Welding Filler Metal

Data Book

Your First Source for Filler Metal Technology

STRENGTH THROUGH **COOPERATION**

Coordinated Research & Manufacturing

ESAB Welding & Cutting Products maintains a 400,000 sf. ft. (37,160m^2) manufacturing plant in Hanover, Pennsylvania -- one of the most complete and modern facilities for the development and manufacture of welding electrodes and flux cored wires. The research and development laboratory adjacent to the plant has a large staff devoted to solving welding problems and searching out new ways to advance welding technology. It is in touch with research facilities and authorities throughout the world.

The coordination of efforts between research and manufacturing is a major reason why ESAB has earned a reputation for consistency in producing quality products for all welding procedures.

WELDING FILLER METAL DATA BOOK

Introduction

With the rapid advances taking place in the welding field, ESAB continues to advance the state-of-the-art as the innovator in developing new welding filler metals.

This book contains the most up-to-date information available at the time of printing and is a complete listing of our product line. A full description of our standard filler metals, their applications, weld metal chemistry and weld metal properties is provided, along with the codes and specifications to which they comply. Each section is followed by a list of additional non-standard items which are also available.

Information is included to help estimate the amount of filler metal needed for the common types of fillet and butt joints. A method for calculating the cost of depositing weld metal using the various welding processes is also included.

Useful conversion tables are included to aid in cross-referencing to metric units in the SI system.

The following pages of chemical and mechanical properties are typicals and are not to be construed as guaranteed values. Tests were performed in strict accordance with AWS procedures, but as with any analysis of weld metal, individual results may differ depending on such elements as welding technique, plate chemistry, cooling rates, etc.

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Covered Electrodes

Covered Electrodes - Section One

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Electrode Selection

The following points should be considered when selecting the proper coated electrode.

1. Match the mechanical properties of the base metal.
2. Match the chemical composition of the base metal as closely as possible.
3. Match electrode to available power supply — AC or DCEN (electrode negative) or DCEP (electrode positive).
4. Match the electrode to the position of the weld.
5. Observe joint design — Use deep penetrating electrodes for tight fit-up and unbeveled joints. Use light penetration electrodes for poor fit-up and thin material.
6. Observe service conditions and select electrode accordingly — High temperature, low temperature, corrosive atmosphere, impact loading. These conditions are best met by using low hydrogen electrodes.
7. Consider welding costs — Highest deposition rate is in the flat position. Use high iron power electrodes to further increase deposition. By far, the largest factor is labor and overhead.

AWS FILLER METAL SPECIFICATION A5.1 MILD STEEL COVERED ELECTRODES

EXAMPLE: E (1) 60 (2) 1 (3) 0 (4)

1. E - Stands for electrode.
2. Two digits indicate tensile strength x 1000 PSI.
3. Third digit refers to welding position.
   - EXX1X All position (flat, horizontal, vertical, overhead).
   - EXX2X Horizontal and flat only.
   - EXX3X Flat position only.
   - EXX4X Flat, overhead, horizontal, vertical down.
4. Last digit indicates usability of the electrode, ie. type of current and the type of covering. In some cases, both the third and fourth digits are significant.

Classification	Current	Arc	Penetration	Covering & Slag	Iron Powder
EXX10	DCEP	Digging	Deep	Cellulose - Sodium	0 - 10%
EXXX1	AC or DECP	Digging	Deep	Cellulose - Potassium	0
EXXX2	AC or DCEN	Medium	Medium	Titania - Sodium	0 - 10%
EXXX3	AC or DCEN or DECP	Soft	Light	Titania - Potassium	0 - 10%
EXXX4	AC or DCEN or DECP	Soft	Light	Titania - Iron Powder	25 - 40%
EXXX5	DECP	Medium	Medium	Low Hyd. - Sodium	0
EXXX6	AC or DCEP	Medium	Medium	Low Hyd. - Potassium	0
EXXX8	AC or DCEP	Medium	Medium	Low Hyd. - Iron Powder	25 - 40%
EXX20	AC or DCEN	Medium	Medium	Iron Oxide - Sodium	0
EXX22	AC or DCEN or DECP	Medium	Medium	Iron Oxide - Sodium	0
EXX24	AC or DCEN or DECP	Soft	Light	Titania - Iron Powder	50%
EXX27	AC or DCEN or DECP	Medium	Medium	Iron Oxide - Iron Powder	50%
EXX28	AC or DCEP	Medium	Medium	Low Hyd. - Iron Powder	50%
EXX48	AC or DCEP	Medium	Medium	Low Hyd. - Iron Powder	25 - 40%

DCEP - Direct Current Electrode Positive **DCEN** - Direct Current Electrode Negative

NOTE: Iron poweder percentage based on weight of the covering.

SUREWELD 10P AWS A5.1: E6010

FEATURES

The red coated Sureweld 10P is an all-position cellulosic electrode developed for the pipe welding industry in order to improve ductility in the weld deposit while maintaining the standard welding characteristics needed for a pipe welding electrode. Sureweld 10P produces a steady, deep penetrating arc and maintains the proper keyhole in an open root. This electrode will produce X-ray quality joints in flat, horizontal, overhead, vertical-up, and vertical-down procedures. Sureweld 10P is recommended for welding API grades A25, A, B and X42 pipe and general structural, ship, barge and storage tank fabrication. It may also be used for welding root passes in higher grade pipe in some circumstances.

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.1
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S.- AWS A5.1: E6010
- AWS A5.1: E6010

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Pipeline
- General Fabrication
- Civil Construction

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	67 ksi, 465 MPa
Tensile Strength	79 ksi, 550 MPa
Elongation in 2”	29%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded	27 ft-lb, 37 J
Testing Temperature -20°F (-29°C)	
As Welded	22 ft-lb, 30 J

WELD METAL ANALYSIS

C	0.12%
M	0.3%
Si	0.2%
P	0.009%
S	0.017%

SUREWELD 10P continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	75	40 - 75	1.5 (0.7)	72
1/8 (3.2)	100	80 - 140	2.1 (0.9)	76.3
	130	80 - 140	2.3 (1)	68.8
5/32 (4.0)	140	130 - 175	2.8 (1.3)	73.6
	170	130 - 175	2.9 (1.3)	64.1
3/16 (4.8)	160	150 - 210	3.3 (1.5)	74.9
	190	150 - 210	3.5 (1.6)	69.7

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
811005081	SW 10P 3/32X12X11#QP	662303050573
811005008	SW 10P 3/32X12X25#CT	662303050498
811005040	SW 10P 3/32X12X50#HS	662303050535
811005131	SW 10P 1/8X14X5#VP	662303050849
811005016	SW 10P 1/8X14X50#CT	662303050504
811005057	SW 10P 1/8X14X50#HS	662303050542
811005149	SW 10P 5/32X14X5#VP	662303050856
811005024	SW 10P 5/32X14X50#CT	662303050511
811005065	SW 10P 5/32X14X50#HS	662303050559
811005073	SW 10P 3/16X14X50#HS	662303050566

SUREWELD 10P PLUS AWS A5.1: E6010

FEATURES

Sureweld 10P-Plus is a modified version of the standard 10P electrode and can be differentiated by its gray coating. It has also been developed for the pipe welding industry but has a more consistent burn-off and a more forgiving arc burn. This provides a better bead profile and sidewall fusion with lower spatter. Sureweld 10P-Plus will maintain the proper keyhole in an open root and will produce X-ray quality joints in the flat, horizontal, overhead, vertical-up, and vertical-down procedures. Sureweld 10P-Plus is recommended for welding API grades A25, A, B and X42 pipe and general structural, ship, barge and storage tank fabrication. It may also be used for welding root passes in higher grade pipe in some circumstances.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	72.9 ksi, 503 MPa
Tensile Strength	86.9 ksi, 599 MPa
Elongation in 2”	25%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded	33 ft-lb, 45 J

CLASSIFICATIONS AND APPROVALS

- A.B.S.- AWS A5.1: E6010
- ASME SFA 5.1
- CERTIFIED BY C.W.B.- CSA W48
- AWS A5.1: E6010

WELD METAL ANALYSIS

C	0.15%
Mn	0.6%
Si	0.2%
P	0.01%
S	0.007%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Pipeline
- General Fabrication
- Civil Construction

SUREWELD 10P PLUS continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	75	40 - 75	1.5 (0.7)	72
1/8 (3.2)	100	80 - 140	2.1 (0.9)	76.3
	130	80 - 140	2.3 (1)	68.8
5/32 (4.0)	140	130 - 175	2.8 (1.3)	73.6
	170	130 - 175	2.9 (1.3)	64.1
3/16 (4.8)	160	150 - 210	3.3 (1.5)	74.9
	190	150 - 210	3.5 (1.6)	69.7

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
811004126	SW 10P PLUS 3/32X12X5#VALP	662303050337
811004084	SW 10P PLUS 3/32X12X11#QP	662303050399
811004001	SW 10P PLUS 3/32X12X25#CT	662303050405
811004043	SW 10P PLUS 3/32X12X50#HS	662303050412
811004134	SW 10P PLUS 1/8X14X5#VALP	662303050368
811004167	SW 10P PLUS 1/8X14X10#VALP	662303050351
811004092	SW 10P PLUS 1/8X14X11#QP	662303050375
811004019	SW 10P PLUS 1/8X14X50#CT	662303050382
811004050	SW 10P PLUS 1/8X14X50#CT	662303050313
811004142	SW 10P PLUS 5/32X14X5#VALP	662303050436
811004100	SW 10P PLUS 5/32X14X11#QP	662303050443
811004027	SW 10P PLUS 5/32X14X50#CT	662303050450
811004068	SW 10P PLUS 5/32X14X50#HS	662303050474
811004076	SW 10P PLUS 3/16X14X50#HS	662303050320

SUREWELD 710P AWS A5.5: E7010-P1

FEATURES

Sureweld 710P is an all-position cellulosic electrode that is especially suited for welding high strength pipe. It produces the consistent, deep penetration required to maintain a proper keyhole when vertical-down welding in open root pipe joints. X-ray quality joints can be produced with Sureweld 710P using flat, horizontal, overhead, vertical-up and vertical-down welding procedures. Sureweld 710P is recommended for welding API grades X46, X52, and X56 pipe. It may also be used for welding root passes in higher grade pipe in some circumstances.

