312

JIS Z3321 YS312

EN ISO 14343-A W 29 9

Applications

- Welding of dissimilar-metal STS to ferritic steel or special steel

Features

- Good resistance to crack and corrosion
- High efficiency
- Good arc stability and bead wetting

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni
0.10	0.38	1.68	30.0	8.8

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)
770 (111,600)	27

SMW

SAW

GMAW

GTAW

FCAW

Non-FERROUS

APPENDIX

ST-316

18%Cr-12%Ni-2%Mo STS

Conformances

AWS A5.9/ ASME SFA5.9 ER316

JIS Z3321 YS316

EN ISO 14343-A W 19 12 3

ABS AWS A5.9 ER316

Applications

- Structural fabrication
- Chemical industries
- Nuclear reactors

Features

- Good resistance to crack and corrosion
- High efficiency
- Good arc stability and bead wetting

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni	Mo
0.05	0.41	1.82	18.9	12.5	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
590 (85,600)	41	0 (32)	130 (95)

ST-316L

Low carbon 18%Cr-12%Ni-2%Mo STS

Conformances

AWS	A5.9/ ASME SFA5.9 ER316L
JIS	Z3321 YS316L
EN	ISO 14343-A W 19 12 3L
KR	RY316L (-196°C ≥29 J)
ABS	AWS A5.9 ER316L
LR	316L (-196°C)
BV	316L (KV -196°C)
DNV	316L (-196°C)
GL	4435
NK	KY316L
CCS	316L
CWB	AWS A5.9 ER316L

Applications

- Structural fabrication
- Chemical industries
- Nuclear reactors

Features

- Good resistance to crack and corrosion
- High efficiency
- Good arc stability and bead wetting

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	✓
1.2 (0.045)	✓
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni	Mo
0.02	0.38	1.85	18.8	12.4	2.5

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
570 (82,700)	44	0 (32)	140 (103)

SMW

SAW

GMW

GTAW

FCW

Non-FERROUS

APPENDIX

ST-347

18%Cr-8%Ni-Nb(STS 347) & 18%Cr-8%Ni-Ti(STS 321)

Conformances

AWS A5.9/ ASME SFA5.9 ER347

JIS Z3321 YS347

EN ISO 14343-A W 199 Nb

Applications

- Boiler
- Gas turbine

Features

- Good resistance to crack
- Good resistance corrosion and heat(Nb contents)

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni	Nb
0.05	0.43	1.66	20.0	9.6	0.7

Typical Mechanical Properties of All-Weld Metal

TS	EL
MPa(lbs/in ²)	(%)
680 (98,600)	32

SMT-2594

25%Cr-7%Ni-4.5%Mo-0.25%N Super Duplex STS

Conformances

AWS A5.9/ ASME SFA5.9 ER2594

EN ISO 14343-A G 25 9 4 NL

ABS AWS A5.9 ER2594

Applications

- Offshore & FPSO
- Chemical industries
- Petrochemical

Features

- Good resistance to corrosion
- Superior pitting resistance

Welding Position



1G 2F 3G 4G
(PA) (PB) (PF-PG) (PE)

Current

GMAW: DC + / GTAW: DC -

Shielding Gas

Ar / Ar+ O₂

Diameter / Packaging

Diameter	Spool			Pac		
	12.5kg (28lbs)	15kg (33 lbs)	20kg (44lbs)	150kg (330lbs)	200kg (440lbs)	250kg (551lbs)
0.8 (0.033)	✓					
0.9 (0.035)	✓					
1.0 (0.040)	✓					
1.2 (0.045)	✓					
1.4 (0.052)						
1.6 (1/16)	✓					

Diameter	5kg*1000						
	1.0 (0.039)	1.2 (0.045)	1.6 (1/16)	2.0 (5/64)	2.4 (3/32)	2.6 (0.10)	3.2 (1/8)
mm (in)			✓	✓	✓	✓	✓

SMW

SAW

GMAW

GTAW

FCAW

Non-FERROUS

APPENDIX

Typical Chemical Composition of the Wire(%)

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	N
0.011	0.41	0.53	0.019	0.001	25.27	9.13	3.86	0.21	0.257

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft.-lbs)	PREN
890 (129,000)	28.6	-50 (-58)	195 (144)	40