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E7010-P1
- (CONFORMS TO E7010-G)
- ASME SFA 5.5
- CERTIFIED BY C.W.B.- CSA W48

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Pipeline Construction

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	69 ksi, 480 MPa
Tensile Strength	81 ksi, 560 MPa
Elongation in 2”	22%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded	29 ft-lb, 39 J
Testing Temperature -50°F (-46°C)	
As Welded	26 ft-lb, 35 J

WELD METAL ANALYSIS

C	0.1%
Mn	0.3%
Si	0.2%
P	0.008%
S	0.016%
Ni	0.5%
Mo	0.24%

SUREWELD 710P continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	75	40 - 75	1.5 (0.7)	72
1/8 (3.2)	100	80 - 140	2.1 (0.9)	76.3
	130	80 - 140	2.3 (1)	68.8
5/32 (4.0)	140	130 - 175	2.8 (1.3)	73.6
	170	130 - 175	2.9 (1.3)	64.1
3/16 (4.8)	160	150 - 210	3.3 (1.5)	74.9
	190	150 - 210	3.5 (1.6)	69.7

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
811070010	SW 710P 3/32X12X50#HS	662303041328
811070028	SW 710P 1/8X14X50#HS	662303027964
811070036	SW 710P 5/32X14X50#HS	662303027971
811070044	SW 710P 3/16X14X50#HS	662303027988

SUREWELD 810P AWS A5.5: E8010-P1

FEATURES

Sureweld 810P is an all-position cellulosic electrode that is especially suited for welding high strength pipe. It produces the consistent, deep penetration required to maintain a proper keyhole when vertical-down welding in open root pipe joints. X-ray quality joints can be produced with Sureweld 810P using flat, horizontal, overhead, vertical-up and vertical-down welding procedures. Sureweld 810P is recommended for welding API grades X60, X65, and X70 pipe.

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E8010-P1
- (CONFORMS TO E8010-G)
- ASME SFA 5.5
- CERTIFIED BY C.W.B.- CSA W48

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Pipeline

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	72 ksi, 500 MPa
Tensile Strength	88 ksi, 605 MPa
Elongation in 2”	24%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded	31 ft-lb, 42 J
Testing Temperature -50°F (-46°C)	
As Welded	25 ft-lb, 34 J

WELD METAL ANALYSIS

C	0.1%
Mn	0.5%
Si	0.24%
P	0.008%
S	0.014%
Ni	0.98%
Mo	0.1%

SUREWELD 810P continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
5/32 (4.0)	140	130 - 175	2.8 (1.3)	73.6
	170	130 - 175	2.9 (1.3)	64.1
3/16 (4.8)	160	150 - 210	3.3 (1.5)	74.9
	190	150 - 210	3.5 (1.6)	69.7

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
811070325	SW 810P 5/32X14X50#HS	662303028015
811070333	SW 810P 3/16X14X50#HS	662303028022

SUREWELD SW-14 AWS A5.1: E6011

FEATURES

Sureweld SW-14 is an all-position cellulosic electrode designed for AC. It produces an easily controlled forceful arc with deep penetration and a high quality weld metal which will pass specification requirements for radiography. SW-14 is used primarily for welding mild steels such as ASTM A-36, A-283, A-284, A-285, A-515, A-516 and ABS Hull and Boiler Steel. Typical applications include welding of buildings, piping, shipbuilding, pressure vessels and tanks. AC-DCEP (Electrode Positive)

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	66 ksi, 460 MPa
Tensile Strength	76 ksi, 525 MPa
Reduction in Area	56
Elongation in 2”	22%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded	31 ft-lb, 42 J

CLASSIFICATIONS AND APPROVALS

- AWS A5.1: E6011
- A.B.S.- AWS A5.1: E6011
- ASME SFA 5.1
- CERTIFIED BY C.W.B.- CSA W48

WELDING PROCESS

- SMAW (Stick)

WELD METAL ANALYSIS

C	0.1%
Mn	0.36%
Si	0.15%
P	0.012%
S	0.016%

INDUSTRIES

- General Fabrication
- Ship/Barge Building
- Tanks

SUREWELD SW-14 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	75	60 - 80	1.3 (0.6)	61
1/8 (3.2)	100	90 - 130	2.3 (1)	70.7
5/32 (4.0)	140	130 - 160	3.7 (1.7)	77
3/16 (4.8)	160	155 - 190	4.1 (1.9)	73.4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
811061274	SW 14 3/32X12X5#VALP	662303053598
811061308	SW 14 3/32X12X10#VALP	662303057527
811061803	SW 14 3/32X12X11#VALP	662303037970
811000306	SW 14 3/32X12X25#CT	662303018917
811061266	SW 14 1/8X14X5#VALP	662303053550
811061290	SW 14 1/8X14X10#VALP	662303057510
811061811	SW 14 1/8X14X11#VALP	662303037833
811000314	SW 14 1/8X14X50#CT	662303018924
811000249	SW 14 1/8X14X50#HS	662303018887
811061282	SW 14 5/32X14X5#VALP	662303057503
811061316	SW 14 5/32X14X10#VALP	662303057534
811061829	SW 14 5/32X14X11#VALP	662303037987
811000322	SW 14 5/32X14X50#CT	662303018931
811000256	SW 14 5/32X14X50#HS	662303018894
811000330	SW 14 3/16X14X50#CT	662303025182
811000264	SW 14 3/16X14X50#HS	662303018900

SUREWELD 6013-LV AWS A5.1: E6013

FEATURES

Sureweld 6013-LV is an all-position multi-purpose electrode designed for light duty applications. It is ideally suited for the hobbyist welder. The low voltage feature permits its use on AC power sources that have less than 50 open circuit volts. Sureweld 6013-LV can be used on thin gauge carbon and galvanized steels. It is an excellent choice for applications where offsets or fit-up is a problem.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	65 ksi, 450 MPa
Tensile Strength	74 ksi, 515 MPa
Reduction in Area	52%
Elongation in 2”	27%

CLASSIFICATIONS AND APPROVALS

- AWS A5.1: E6013
- ASME SFA 5.1
- CERTIFIED BY C.W.B.- CSA W48

WELD METAL ANALYSIS

C	0.08%
Mn	0.4%
Si	0.24%
P	0.02%
S	0.015%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Pipeline
- General Fabrication
- Home Hobbyist

SUREWELD 6013-LV continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	85	60 - 90	1.6 (0.7)	73
1/8 (3.2)	125	120 - 135	2.1 (1)	73
5/32 (4.0)	140	145 - 190	2.6 (1.2)	75.6
	160	145 - 190	3 (1.4)	74.1
	180	145 - 190	3.5 (1.6)	71.2

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
811061449	SW 6013LV 3/32X12X5#VALP	662303053574
811061480	SW 6013LV 3/32X12X10#VALP	662303064143
811062009	SW 6013LV 3/32X12X11#QP	662303038038
811061522	SW 6013LV 3/32X12X25#CT	662303019617
811061431	SW 6013LV 1/8X14X5#VALP	662303053567
811061472	SW 6013LV 1/8X14X10#VALP	662303057572
811062017	SW 6013LV 1/8X14X11#QP	662303037826
811061530	SW 6013LV 1/8X14X50#CT	662303019624
811062058	SW 6013LV 5/32X14X5#VALP	662303064204
811061571	SW 6013LV 5/32X14X10#VALP	662303064181
811062025	SW 6013LV 5/32X14X11#QP	662303038045
811061548	SW 6013LV 5/32X14X50#CT	662303019631

SUREWELD SW-15 IP AWS A5.1: E7014

FEATURES

Sureweld SW-15 IP is an iron powder coated electrode permitting the use of higher welding currents while improving the deposition rate. The use of an iron-powder coating also improves deposition efficiency. High speeds and high heats can be used without undercut. Slag removal is excellent. SW-15 IP is widely used for welding mild steels such as ASTM A-36, A-113, A-283, A-284, A-285, A-306, A-515 and A-516. Typical applications include construction equipment, metal fixtures, automotive parts, barges and farm machinery.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	61 ksi, 420 MPa
Tensile Strength	71 ksi, 490 MPa
Reduction in Area	64%
Elongation in 2”	28%

CLASSIFICATIONS AND APPROVALS

- AWS A5.1: E7014
- ASME SFA 5.1

WELD METAL ANALYSIS

C	0.04%
Mn	0.3%
Si	0.14%
P	0.015%
S	0.019%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Mibile Equipment
- Barges

SUREWELD SW-15 IP continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	85	70 - 100	2 (0.9)	60
1/8 (3.2)	120	100 - 150	2.4 (1.1)	63.9
	150	100 - 150	3.1 (1.4)	61.1
5/32 (4.0)	160	160 - 200	3 (1.4)	71.9
	200	160 - 200	3.7 (1.7)	67
3/16 (4.8)	230	190 - 270	4.5 (2)	70.9
	270	190 - 270	5.5 (2.5)	73.2

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
811041318	SW 15IP 3/32X12X5#VALP	662303057435
811041342	SW 15IP 3/32X12X10#VALP	662303057466
811001296	SW 15IP 3/32X12X25#CT	662303019075
811041300	SW 15IP 1/8X14X5#VALP	662303057428
811041334	SW 15IP 1/8X14X10#VALP	662303057459
811041375	SW 15IP 1/8X14X11#QP	662303038069
811001304	SW 15IP 1/8X14X50#CT	662303019082
811041326	SW 15IP 5/32X14X5#VALP	662303057442
811041359	SW 15IP 5/32X14X10#VALP	662303057558
811001312	SW 15IP 5/32X14X50#CT	662303019099
811001320	SW 15IP 3/16X14X50#CT	662303019105

SUREWELD 7024 AWS A5.1: E7024

FEATURES

Sureweld 7024 is a high speed, heavy-coated, iron powder electrode for high deposition rates on horizontal and downhand welding. Excellent operator appeal, produces equal 45° fillets, thereby eliminating over welding. Excellent bead appearance and self-cleaning slag. This electrode has good weldability and superior mechanical properties. It is particularly useful in obtaining increased penetration with little or no root porosity in horizontal or positioned fillets. Sureweld 7024 is ideal for making high speed horizontal fillet and lap welds on mild and some alloy steels, such as earthmoving and construction equipment, truck bodies, ships, barges and railcars. Sureweld 7024 exceeds the AWS A5.1 elongation% and Charpy v-notch requirements for 7024-1.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	71 ksi, 490 MPa
Tensile Strength	81 ksi, 550 MPa
Reduction in Area	63%
Elongation in 2”	26%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded	25 ft-lb, 34 J

CLASSIFICATIONS AND APPROVALS

- AWS A5.1: E7024A.B.S.- 2,2Y
- (CONFORMS TO E7024-1)
- ASME SFA 5.1
- CERTIFIED BY C.W.B.- CSA W48

WELDING PROCESS

- SMAW (Stick)

WELD METAL ANALYSIS

C	0.06%
Mn	0.8%
Si	0.3%
P	0.01%
S	0.018%

INDUSTRIES

- General Fabrication
- Ship and Barge Building
- Mibile Equipment
- Railcars

SUREWELD 7024 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
1/8 (3.2)	140	130 - 180	4.2 (1.9)	71.8
	180	130 - 180	5.1 (2.3)	70.7
5/32 (4.0)	180	180 - 240	5.3 (2.4)	71.3
	210	180 - 240	6.3 (2.9)	72.5
	240	180 - 240	7.2 (3.3)	69.4
3/16 (4.8)	245	250 - 290	7.5 (3.4)	69.2
	270	250 - 290	8.3 (3.8)	70.5
	290	250 - 290	9.1 (4.1)	68
7/32 (5.6)	320	300 - 340	9.4 (4.3)	72.4
	360	300 - 340	11.6 (5.3)	69.1
1/4 (6.4)	400	350 - 400	12.6 (5.7)	71.7

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
811041755	SW 7024 1/8X14X11#QP	662303039813
811010214	SW 7024 1/8X14X50#CT	662303019303
811010222	SW 7024 5/32X14X50#CT	662303019310
811010230	SW 7024 3/16X18X50#CT	662303019327
811010248	SW 7024 7/32X18X50#CT	662303019334
811010255	SW 7024 1/4X18X50#CT	662303019341

Additional Products

- Sureweld SW 75
- Sureweld 70 LA2
- Sureweld SW-612

For additional information on the above products, please visit us at www.esabna.com

Electrode Dimension Conversion Chart

Diameter		Length	
Inches	mm	Inches	mm
5/64	2.0	12	300
3/32	2.4	12	300
1/6	3.2	14	350
5/32	4.0	14	350
3/16	4.8	14	350
7/32	5.6	18	450
1/4	6.4	18	450
5/16	8.0	18	450

Sureweld Coated Electrode Deposition Data and Current Ranges*

Electrode Diameter in (mm)		Current Range Amps	Optimum Current Amps	Deposition Rate lb/hr (kg/hr)		Efficiency %
E6010/E7010-A1/E7010-P1/E8010-P1						
3/32	(2.4)	40-75	75	1.5	(0.7)	72.0
1/8	(3.2)	80-140	100	2.1	(0.9)	76.3
		80-140	130	2.3	(1.0)	68.8
5/32	(4.0)	130-175	140	2.8	(1.3)	73.6
		130-175	170	2.9	(1.3)	64.1
3/16	(4.8)	150-210	160	3.3	(1.5)	74.9
		150-210	190	3.5	(1.6)	69.7
7/32	(5.6)	180-275	190	4.5	(2.0)	76.9
		180-275	230	5.1	(2.3)	73.1
E6011						
3/32	(2.4)	60-80	75	1.3	(0.6)	61.0
1/8	(3.2)	90-130	120	2.3	(1.0)	70.7
5/32	(4.0)	130-160	150	3.7	(1.7)	77.0
3/16	(4.8)	155-190	180	4.1	(1.9)	73.4
7/32	(5.6)	175-220	210	5.0	(2.3)	74.2
1/4	(6.4)	225-260	250	5.6	(2.5)	71.9
E6012						
1/8	(3.2)	110-140	130	2.9	(1.3)	81.8
5/32	(4.0)	140-200	165	3.2	(1.5)	78.8
		140-200	200	3.4	(1.5)	69.0
3/16	(4.8)	150-280	220	4.0	(1.8)	77.0
		150-280	250	4.2	(1.9)	74.5
7/32	(5.6)	180-300	320	5.6	(2.5)	69.8
1/4	(6.4)	300-400	320	5.6	(2.5)	70.0
		300-400	360	6.6	(3.0)	67.7
		300-400	380	7.1	(3.2)	66.0

Note: Efficiencies for coated electrodes do not include stub loss.

Sureweld Coated Electrode Deposition Data and Current Ranges*

Electrode Diameter in (mm)	Current Range Amps	Optimum Current Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
E6013/E6013LV				
5/64 (2.0)	40-60	50	1.4 (0.6)	73.0
3/32 (2.4)	60-90	85	1.6 (0.7)	73.0
1/8 (3.2)	120-135	125	2.1 (1.0)	73.0
5/32 (4.0)	145-190	140	2.6 (1.2)	75.6
	145-190	160	3.0 (1.4)	74.1
	145-190	180	3.5 (1.6)	71.2
3/16 (4.8)	170-230	180	3.2 (1.5)	73.9
	170-230	200	3.8 (1.7)	71.1
	170-230	220	4.1 (1.9)	72.9
7/32 (5.6)	260-300	250	5.3 (2.4)	71.3
	260-300	270	5.7 (2.6)	73.0
	260-300	290	6.1 (2.8)	72.7
1/4 (6.4)	300-340	290	6.2 (2.8)	75.0
	300-340	310	6.5 (2.9)	73.5
	300-340	330	7.1 (3.2)	72.1
E7014				
3/32 (2.4)	70-100	85	2.0 (0.9)	60.0
1/8 (3.2)	100-150	120	2.4 (1.1)	63.9
	100-150	150	3.1 (1.4)	61.1
5/32 (4.0)	160-200	160	3.0 (1.4)	71.9
	160-200	200	3.7 (1.7)	67.0
3/16 (4.8)	190-270	230	4.5 (2.0)	70.9
	190-270	270	5.5 (2.5)	73.2
7/32 (5.6)	230-300	290	5.8 (2.6)	67.2
	230-300	330	7.1 (3.2)	70.3
1/4 (6.4)	250-350	350	7.1 (3.2)	68.7
	250-350	400	8.7 (3.9)	69.9
E7016				
3/32 (2.4)	70-100	85	1.6 (0.7)	73.0
1/8 (3.2)	110-140	100	1.7 (0.8)	63.9
	110-140	130	2.3 (1.0)	65.8
5/32 (4.0)	140-200	140	3.0 (1.4)	70.5
	140-200	160	3.2 (1.5)	69.1
	140-200	190	3.6 (1.6)	66.0
3/16 (4.8)	175-250	175	3.8 (1.7)	71.0
	175-250	200	4.2 (1.9)	71.0
	175-250	225	4.4 (2.0)	70.0
	175-250	250	4.8 (2.2)	65.8
1/4 (6.4)	300-350	250	5.9 (2.7)	74.5
	300-350	275	6.4 (2.9)	74.1
	300-350	300	6.8 (3.1)	73.2
	300-350	350	7.6 (3.4)	71.5

Note: Efficiencies for coated electrodes do not include stub loss.

Sureweld Coated Electrode Deposition Data and Current Ranges*

Electrode Diameter in (mm)	Current Range Amps	Optimum Current Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
E7024/7024-1				
1/8 (3.2)	130-180	140	4.2 (1.9)	71.8
	130-180	180	5.1 (2.3)	70.7
5/32 (4.0)	180-240	180	5.3 (2.4)	71.3
	180-240	210	6.3 (2.9)	72.5
	180-240	240	7.2 (3.3)	69.4
3/16 (4.8)	250-290	245	7.5 (3.4)	69.2
	250-290	270	8.3 (3.8)	70.5
	250-290	290	9.1 (4.1)	68.0
7/32 (5.6)	300-340	320	9.4 (4.3)	72.4
	300-340	360	11.6 (5.3)	69.1
1/4 (6.4)	350-400	400	12.6 (5.7)	71.7

Note: Efficiencies for coated electrodes do not include stub loss.

Stub Loss Correction Table for Coated Electrodes

Deposition Efficiency	2" (50 mm) STUB	3" (75 mm) STUB	4" (100 mm) STUB	5" (125 mm) STUB
12" (300 mm) Electrode				
60%	50.0%	45.0%	40.0%	35.0%
65%	54.2%	48.7%	43.3%	37.9%
70%	58.3%	52.5%	46.6%	40.8%
75%	62.5%	56.2%	50.0%	43.7%
80%	66.6%	60.0%	53.3%	46.6%
14" (350 mm) Electrode				
60%	51.4%	47.1%	42.8%	38.5%
65%	55.7%	51.1%	46.4%	41.8%
70%	60.0%	55.0%	50.0%	45.0%
75%	64.3%	58.9%	53.6%	48.2%
80%	68.5%	62.8%	57.1%	51.4%
18" (450 mm) Electrode				
60%	53.3%	50.0%	46.6%	43.3%
65%	57.7%	54.2%	50.5%	46.9%
70%	62.2%	58.3%	54.4%	50.5%
75%	66.6%	62.5%	58.3%	54.2%
80%	71.1%	66.6%	62.2%	57.7%

Sureweld Covered Electrode per lb (kg)

Diameter in (mm)	5/64 (2.0)	3/32 (2.4)	1/8 (3.2)	5/32 (4.0)	3/16 (4.8)		7/32 (5.6)	1/4 (6.4)
Length in (mm)	12 (300)	12 (300)	14 (350)	14 (350)	14 (350)	18 (450)	18 (450)	18 (450)
10P		35.3 (78)	17.1 (38)	11.2 (25)	7.9 (17)			
10P-Plus		35.3 (78)	17.1 (38)	11.2 (25)	7.9 (17)			
710P		35.3 (78)	17.1 (38)	11.2 (25)	7.9 (17)			
810P		35.3 (78)	17.1 (38)	11.2 (25)	7.9 (17)			
SW-14		36.1 (80)	17.5 (39)	11.6 (26)	8.0 (18)		4.6 (10)	3.4 (7.5)
SW-612			15.2 (34)	10.5 (23)	7.6 (17)			2.1 (4.6)
SW-15		35.4 (80)	17.2 (38)	11.1 (24)	7.6 (17)		4.3 (9.5)	3.3 (7.3)
6013LV	46.3 (102)	35.4 (80)	17.2 (38)	11.1 (24)				
SW-75		35.6 (81)	17.3 (38)	11.2 (25)	7.9 (17)			
SW-15 IP		27.9 (62)	13.3 (29)	9.2 (20)	6.3 (14)		3.5 (7.7)	2.8 (6.2)
70 LA-2			14.5 (32)	9.7 (21)	7.0 (15)			3.1 (6.8)
7024			9.7 (21)	6.2 (14)	3.4 (7.5)		2.5 (5.5)	2.0 (4.4)

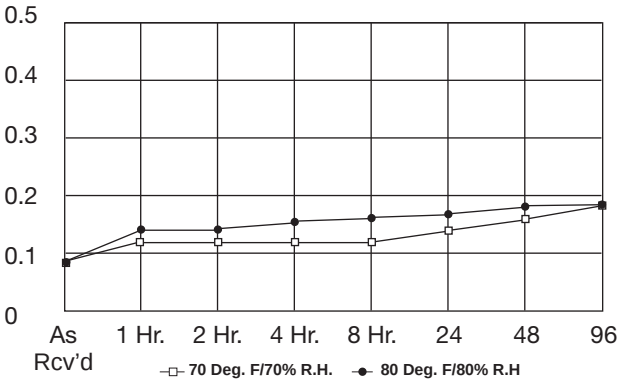
ATOM ARC® Iron Powder Low Hydrogen Electrodes

The introduction of iron powder into low hydrogen electrodes greatly increased productivity, making the use of Atom Arc for most welding operations more than competitive with common mild steel electrodes in overall cost. The real advantage of course is that by improving the efficiency of welding operations, fabricators have a means of equalizing increasing overhead and labor costs.