Typical Operating Procedures

Diameter, Polarity Shielding Gas	CTWD mm(in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)
1.0mm (0.040 in), DC +					
100% Ar Gas	15~20 (0.59~0.78)	6.0 (236)	24	140	2.1 (4.6)
		7.1 (280)	24	160	2.5 (5.5)
		9.2 (362)	24	190	3.2 (7.1)
Mixed Gas (Ar + 2% O ₂)	15~20 (0.59~0.78)	5.2 (204)	26	160	1.8 (4.0)
		7.0 (276)	26	190	2.4 (5.3)
		8.3 (327)	26	220	2.9 (6.4)
1.2mm (0.045 in), DC +					
100% Ar Gas	15~20 (0.59~0.78)	9.2 (362)	27	190	4.6 (10.1)
		11.9 (469)	27	220	6.0 (13.2)
		15.5 (610)	27	260	7.8 (17.2)
Mixed Gas (Ar + 2% O ₂)	15~20 (0.59~0.78)	7.7 (303)	28	200	3.9 (8.6)
		8.6 (339)	28	230	4.3 (9.5)
		10.1 (398)	28	260	5.1 (11.2)

ST-2209

22%Cr-5%Ni-2%Mo-0.15%N STS

Conformances

AWS A5.9/ ASME SFA5.9 ER2209
JIS Z3321 YS2209
EN ISO 14343-A W 22 9 3N L
ABS AWS A5.9 ER2209(-50)
LR S31803m
DNV Duplex Stainless Steel

Applications

- Offshore
- Petrochemical

Features

- Good resistance to corrosion
- High resistance to chloride stress corrosion cracking(CSCC)

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni	Mo
0.01	0.41	1.70	23.4	8.9	3.2

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)	PREN
810 (116,700)	27	-20 (-4)	195 (144)	35

SMW

SAW

GMW

GTAW

FCW

Non-FERROUS

APPENDIX

SMT-904L

20%Cr-25%Ni-4.5%Mo-1.5%Cu STS

Conformances

AWS A5.9/ ASME SFA5.9 ER385

JIS Z3321 YS385

EN ISO 14343-A G(W) 20 25 5 Cu L

Applications

- Offshore & FPSO
- Chemical industries
- Petrochemical

Features

- Good resistance to corrosion
- Preferably keep heat input below 1.5KJ/mm

Welding Position



1G 2F 3G 4G
(PA) (PB) (PF-PG) (PE)

Current

GMAW: DC + / GTAW: DC -

Shielding Gas

Ar / Ar+ O₂

Diameter / Packaging

Diameter mm (in)	Spool			Pac		
	12.5kg (28lbs)	15kg (33 lbs)	20kg (44lbs)	150kg (330lbs)	200kg (440lbs)	250kg (551lbs)
0.8 (0.033)	✓					
0.9 (0.035)	✓					
1.0 (0.040)	✓					
1.2 (0.045)	✓					
1.4 (0.052)						
1.6 (1/16)	✓					

Diameter mm (in)	5kg*1000						
	1.0 (0.039)	1.2 (0.045)	1.6 (1/16)	2.0 (5/64)	2.4 (3/32)	2.6 (0.10)	3.2 (1/8)
			✓	✓	✓	✓	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	P	S	Cr	Ni	Mo	Cu
0.013	0.31	1.89	0.013	0.001	20.52	24.96	4.32	1.42

Typical Mechanical Properties of All-Weld Metal

YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
490 (71,000)	650 (94,300)	35.0	20 (68)	110 (81)
			-196 (-321)	70 (52)

Typical Operating Procedures

Diameter, Polarity Shielding Gas	CTWD mm(in)	Wire Feed Speed m/min (in/min)	Voltage (volts)	Approx. Current (amps)	Melt-Off Rate kg/hr (lb/hr)
1.0mm (0.040 in), DC +					
100% Ar Gas	15~20 (0.59~0.78)	6.0 (236)	24	140	2.1 (4.6)
		7.1 (280)	24	160	2.5 (5.5)
		9.2 (362)	24	190	3.2 (7.1)
Mixed Gas (Ar + 2% O ₂)	15~20 (0.59~0.78)	5.2 (204)	26	160	1.8 (4.0)
		7.0 (276)	26	190	2.4 (5.3)
		8.3 (327)	26	220	2.9 (6.4)
1.2mm (0.045 in), DC +					
100% Ar Gas	15~20 (0.59~0.78)	9.2 (362)	27	190	4.6 (10.1)
		11.9 (469)	27	220	6.0 (13.2)
		15.5 (610)	27	260	7.8 (17.2)
Mixed Gas (Ar + 2% O ₂)	15~20 (0.59~0.78)	7.7 (303)	28	200	3.9 (8.6)
		8.6 (339)	28	230	4.3 (9.5)
		10.1 (398)	28	260	5.1 (11.2)