Moisture Resistant Coating

Atom Arc electrodes are manufactured with a flux coating that effectively resists moisture pick-up for many hours after the container is opened. This improved coating provides an extra degree of reliability, especially for electrodes exposed to high temperature, high humidity working conditions.

Typical% Moisture in Atom Arc Coatings



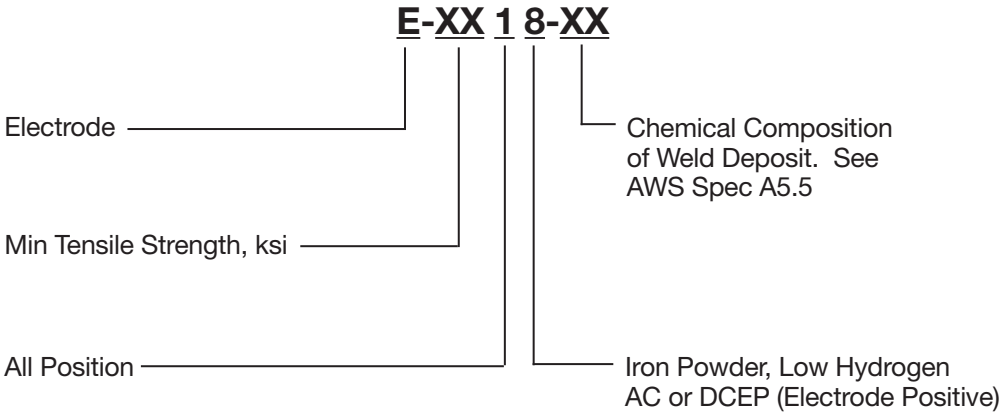
It should be noted that even though Atom Arc electrodes resist moisture pick-up longer than ever before, no moisture resistant electrode will eliminate the need for storage and rebake ovens or the necessity to follow code requirements for allowable exposure times.

The graph above shows the rate of moisture pick-up of Atom Arc electrodes.

Electrode Storage

Unopened containers can be stored safely for an indefinite length of time under normal dry storage conditions. They should be protected from humid air after the container is opened by being kept at 225°F to 300°F, (107°C to 149°C) or if the need arises, they can be reconditioned by baking for one hour at 700°F (371°C).

AWS Filler Metal Specification A5.5
Low Alloy Steel Covered Electrodes



ATOM ARC 7018 AWS A5.1: E7018

FEATURES

Atom Arc 7018 is an all-position low hydrogen moisture resistant electrode. The wider operating ranges and smooth weld metal transfer minimizes post weld clean up. This premium quality electrode meets a multitude of codes and welding specifications. Atom Arc 7018 was developed to weld carbon and low-alloy steels, including a variety of hardenable steels.

CLASSIFICATIONS AND APPROVALS

- CERTIFIED BY C.W.B.- CSA W48
- ASME SFA 5.1
- L.R.- 3m,3Ym(H10)
- D.N.V.- 3Y(H10)
- A.B.S.- 2Y / AWS A5.1: E7018
- AWS A5.1: E7018H4R
- Mil-E-22200/1 Mil-7018

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Automotive
- Rail Road Car
- Bridge Construction
- General Fabrication
- Civil Construction
- Shipbuilding
- Mobile Machinery

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	68 ksi, 470 MPa
Tensile Strength	78 ksi, 540 MPa
Elongation in 2”	30%
Reduction in Area	75%
Stress Relieved 8 hrs. @ 1150°F (621°C)	
Yield Strength	57 ksi, 395 MPa
Tensile Strength	70 ksi, 485 MPa
Reduction in Area	77%
Elongation in 2”	33%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded	168 ft-lb, 225 J
Stress Relieved 8 hrs. @ 1150°F (621°C)	
	193 ft-lb, 260 J

WELD METAL ANALYSIS

C	0.045%
Mn	1.1%
Si	0.4%
P	0.015%
S	0.014%

ATOM ARC 7018 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.4)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74
1/4 (6.4)	300	300 - 400	7.7 (3.5)	78
	350	300 - 400	8.7 (3.9)	77

ATOM ARC 7018 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255015521	AA 7018 3/32X14X5#VALP	662303029050
255015554	AA 7018 3/32X14X10#VALP	662303029081
255013328	AA 7018 3/32X14X10#HS	662303016197
255014201	AA 7018 3/32X14X11#QP	662303028961
255013310	AA 7018 3/32X14X50#HS	662303016180
255015505	AA 7018 1/8X14X5#VALP	662303029036
255015539	AA 7018 1/8X14X10#VALP	662303029067
255011827	AA 7018 1/8X14X10#HS	662303016098
255014219	AA 7018 1/8X14X11#QP	662303028978
255011819	AA 7018 1/8X14X50#HS	662303016081
255015513	AA 7018 5/32X14X5#VALP	662303029043
255015547	AA 7018 5/32X14X10#VALP	662303029074
255015323	AA 7018 5/32X14X10#HS	662303016388
255014227	AA 7018 5/32X14X11#QP	662303028985
255015315	AA 7018 5/32X14X50#HS	662303016371
255015562	AA 7018 3/16X14X10#VALP	662303063658
255013120	AA 7018 3/16X14X10#HS	662303016142
255014235	AA 7018 3/16X14X11#QP	662303028992
255013112	AA 7018 3/16X14X50#HS	662303016135
255017311	AA 7018 7/32X18X50#HS	662303016548
255011413	AA 7018 1/4X18X50#HS	662303016043

ATOM ARC 7018 ACCLAIM AWS A5.1: E7018

FEATURES

This newest addition to the family offers the deep, penetrating arc and tough mechanical properties of the original Atom Arc 7018 with greater puddle control resulting in ease of use in out-of-position welding applications and superior arc initiation desired by many newer welders. Both novice and seasoned welders can appreciate its excellent weld performance, wide operating range and easy clean up. Greater puddle control resulting in easier out-of-position welds, superior arc initiation and ease of use with wider operating range and minimal clean-up

TYPICAL MECHANICAL PROPERTIES

Yield Strength	65 ksi, 450 MPa
Tensile Strength	79 ksi, 550 MPa
Elongation% in 2”	36%

CLASSIFICATIONS AND APPROVALS

- D.N.V.- 3Y(H10)
- ASME SFA 5.1
- A.B.S.- 2Y / AWS A5.1: E7018
- AWS A5.1: E7018H4R
- Mil-E-22200/1 Mil-7018
- CERTIFIED BY C.W.B.- CSA W48
- L.R.- 3m,3Ym(H10)

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (29°C)	
	170 ft-lbs, 230 J

WELDING PROCESS

- SMAW (Stick)

WELD METAL ANALYSIS

C	0.05%
Mn	1.20%
Si	0.45%
P	0.011%
S	0.008%

INDUSTRIES

- Civil Construction
- Mobile Machinery
- Shipbuilding
- Bridge Construction
- Rail Road Car
- Automotive
- General Fabrication

ATOM ARC 7018 ACCLAIM continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.4)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255012080	7018 Acclaim, 3/32 x 14 x 5# VALP	
255012049	7018 Acclaim, 3/32 x 14 x 10# HSC	
255012007	7018 Acclaim 3/32 x 14 x 50# HSC	662303084646
255012098	7018 Acclaim, 1/8 x 14 x 5# VALP	
255012056	7018 Acclaim 1/8x 14 x 10# HSC	
255012015	7018 Acclaim 1/8x 14 x 50# HSC	662303084134
255012106	7018 Acclaim, 5/32 x 14 x 5# VALP	
255012064	7018 Acclaim, 5/32 x 14 x 10# HSC	
255012023	7018 Acclaim 5/32 x 14 x 50# HSC	662303085209
255012072	7018 Acclaim, 3/16 x 14 x 10# HSC	
255012031	7018 Acclaim, 3/16 x 14 x 50# HSC	

ATOM ARC 7018-AC AWS A5.1: E7018

FEATURES

Atom Arc 7018-AC is a product specifically designed to have optimum arc characteristics when used with AC power sources having an open circuit voltage of 75 to 80V. Compared to standard Atom Arc 7018 operating on AC, this electrode will have easier arc starting and restrike, a smoother arc and lower spatter. It is usable on a wide range of steels.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	77 ksi, 535 MPa
Tensile Strength	86 ksi, 595 MPa
Elongation in 2”	29%
Reduction in Area	72%

CLASSIFICATIONS AND APPROVALS

- AWS A5.1: E7018
- ASME SFA 5.1

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded	46 ft-lb, 60 J

WELDING PROCESS

- SMAW (Stick)

WELD METAL ANALYSIS

C	0.05%
Mn	0.9%
Si	0.3%
P	0.014%
S	0.015%

INDUSTRIES

- Civil Construction
- General Fabrication

ATOM ARC 7018-AC continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.4)	75
	170	130 - 220	3.8 (1.7)	73.5

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255028631	AA 7018-AC 3/32X14X5#VALP	662303029142
255028656	AA 7018-AC 3/32X14X10#VALP	662303029166
255028581	AA 7018-AC 3/32X14X10#HS	662303016623
255028680	AA 7018-AC 3/32X14X11#QP	662303029197
255028508	AA 7018-AC 3/32X14X50#HS	662303016586
255028623	AA 7018-AC 1/8X14X5#VALP	662303029135
255028649	AA 7018-AC 1/8X14X10#VALP	662303029159
255028573	AA 7018-AC 1/8X14X10#HS	662303016616
255028698	AA 7018-AC 1/8X14X11#QP	662303037819
255028516	AA 7018-AC 1/8X14X50#HS	662303016593
255028664	AA 7018-AC 5/32X14X5#VALP	662303029173
255028672	AA 7018-AC 5/32X14X10#VALP	662303029180
255028599	AA 7018-AC 5/32X14X10#HS	662303016630
255028524	AA 7018-AC 5/32X14X50#HS	662303016609

ATOM ARC 7018-1 AWS A5.1: E7018-1H4R

FEATURES

Atom Arc 7018-1 is an all-position, low hydrogen electrode that provides exceptional impact toughness at low service temperatures. Atom Arc 7018-1 provides smooth metal transfer, minimal spatter, and easy slag removal. Atom Arc 7018-1 is used to join a wide variety of carbon and low alloy steels. It is also an excellent choice for welding higher strength steels if undermatching welds are specified.

CLASSIFICATIONS AND APPROVALS

- AWS A5.1:E7018-1H4R
- D.N.V.- 3Y (H10)
- L.R.- 3m,3Ym (H10)
- ASME SFA 5.1
- A.B.S.-3,3Y(H10)/A5.1: E7018-1
- CERTIFIED BY C.W.B.- CSA W48

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Mobile Machinery
- Rail Road Car
- General Fabrication
- Automotive
- Civil Construction

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	69 ksi, 475 MPa
Tensile Strength	81 ksi, 565 MPa
Elongation in 2”	30%
Reduction in Area	72%
Stress Relieved 8 hrs. @ 1150°F (621°C)	
Yield Strength	60 ksi, 415 MPa
Tensile Strength	74 ksi, 510 MPa
Reduction in Area	72%
Elongation in 2”	33%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -50°F (-46°C)	
As Welded	104 ft-lb, 141 J
Stress Relieved 8 hrs. @ 1150°F (621°C)	
	165 ft-lb, 224 J

WELD METAL ANALYSIS

C	0.04%
Mn	1.3%
Si	0.3%
P	0.014%
S	0.015%

ATOM ARC 7018-1 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.4)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74
1/4 (6.4)	300	300 - 400	7.7 (3.5)	78
	350	300 - 400	8.7 (3.9)	77

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255013351	AA 7018-1 3/32X14X10#HS	662303016210
255013344	AA 7018-1 3/32X14X50#HS	662303016203
255011850	AA 7018-1 1/8X14X10#HS	662303016111
255011306	AA 7018-1 1/8X14X11#QP	662303028862
255011843	AA 7018-1 1/8X14X50#HS	662303016104
255015356	AA 7018-1 5/32X14X10#HS	662303016401
255015349	AA 7018-1 5/32X14X50#HS	662303016395
255013153	AA 7018-1 3/16X14X10#HS	662303016166
255013146	AA 7018-1 3/16X14X50#HS	662303016159
255017345	AA 7018-1 7/32X18X50#HS	662303016562
255011447	AA 7018-1 1/4X18X50#HS	662303016067

ATOM ARC 7018-SR AWS A5.1: E7018H4R

FEATURES

Atom Arc 7018-SR is an all-position low hydrogen electrode. The moisture resistance and welder appeal is similar to other Atom Arc electrodes. Atom Arc 7018-SR was developed to maintain 70 ksi (483 MPa) tensile strength after 16 hours stress relieving.

CLASSIFICATIONS AND APPROVALS

- AWS A5.1: E7018H4R
- ASME SFA 5.1

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Mobile Machinery
- Power Generation
- Civil Construction
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	68 ksi, 475 MPa
Tensile Strength	83 ksi, 575 MPa
Elongation in 2”	32%
Reduction in Area	76%
Stress Relieved 8 hrs. @ 1150°F (621°C)	
Yield Strength	61 ksi, 420 MPa
Tensile Strength	76 ksi, 520 MPa
Reduction in Area	76%
Elongation in 2”	35%
Stress Relieved 16 hrs. @ 1150°F (621°C)	
Yield Strength	59 ksi, 405 MPa
Tensile Strength	74 ksi, 510 MPa
Reduction in Area	77%
Elongation in 2”	35%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded	114 ft-lb, 195 J
Stress Relieved 8 hrs. @ 1150°F (621°C)	
	133 ft-lb, 180 J
Stress Relieved 16 hrs. @ 1150°F (621°C)	
	185 ft-lb, 250 J

WELD METAL ANALYSIS

C	0.06%
Mn	1.3%
Si	0.3%
P	0.014%
S	0.014%
Mo	0.1%

ATOM ARC 7018-SR continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.4)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255325078	AA 7018-SR 3/32X14X10#HS	662303016760
255325003	AA 7018-SR 3/32X14X50#HS	662303016692
255325003-21	AA 7018-SR 3/32X14X50#HS S/L	662303057206
255325011	AA 7018-SR 1/8X14X50#HS	662303016708
255325011-21	AA 7018-SR 1/8X14X50#HS S/L	662303057190
255325029	AA 7018-SR 5/32X14X50#HS	662303016715
255325029-21	AA 7018-SR 5/32X14X50#HS	662303059699
255325037	AA 7018-SR 3/16X14X50#HS	662303016722
255325037-21	AA 7018-SR 3/16X14X50#HS S/L	662303057275

ATOM ARC 7018-Mo AWS A5.5: E7018-A1

FEATURES

Atom Arc 7018-Mo electrodes contain 0.5% Mo as alloy addition. They are recommended for welding low-alloy, high tensile steels of 50 ksi (345 MPa) minimum yield strength and also 0.5% Molybdenum steels and pipes. They are widely employed in the fabrication and erection of boilers, pressure piping and tubing and other pressure vessel applications.

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.5
- A.B.S.- AWS A5.5: E7018-A1
- AWS A5.5: E7018-A1H4R

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Civil Construction
- Mobile Machinery
- Power Generation
- General Fabrication

WELD METAL ANALYSIS

C	0.04%
Mn	0.8%
Si	0.4%
P	0.012%
S	0.01%
Mo	0.55%

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	77 ksi, 530 MPa
Tensile Strength	87 ksi, 600 MPa
Elongation% in 2”	27%
Stress Relieved 1 hr @ 1150°F (620°C)	
Yield Strength	75 ksi, 518 MPa
Tensile Strength	88 ksi, 607 MPa
Elongation% in 2”	29%
Stress Relieved 8 hrs @ 1150°F (620°C)	
Yield Strength	76 ksi, 524 MPa
Tensile Strength	88 ksi, 607 MPa
Elongation% in 2”	28%
Stress Relieved 20 hrs @ 1150°F (620°C)	
Yield Strength	73 ksi, 504 MPa
Tensile Strength	85 ksi, 587 MPa
Elongation% in 2”	29%

CHARPY V-NOTCH PROPERTIES

Testing Temperature @ 60°F (15°C)
Stress Relieved 20 hrs. @ 1150°F (620°C)
150 ft-lb, 203 J
Testing Temperature @ 30°F (0°C)
Stress Relieved 8 hrs. @ 1150°F (620°C)
108 ft-lb, 146 J
Testing Temperature @ 10°F (-10°C)
Stress Relieved 13 hrs. @ 1150°F (620°C)
135 ft-lb, 183 J
Testing Temperature @ -20°F (-30°C)
Stress Relieved 8 hrs. @ 1150°F (620°C)
69 ft-lb, 94 J

ATOM ARC 7018-Mo continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.4)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255023327	AA 7018-MO 3/32X14X10#HS	662303016869
255023319	AA 7018-MO 3/32X14X50#HS	662303016852
255021826	AA 7018-MO 1/8X14X10#HS	662303016821
255021818	AA 7018-MO 1/8X14X50#HS	662303016814
255025322	AA 7018-MO 5/32X14X10#HS	662303016883
255025314	AA 7018-MO 5/32X14X50#HS	662303016876
255023111	AA 7018-MO 3/16X14X50#HS	662303016838
255027310	AA 7018-MO 7/32X18X50#HS	662303016890
255021412	AA 7018-MO 1/4X18X50#HS	662303016791

ATOM ARC 8018-CM AWS A5.5: E8018-B2H4R

FEATURES

Atom Arc 8018-CM electrodes contain 1.25% Cr and 0.50% Mo as alloy addition. They are used for the welding of such steels as 0.5% Cr - 0.5% Mo, 1% Cr - 0.5% Mo, and 1.25% Cr - 0.5% Mo, which are used principally in power piping and boiler work for the fabrication of plates, pipes, tubes, castings, and forgings.

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E8018-B2H4R
- MILITARY-MIL-E-22200/8; MIL-8018-B2
- A.B.S.- AWS A5.5: E8018-B2
- ASME SFA 5.5

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Power Generation
- Pipeline
- Pressure Vessels

WELD METAL ANALYSIS

C	0.06%
Mn	0.8%
Si	0.5%
P	0.011%
S	0.008%
Cr	1.3%
Mo	0.57%
X-Factor	< 15

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 8 hrs @ 1150°F (620°C)	
Yield Strength	88 ksi, 607 MPa
Tensile Strength	102 ksi, 704 MPa
Elongation% in 2”	24%
Stress Relieved 1 hr @ 1275°F (690°C)	
Yield Strength	84 ksi, 580 MPa
Tensile Strength	97 ksi, 669 MPa
Elongation% in 2”	25%
Stress Relieved 8 hrs @ 1275°F (690°C)	
Yield Strength	82 ksi, 566 MPa
Tensile Strength	96 ksi, 662 MPa
Elongation% in 2”	26%
Stress Relieved 1 hr @ 1300°F (705°C)	
Yield Strength	90 ksi, 621 MPa
Tensile Strength	93 ksi, 642 MPa
Elongation% in 2”	25%

CHARPY V-NOTCH PROPERTIES

Testing Temperature @ 30°F (0°C)
Stress Relieved 8 hrs. @ 1125°F (607°C)
80 ft-lb, 108 J
Testing Temperature @ 30°F (0°C)
Stress Relieved 8 hrs. @ 1150°F (620°C)
83 ft-lb, 113 J
Testing Temperature @ 30°F (0°C)
Stress Relieved 8 hrs. @ 1250°F (677°C)
98 ft-lb, 133 J

ATOM ARC 8018-CM continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74
1/4 (6.4)	300	300 - 400	7.7 (3.5)	78
	350	300 - 400	8.7 (3.9)	77

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255053324	AA 8018-CM 3/32X14X10#HS	662303017248
255053316	AA 8018-CM 3/32X14X50#HS	662303017231
255053316-21	AA 8018-CM 3/32X14X50#HS S/L	662303057732
255051823	AA 8018-CM 1/8X14X10#HS	662303017200
255051815	AA 8018-CM 1/8X14X50#HS	662303017194
255051815-21	AA 8018-CM 1/8X14X50#HS S/L	662303055240
255051443	AA 8018-CM 1/8X14X50#HS XF	662303081317
255055329	AA 8018-CM 5/32X14X10#HS	662303017262
255055311	AA 8018-CM 5/32X14X50#HS	662303017255
255051518	AA 8018-CM 5/32X14X50#HS XF	662303081324
255053126	AA 8018-CM 3/16X14X10#HS	662303017224
255053118	AA 8018-CM 3/16X14X50#HS	662303017217
255057317	AA 8018-CM 7/32X18X50#HS	662303017279
255051419	AA 8018-CM 1/4X18X50#HS	662303017187

ATOM ARC 7018-B2L AWS A5.5: E7018-B2LH4R

FEATURES

Atom Arc 7018-B2L is a 1 1/4 Cr - 1/2 Mo electrode with sensitivity extra low carbon content. The low carbon content in the weld metal is beneficial in reducing cracking of weldments. Atom Arc 7018-B2L is carefully engineered to produce a stable arc and good slag release when welding low-alloy steels in the categories of 0.5% Cr - 0.5% Mo, 1% Cr - 0.5% Mo, 1.25% Cr - 0.5% Mo steels. Most grades of these steels are used in power piping, boiler work, castings and forgings