ST-410

13%Cr STS(STS 403, STS 410)

Conformances

AWS A5.9/ ASME SFA5.9 ER410

JIS Z3321 YS410

EN ISO 14343-A W 13

Applications

- Hardfacing application

Features

- Good resistance to corrosion and abrasion
- Good anti-abrasive property

Current

DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	✓
2.0 (5/64)	✓
2.4 (3/32)	✓
2.6 (0.10)	✓
3.2 (1/8)	✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni
0.10	0.38	0.34	12.0	0.17

Typical Mechanical Properties of All-Weld Metal

TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft-lbs)
530 (76,800)	37	0 (32)	-

SM-90B3 / ST-90B3

2.25%Cr- 1%Mo steels, Joining carbon steel and Cr-Mo alloys

Conformances

AWS A5.28/ ASME SFA5.28 ER90S-B3

Applications

- High pressure pipe
- Pressure vessels

Features

- Careful control of preheat, interpass temperatures postweld heat treatment is essential to prevent cracking

Welding Position



1G 2F 3G 4G
(PA) (PB) (PF-PG) (PE)

Current

GMAW: DC + / GTAW: DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter mm (in)	Spool			Pac		
	10kg (22lbs)	15kg (33 lbs)	20kg (44lbs)	30kg (66lbs)	150kg (330lbs)	200kg (440lbs)
0.8 (0.033)						
0.9 (0.035)						
1.0 (0.040)						
1.2 (0.045)		✓	✓			
1.4 (0.052)						
1.6 (1/16)						

Diameter mm (in)	5kg*1000						
	1.0 (0.039)	1.2 (0.045)	1.6 (1/16)	2.0 (5/64)	2.4 (3/32)	2.6 (0.10)	3.2 (1/8)
				✓	✓		✓

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni	Mo	Cu	Shielding Gas
0.118	0.48	0.54	2.48	0.15	0.98	0.32	Ar

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)
As welded with 100% Ar	590 (85,600)	759 (109,518)	24

SMW

SAW

GMAW

GTAW

FCAW

Non-FERROUS

APPENDIX

ST-91B9

A213 T91(Seamless tube), A335 P91(Seamless pipe), A387 Gr91(Plate), A182/A336 F91(forging), A234 WP91

Conformances

AWS A5.28/ ASME SFA5.28 ER90S-B9
EN ISO 21952-A W CrMo91

Applications

- Headers
- Steam piping and turbine casings

Features

- Good resistance to creep at high temperature
- Tempered martensite structure with alloy carbides in the PWHT

Current

GTAW: DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	
2.0 (5/64)	
2.4 (3/32)	√
2.6 (0.10)	
3.2 (1/8)	

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni	Mo	Shielding Gas
0.10	0.30	0.47	8.91	0.67	0.96	Ar

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft.lbs)
As welded with 100% Ar	746 (108,200)	830 (121,000)	21	0 (32) R.T	180 (133) 190 (137)

ST-92B9

A213 T92(Seamless tube), A335 P92(Seamless pipe), A387 Gr92(Plate), A182/A336 F92(forging), A234 WP92

Conformances

AWS A5.28/ ASME SFA5.28 ER90S-G

Applications

- Headers
- Steam piping and turbine casings

Features

- Good resistance to creep at high temperature
- Tempered martensite structure with alloy carbides in the PWHT

Current

GTAW: DC -

Shielding Gas

Ar

Diameter / Packaging

Diameter	
mm (in)	5kg*1000
1.0 (0.039)	
1.2 (0.045)	
1.6 (1/16)	
2.0 (5/64)	
2.4 (3/32)	√
2.6 (0.10)	
3.2 (1/8)	

Typical Chemical Composition of the Wire(%)

C	Si	Mn	Cr	Ni	Mo	Shielding Gas
0.10	0.23	0.55	8.82	0.67	0.44	Ar

Typical Mechanical Properties of All-Weld Metal

	YS MPa(lbs/in ²)	TS MPa(lbs/in ²)	EL (%)	Temp °C(°F)	CVN-Impact Value J (ft.-lbs)
As welded with 100% Ar	758 (109,939)	845 (122,557)	21	0 (32) R.T	30 (22) 150 (111)

SMW

SAW

GMW

GTAW

FCW

Non-FERROUS

APPENDIX