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr. @ 1275°F (691°C)	
Yield Strength	74 ksi, 510 MPa
Tensile Strength	88 ksi, 607 MPa
Elongation in 2”	29%

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E7018-B2LH4R
- ASME SFA 5.5

WELD METAL ANALYSIS

C	0.04%
Mn	0.8%
Si	0.5%
P	0.010%
S	0.008%
Cr	1.27%
Mo	0.54%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Pipeline
- Power Generation

ATOM ARC 7018-B2L continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255183329	AA 7018-B2L 3/32X14X10#HS	662303018498
255183311	AA 7018-B2L 3/32X14X50#HS	662303018481
255181828	AA 7018-B2L 1/8X14X10#HS	662303018450
255181810	AA 7018-B2L 1/8X14X50#HS	662303018443
255185316	AA 7018-B2L 5/32X14X50#HS	662303018504
255183113	AA 7018-B2L 3/16X14X50#HS	662303018467
255187312	AA 7018-B2L 7/32X18X50#HS	662303018528

ATOM ARC 8018-B3L AWS A5.5: E8018-B3LH4R

FEATURES

Atom Arc 8018-B3L electrodes contain 2.25% Cr and 1% Mo alloy additions with low carbon content. The electrode is designed for welding 2.25% Cr - 1% Mo steels. The rod operates with a very stable arc and minimal spatter. The low carbon analysis of the weld metal contributes to its crack resistance. The addition of Cr and Mo provide for the excellent creep and stress rupture properties of weldments subjected to elevated temperature service.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr. @ 1275°F (691°C)	
Yield Strength	78 ksi, 538 MPa
Tensile Strength	93 ksi, 641 MPa
Elongation in 2”	25%

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E8018-B3LH4R
- ASME SFA 5.5

WELD METAL ANALYSIS

C	0.04%
Mn	0.7%
Si	0.4%
P	0.017%
S	0.015%
Cr	2.3%
Mo	1.1%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Mobile Machinery
- Pipeline
- Power Generation

ATOM ARC 8018-B3L continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9%
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255173320	AA 8018-B3L 3/32X14X10#HS	662303018351
255173312	AA 8018-B3L 3/32X14X50#HS	662303018344
255171829	AA 8018-B3L 1/8X14X10#HS	662303018313
255171811	AA 8018-B3L 1/8X14X50#HS	662303018306
255175325	AA 8018-B3L 5/32X14X10#HS	662303018375
255175317	AA 8018-B3L 5/32X14X50#HS	662303018368
255173114	AA 8018-B3L 3/16X14X50#HS	662303018320

ATOM ARC 8018-B6L AWS A5.5: E8018-B6LH4R

FEATURES

Atom Arc 8018-B6L deposits a low carbon 5% Cr, 0.5% Mo weld metal. It is designed for welding ASTM A200-T5, A335-P5, A387-Gr5 and similar steels. Applications tend to be in the petrochemical and petroleum industries, especially where hydrogen attack accelerates metal failure. Additionally, these steels are used in pressure vessels and piping for high temperature service.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr. @ 1375°F (746°C)	
Yield Strength	95 ksi, 655 MPa
Tensile Strength	81 ksi, 558 MPa
Elongation	25%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.5
- MILITARY MIL-22200/8; MIL-E-502-15
- AWS A5.5: E8018-B6LH4R

WELD METAL ANALYSIS

C	0.04%
Mn	0.6%
Si	0.6%
P	0.015%
S	0.011%
Cr	5.4%
Ni	0.05%
Mo	0.6%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Pipeline
- Power Generation

ATOM ARC 8018-B6L continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255187809	AA 8018-B6L 3/32X14X10#HS	662303041342
255187817	AA 8018-B6L 1/8X14X10#HS	662303041359
255187825	AA 8018-B6L 5/32X14X10#HS	662303041366

ATOM ARC 9018-CM AWS A5.5: E9018-B3H4R

FEATURES

The principal application of Atom Arc 9018-CM electrodes is for welding 2.5% Cr - 1% Mo steels commonly found in pressure vessels, heat exchangers, pipings and other related components.

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E9018-B3H4R
- MILITARY-MIL-E-0022200/8; MIL-9018-B3
- A.B.S.- AWS A5.5: E9018-B3
- ASME SFA 5.5

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Power Generation
- Pipeline

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr @ 1275°F (690°C)	
Yield Strength	85 ksi, 587 MPa
Tensile Strength	102 ksi, 704 MPa
Elongation% in 2”	23%
Stress Relieved 8 hrs @ 1275°F (690°C)	
Yield Strength	82 ksi, 566 MPa
Tensile Strength	97 ksi, 669 MPa
Elongation% in 2”	26%
Stress Relieved 20 hrs @ 1275°F (690°C)	
Yield Strength	85 ksi, 587 MPa
Tensile Strength	100 ksi, 690 MPa
Elongation% in 2”	22%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 30°F (-1°C)	
As Welded	36 ft-lb, 495 J
Stress Relieved 8 hrs. @ 1275°F (685°C)	
	97 ft-lb, 131 J

WELD METAL ANALYSIS

C	0.07%
Mn	0.7%
Si	0.4%
P	0.011%
S	0.008%
Cr	2.2%
Mo	1.1%
X-Factor	< 15

ATOM ARC 9018-CM continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74
1/4 (6.4)	300	300 - 400	7.7 (3.5)	78
	350	300 - 400	8.7 (3.9)	77

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255073322	AA 9018-CM 3/32X14X10#HS	662303017484
255073314	AA 9018-CM 3/32X14X50#HS	662303017477
255073314-21	AA 9018-CM 3/32X14X50#HS S/L	662303055455
255071821	AA 9018-CM 1/8X14X10#HS	662303017446
255071813	AA 9018-CM 1/8X14X50#HS	662303017439
255071813-21	AA 9018-CM 1/8X14X50#HS S/L	662303055462
255075327	AA 9018-CM 5/32X14X10#HS	662303017507
255075319	AA 9018-CM 5/32X14X50#HS	662303017491
255073124	AA 9018-CM 3/16X14X10#HS	662303017460
255073116	AA 9018-CM 3/16X14X50#HS	662303017453
255071417	AA 9018-CM 1/4X18X50#HS	662303017422

ATOM ARC 8018-B6 AWS A5.5: E8018-B6H4R

FEATURES

Atom Arc 8018-B6 is designed to weld 5% Cr -0.5% Mo creep resisting steels such as ASTM A387 Grade 5, A213-T5 and A335-P5. These steels are normally used in pressure vessels and piping for high temperature service.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hrs @ 1375°F (746°C)	
Yield Strength	86 ksi, 593 MPa
Tensile Strength	101 ksi, 695 MPa
Elongation% in 2”	23%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.5
- AWS A5.5: E8018-B6H4R

WELD METAL ANALYSIS

C	0.07%
Mn	0.7%
Si	0.5%
P	0.013%
S	0.009%
Cr	5.3%
Mo	0.6%
X-Factor	< 15

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Power Generation
- Pipeline
- Shipbuilding

ATOM ARC 8018-B6 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255197808	AA 8018-B6 3/32X14X10#HS	662303054380
255197816	AA 8018-B6 1/8X14X10#HS	662303054397
255197824	AA 8018-B6 5/32X14X10#HS	662303054403
255197832	AA 8018-B6 3/16X14X10#HS	662303054410

ATOM ARC 8018-B8 AWS A5.5: E8018-B8H4R

FEATURES

Atom Arc 8018-B8 is designed to weld 9% Cr - 1% Mo creep resisting steels such as ASTM A213-T9 and A335-P9. These steels are used in pressure vessels and piping for high temperature service.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hrs @ 1375°F (746°C)	
Yield Strength	79 ksi, 545 MPa
Tensile Strength	98 ksi, 676 MPa
Elongation% in 2”	22%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.5
- AWS A5.5: E8018-B8H4R

WELD METAL ANALYSIS

C	0.07%
Mn	0.8%
Si	0.3%
P	0.01%
S	0.01%
Cr	8.6%
Mo	1.0%
X-Factor	< 15

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Power Generation
- Pipeline
- Shipbuilding

ATOM ARC 8018-B8 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255187908	AA 8018-B8 3/32X14X10#HS	662303063702
255187916	AA 8018-B8 1/8X14X10#HS	662303063719
255187924	AA 8018-B8 5/32X14X10#HS	662303063726
255187932	AA 8018-B8 3/16X14X10#HS	662303084837

ATOM ARC 9015-B9 AWS A5.5: E9015-B9H4R

FEATURES

Atom Arc 9015-B9 is designed to weld the modified 9% Cr & 1% Mo steels known by the designations T91, P91 or Grade91. These steels are designed to provide improved creep strength, fatigue, oxidation, and corrosion resistance at elevated temperatures.

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E9015-B9H4R
- ASME SFA 5.5

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Pipeline
- Petrochemical
- Power Generation

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr @ 1350°F (732°C)	
Yield Strength	95 ksi, 655 MPa
Tensile Strength	114 ksi, 787 MPa
Elongation% in 2”	20%
Stress Relieved 1 hrs @ 1375°F (746°C)	
Yield Strength	102 ksi, 704 MPa
Tensile Strength	119 ksi, 821 MPa
Elongation% in 2”	19%
Stress Relieved 1 hr @ 1400°F (760°C)	
Yield Strength	86 ksi, 593 MPa
Tensile Strength	106 ksi, 731 MPa
Elongation% in 2”	23%

WELD METAL ANALYSIS

C	0.1%
Mn	0.85%
Si	0.19%
P	0.009%
S	0.009%
Cr	8.6%
Mo	1.0%
X-Factor	< 15
V	0.21
Cu	0.05
AR	<.01
Nb	0.04
N	0.04

ATOM ARC 9015-B9 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255061335	AA 9015-B9 3/32X14X10#HS XF	662303068011
255061343	AA 9015-B9 1/8X14X10#HS XF	662303068028
255061350	AA 9015-B9 5/32X14X10#HS XF	662303068004
255061368	AA 9015-B9 3/16X14X10#HS XF	662303068035

ATOM ARC 9018-B9 AWS A5.5: E9018-B9H4R

FEATURES

Atom Arc 9018-B9 is designed to weld the modified 9% Cr - 1% Mo steels known by the designations T91, P91 or Grade 91. These steels are designed to provide improved creep strength, toughness, fatigue, and oxidation and corrosion resistance at elevated temperatures.

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.5
- AWS A5.5: E9018-B9H4R

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Power Generation
- Petrochemical
- Pipeline

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr @ 1375°F (746°C)	
Yield Strength	103 ksi, 711 MPa
Tensile Strength	119 ksi, 821 MPa
Elongation% in 2”	19%
Stress Relieved 2 hrs @ 1400°F (760°C)	
Yield Strength	85 ksi, 587 MPa
Tensile Strength	105 ksi, 724 MPa
Elongation% in 2”	25%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 70°F (21°C)
Stress Relieved 2 hrs. @ 1400°F (760°C)
61 ft-lb, 83 J

WELD METAL ANALYSIS

C	0.1%
Mn	0.8%
Si	0.17%
P	0.008%
S	0.009%
Cr	8.5%
Ni	0.20%
Mo	1.0%
V	0.19
Cu	0.04
Al	<.01
Nb	0.04
N	0.04
X-Factor	< 15

ATOM ARC 9018-B9 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255067845	AA 9018-B9 3/32X14X10#HS XF	662303053482
255067852	AA 9018-B9 1/8X14X10#HS XF	662303053499
255067860	AA 9018-B9 5/32X14X10#HS XF	662303053505

ATOM ARC 8018 AWS A5.5: E8018-C3

FEATURES

Atom Arc 8018 electrodes deposit 1% Ni weld metal. They are used primarily to weld high-tensile steels in the 70-80 ksi (483-552 MPa) tensile strength range, especially where notch toughness at temperatures as low as -40°F (-40°C) is required.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	74 ksi, 510 MPa
Tensile Strength	85 ksi, 585 MPa
Elongation in 2”	30%
Stress Relieved 8 hrs. @ 1150°F (621°C)	
Yield Strength	70 ksi, 485 MPa
Tensile Strength	81 ksi, 560 MPa
Elongation in 2”	30%

CLASSIFICATIONS AND APPROVALS

- L.R.- 4Y40m(H10)
- QPL-22200/1; MIL-8018-C3
- A.B.S.- 3Y/AWS A5.5: E8018-C3
- ASME SFA 5.5
- CERTIFIED BY C.W.B.- CSA W48
- AWS A5.5: E8018-C3

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded	124 ft-lb, 168 J
Stress Relieved 8 hrs. @ 1150°F (621°C)	
	129 ft-lb, 175 J
Testing Temperature -40°F (-40°C)	
As Welded	114 ft-lb, 154 J
Stress Relieved 8 hrs. @ 1150°F (621°C)	
	115 ft-lb, 156 J

WELDING PROCESS

- SMAW (Stick)

WELD METAL ANALYSIS

C	0.046%
Mn	1.11%
Si	0.33%
P	0.011%
S	0.009%
Ni	0.97%
Mo	0.13%

INDUSTRIES

- Pipeline
- Bridge Construction
- Power Generation
- Shipbuilding
- Mobile Machinery
- Petrochemical
- General Fabrication

ATOM ARC 8018 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74
1/4 (6.4)	300	300 - 400	7.7 (3.5)	78
	350	300 - 400	8.7 (3.9)	77

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255047359	AA 8018 3/32X14X10#HS	662303017163
255047342	AA 8018 3/32X14X50#HS	662303017156
255041824	AA 8018 1/8X14X10#HS	662303017057
255041816	AA 8018 1/8X14X50#HS	662303017040
255045320	AA 8018 5/32X14X10#HS	662303017125
255045312	AA 8018 5/32X14X50#HS	662303017118
255043119	AA 8018 3/16X14X50#HS	662303017071
255047318	AA 8018 7/32X18X50#HS	662303017149
255041410	AA 8018 1/4X18X50#HS	662303017026

ATOM ARC 8018-SR AWS A5.5: E8018-GH4R

FEATURES

Atom Arc 8018-SR is an all-position low hydrogen electrode. The moisture resistance and welder appeal is similar to other Atom Arc electrodes. Atom Arc 8018-SR was developed to maintain 80 ksi (552 MPa) after 50 hours stress relieving.

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.5
- AWS A5.5: E8018-GH4R

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Power Generation

WELD METAL ANALYSIS

C	0.08%
Mn	1.10%
Si	0.3%
P	0.014%
Cr	0.007%
Ni	1.0%
Mo	0.3%

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 8 hrs. @ 1150°F (621°C)	
Yield Strength	71 ksi, 490 MPa
Tensile Strength	85 ksi, 587 MPa
Reduction in Area	75%
Elongation in 2”	29%
Stress Relieved 20 hrs. @ 1150°F (621°C)	
Yield Strength	72 ksi, 495 MPa
Tensile Strength	85 ksi, 580 MPa
Reduction in Area	76%
Elongation in 2”	30%
Stress Relieved 50 hrs. @ 1150°F (621°C)	
Yield Strength	69 ksi, 470 MPa
Tensile Strength	82 ksi, 562 MPa
Reduction in Area	76
Elongation in 2”	32%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 60°F (16°C)
Stress Relieved 8 hrs. @ 1150°F (621°C)
160 ft-lb, 217 J
Stress Relieved 20 hrs. @ 1150°F (621°C)
172 ft-lb, 233 J
Stress Relieved 50 hrs. @ 1150°F (621°C)
165 ft-lb, 224 J
Testing Temperature -50°F (-46°C)
Stress Relieved 8 hrs. @ 1150°F (621°C)
108 ft-lb, 146 J
Stress Relieved 20 hrs. @ 1150°F (621°C)
106 ft-lb, 144 J
Stress Relieved 50 hrs. @ 1150°F (621°C)
114 ft-lb, 155 J

ATOM ARC 8018-SR continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255043143	AA 8018-SR 3/32X14X50#HS	662303017101
255041832	AA 8018-SR 1/8X14X50#HS	662303017064
255045338	AA 8018-SR 5/32X14X50#HS	662303017132
255043135	AA 8018-SR 3/16X14X50#HS	662303017095

ATOM ARC 8018-C1 AWS A5.5: E8018-C1H4R

FEATURES

Atom Arc 8018-C1 electrodes deposit weld metal which contains nominal 2.33% Ni. Their principal use is in the welding of nickel-bearing steels for low temperature applications where toughness of the weld metal at low temperatures is important.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	80 ksi, 550 MPa
Tensile Strength	90 ksi, 620 MPa
Elongation in 2”	30%
Stress Relieved 1 hr. @ 1150°F (621°C)	
Yield Strength	75 ksi, 515 MPa
Tensile Strength	86 ksi, 595 MPa
Reduction in Area	74%
Elongation in 2”	30%

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E8018-C1H4R
- Certified by CWB to CSA W48
- L.R.- 3m,3Ym(H15)
- A.B.S.- 3Y
- ASME SFA 5.5

CHARPY V-NOTCH PROPERTIES

Testing Temperature -75°F (-59°C)	
As Welded	47 ft-lb, 64 J
Stress Relieved 1 hr. @ 1150°F (621°C)	
	64 ft-lb, 87 J

WELDING PROCESS

- SMAW (Stick)

WELD METAL ANALYSIS

C	0.04%
Mn	1.1%
Si	0.3%
P	0.011%
S	0.009%
Ni	2.4%

INDUSTRIES

- Mobile Machinery
- Bridge Construction
- Petrochemical
- General Fabrication

ATOM ARC 8018-C1 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74
1/4 (6.4)	300	300 - 400	7.7 (3.5)	78
	350	300 - 400	8.7 (3.9)	77

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255163206	AA 8018-C1 3/32X14X10#HS	662303018245
255163214	AA 8018-C1 3/32X14X50#HS	662303018252
255161820	AA 8018-C1 1/8X14X10#HS	662303018160
255161812	AA 8018-C1 1/8X14X50#HS	662303018153
255165326	AA 8018-C1 5/32X14X10#HS	662303018276
255165318	AA 8018-C1 5/32X14X50#HS	662303018269
255163123	AA 8018-C1 3/16X14X10#HS	662303018238
255163115	AA 8018-C1 3/16X14X50#HS	662303018221
255167314	AA 8018-C1 7/32X18X50#HS	662303018283
255161416	AA 8018-C1 1/4X18X50#HS	662303018146

ATOM ARC 9018 AWS A5.5: E9018MH4R

FEATURES

Atom Arc 9018 electrodes are used for attachment welds on T-1, HY-80 and HY-90 steels and other high tensile, quenched and tempered steels.

CLASSIFICATIONS AND APPROVALS

- QPL-22200/1; MIL-9018-M
- L.R.- 3Ym(H15)
- A.B.S.- 3Y
- AWS A5.5: E9018MH4R
- ASME SFA 5.5

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Bridge Construction
- Shipbuilding
- Mobile Machinery
- General Fabrication
- Rail Road Car
- Civil Construction

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	84 ksi, 580 MPa
Tensile Strength	95 ksi, 655 MPa
Reduction in Area	69%
Elongation in 2”	28%
Stress Relieved 24 hrs. @ 1100°F (593°C)	
Yield Strength	68 ksi, 470 MPa
Tensile Strength	92 ksi, 635 MPa
Reduction in Area	72%
Elongation in 2”	27%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -60°F (-51°C)	
As Welded	60 ft-lb, 81 J
Stress Relieved 24 hrs. @ 1100°F (593°C)	
	66 ft-lb, 92 J

WELD METAL ANALYSIS

C	0.043%
Mn	1.00%
Si	0.26%
P	0.012%
S	0.010%
Ni	1.60%
Mo	0.29%

ATOM ARC 9018 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255061798	AA 9018 3/32X14X10#HS	662303017316
255061806	AA 9018 3/32X14X50#HS	662303017323
255061822	AA 9018 1/8X14X10#HS	662303017347
255061814	AA 9018 1/8X14X50#HS	662303017330
255065328	AA 9018 5/32X14X10#HS	662303017392
255065310	AA 9018 5/32X14X50#HS	662303017385
255063125	AA 9018 3/16X14X10#HS	662303017361
255063117	AA 9018 3/16X14X50#HS	662303017354

ATOM ARC 10018 AWS A5.5: E10018MH4R

FEATURES

Atom Arc 10018 electrodes are used primarily for applications which require weld joints of at least 100 ksi (690 MPa) tensile strength, good ductility and crack resistance. Good notch toughness at temperatures as low as -60°F (-51°C) is possible with this electrode. Atom Arc 10018 can be used to weld HY-80 and T-1 steel.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	99 ksi, 685 MPa
Tensile Strength	108 ksi, 745 MPa
Reduction in Area	64%
Elongation in 2”	24%

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E10018MH4R
- ASME SFA 5.5

CHARPY V-NOTCH PROPERTIES

Testing Temperature -40°F (-40°C)	
As Welded	46 ft-lb, 62 J
Testing Temperature -60°F (-51°C)	
As Welded	28 ft-lb, 38 J

WELDING PROCESS

- SMAW (Stick)

WELD METAL ANALYSIS

C	0.051%
Mn	1.46%
Si	0.31%
P	.013%
S	.011%
Ni	1.72%
Mo	0.27%

INDUSTRIES

- Shipbuilding
- Rail Road Car
- Mobile Machinery
- Bridge Construction
- General Fabrication

ATOM ARC 10018 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74
1/4 (6.4)	300	300 - 400	7.7 (3.5)	78
	350	300 - 400	8.7 (3.9)	77

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255081713	AA 10018 3/32X14X50#HS	662303017552
255081820	AA 10018 1/8X14X10#HS	662303017576
255081812	AA 10018 1/8X14X50#HS	662303017569
255085326	AA 10018 5/32X14X10#HS	662303017613
255085318	AA 10018 5/32X14X50#HS	662303017606
255083123	AA 10018 3/16X14X10#HS	662303017590
255083115	AA 10018 3/16X14X50#HS	662303017583
255081416	AA 10018 1/4X18X50#HS	662303017538

ATOM ARC T AWS A5.5: E11018MH4R

FEATURES

Atom Arc T was developed for welding T-1 steel in all applications. Mechanical properties of the welded joints equal or exceed the properties of the base steel in either the as-welded or stress relieved condition, thus giving 100% design joint efficiency. In addition, Atom Arc T electrodes are suitable for many other applications, particularly where high-strength welds with excellent low temperature impact properties are required.

INDUSTRIES

- General Fabrication
- Rail Road Car
- Mobile Machinery
- Bridge Construction
- Civil Construction
- Shipbuilding

CLASSIFICATIONS AND APPROVALS

- QPL-22200/1; MIL-11018-M
- Certified by CWB to CSA W48
- AWS A5.5: E11018MH4R
- A.B.S.- AWS A5.5: E11018-M
- ASME SFA 5.5

WELD METAL ANALYSIS

C	0.048%
Mn	1.48%
Si	0.30%
P	0.012%
S	0.010%
Cr	0.24%
Ni	1.95%
Mo	0.38%

WELDING PROCESS

- SMAW (Stick)

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	105 ksi, 725 MPa
Tensile Strength	115 ksi, 795 MPa
Reduction in Area	62%
Elongation in 2”	23%
Stress Relieved 1 hr. @ 1025°F (552°C)	
Yield Strength	102 ksi, 705 MPa
Tensile Strength	112 ksi, 770 MPa
Reduction in Area	63%
Elongation in 2”	23%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded	55 ft-lb, 75 J
Stress Relieved 1 hr. @ 1025°F (552°C)	
	50 ft-lb, 68 J
Testing Temperature -40°F (-40°C)	
As Welded	48 ft-lb, 65 J
Stress Relieved 1 hr. @ 1025°F (552°C)	
	42 ft-lb, 57 J
Testing Temperature -60°F (-51°C)	
As Welded	44 ft-lb, 60 J
Stress Relieved 1 hr. @ 1025°F (552°C)	
	25 ft-lb, 34 J

ATOM ARC T continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74
1/4 (6.4)	300	300 - 400	7.7 (3.5)	78
	350	300 - 400	8.7 (3.9)	77

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255113326	AA T 3/32X14X10#HS	662303018085
255113318	AA T 3/32X14X50#HS	662303018078
255111825	AA T 1/8X14X10#HS	662303018047
255111817	AA T 1/8X14X50#HS	662303018030
255115321	AA T 5/32X14X10#HS	662303018108
255115313	AA T 5/32X14X50#HS	662303018092
255113128	AA T 3/16X14X10#HS	662303018061
255113110	AA T 3/16X14X50#HS	662303018054
255117319	AA T 7/32X18X50#HS	662303018115
255111411	AA T 1/4X18X50#HS	662303017996

ATOM ARC 12018 AWS A5.5: E12018MH4R

FEATURES

Atom Arc 12018 is recommended for use in fabrication of low-alloy, high tensile steels where welds of 120 ksi (830 MPa) minimum tensile strength are required. Atom Arc 12018 is typically used to weld forging, casting plate and pressure vessels.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	120 ksi, 830 MPa
Tensile Strength	133 ksi, 920 MPa
Reduction in Area	56%
Elongation in 2”	18%

CLASSIFICATIONS AND APPROVALS

- AWS A5.5: E12018MH4R
- ASME SFA 5.5

CHARPY V-NOTCH PROPERTIES

Testing Temperature -60°F (-51°C)	
As Welded	26 ft-lb, 35 J

WELDING PROCESS

- SMAW (Stick)

WELD METAL ANALYSIS

C	0.057%
Mn	1.75%
Si	0.34%
P	0.014%
S	0.010%
Cr	0.85%
Ni	1.97%
Mo	0.47%

INDUSTRIES

- Automotive
- General Fabrication
- Rail Road Car
- Mobile Machinery

ATOM ARC 12018 continued

DEPOSITION TABLE				
Diameter in (mm)	Optimal Current Amps	Current Range Amps	Deposition Rate lb/hr (kg/hr)	Efficiency %
3/32 (2.4)	90	70 - 100	1.7 (0.8)	66.3
1/8 (3.2)	120	90 - 160	2.6 (1.2)	71.6
	140	90 - 160	2.7 (1.2)	70.9
5/32 (4.0)	140	130 - 220	3.1 (1.1)	75
	170	130 - 220	3.8 (1.7)	73.5
3/16 (4.8)	200	200 - 300	4.9 (2.2)	76.4
	250	200 - 300	5.4 (2.4)	74.6
7/32 (5.6)	250	250 - 350	6.5 (2.9)	75
	300	250 - 350	7.2 (3.3)	74
1/4 (6.4)	300	300 - 400	7.7 (3.5)	78
	350	300 - 400	8.7 (3.9)	77

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
255107336	AA 12018 3/32X14X50#HS	662303017903
255101818	AA 12018 1/8X14X50#HS	662303017835
255105322	AA 12018 5/32X14X10#HS	662303017880
255105314	AA 12018 5/32X14X50#HS	662303017873
255103111	AA 12018 3/16X14X50#HS	662303017859
255101412	AA 12018 1/4X18X50#HS	662303017811

Additional Products

- Atom Arc 7018-M
- Atom Arc 8018-N
- Atom Arc 8018-W
- Atom Arc 10018-M1
- Atom Arc 10018-MM
- Atom Arc 10718-M
- Atom Arc 12018-M2
- Atom Arc 4140
- Atom Arc 4130
- Atom Arc 4130 Ln
- Atom Arc 4340
- Atom Arc 8018-NM
- Atom Arc 9018-SR

For additional information on the above products, please visit us at www.esabna.com

ATOM ARC® Iron Powder Low Hydrogen Electrodes

Welding Procedure:

Experienced welders find Atom Arc electrodes surprisingly easy to use compared to conventional low hydrogen electrodes and quite different from ordinary mild steel electrodes. The following steps should be taken to obtain maximum performance from these electrodes.

Proper Current — Set the power source for the proper amperage on either DCEP (Electrode Positive) or alternating current (AC).

Starting Technique — Strike electrode ahead of the usual starting point and back step to the previous bead. Reduce arc length to proper height and proceed.

Do Not Use a Whipping Technique — This should not be used with a 7018 electrode. Use a straightforward progression in all positions. Weaving may be used as long as a short arc length is maintained.

Diameters 3/32” (2.4mm), 1/8” (3.2mm), 5/32” (4.0mm) are all position electrodes, 3/16” (4.8mm), 7/32” (5.6mm), 1/4” (6.4mm) diameter electrodes are recommended for flat or horizontal fillet work only.

ATOM ARC Electrodes Per Pound (kg)

Diameter In (mm)	3/32 (2.4)	1/8 (3.2)	5/32 (4.0)	3/16 (4.8)	7/32 (5.6)	1/4 (6.4)
Length In (mm)	14 (350)	14 (350)	14 (350)	14 (350)	18 (450)	18 (450)
Pieces / lb. (kg)	21.0 (46.3)	13.0 (28.7)	9.2 (20.3)	6.6 (14.5)	3.8 (8.4)	2.9 (6.4)

Electrode Dimension Conversion Chart

Diameter		Length	
Inches	mm	Inches	mm
5/64	2.0	12	300
3/32	2.4	12	300
1/8	3.2	14	350
5/32	4.0	14	350
3/16	4.8	14	350
7/32	5.6	18	450
1/4	6.4	18	450
5/16	8.0	18	450

Atom Arc Coated Electrodes Deposition Data and Current Ranges*

Electrode Diameter		Range Amperage	Optimum Amperage	Deposition Rate		Efficiency%
In	(mm)			lb/hr	kg/hr	
E7018, E8018, etc...						
3/32	(2.4)	70-100	90	1.7	(0.8)	66.3
1/8	(3.2)	90-160	120	2.6	(1.2)	71.6
		90-160	140	2.7	(1.2)	70.9
5/32	(4.0)	130-220	140	3.1	(1.4)	75.0
		130-220	170	3.8	(1.7)	73.5
3/16	(4.8)	200-300	200	4.9	(2.2)	76.4
		200-300	250	5.4	(2.4)	74.6
7/32	(5.6)	250-350	250	6.5	(2.9)	75.0
		250-350	300	7.2	(3.3)	74.0
1/4	(6.4)	300-400	300	7.7	(3.5)	78.0
		300-400	350	8.7	(3.9)	77.0

*Note: Efficiencies for coated electrodes do not include stub loss.

Stub Loss Correction Table for Coated Electrodes

	Deposition Efficiency	2" (50mm) STUB	3" (75mm) STUB	4" (100mm) STUB	5" 125mm) STUB
12" (300 mm) Electrode					
	60%	50.0%	45.0%	40.0%	35.0%
	65%	54.2%	48.7%	43.3%	37.9%
	70%	58.3%	52.5%	46.6%	40.8%
	75%	62.5%	56.2%	50.0%	43.7%
	80%	66.6%	60.0%	53.3%	46.6%
14" (350 mm) Electrode					
	60%	51.4%	47.1%	42.8%	38.5%
	65%	55.7%	51.1%	46.4%	41.8%
	70%	60.0%	55.0%	50.0%	45.0%
	75%	64.3%	58.9%	53.6%	48.2%
	80%	68.5%	62.8%	57.1%	51.4%
18" (450 mm) Electrode					
	60%	53.3%	50.0%	46.6%	43.3%
	65%	57.7%	54.2%	50.5%	46.9%
	70%	62.2%	58.3%	54.4%	50.5%
	75%	66.6%	62.5%	58.3%	54.2%
	80%	71.1%	66.6%	62.2%	57.7%

ARCALOY® Stainless Steel Covered Electrode Coatings

Coating Types...Factors such as coating type and core wire analysis can affect the corrosion resistance and mechanical properties of the weld metals as well as the equipment that must be used, position of welding, radiographic standards, bead shape required and the total economics of making the joint. Each of the three coating types has its own area of application.

Lime...coatings, also known as lime fluorspar or basic, are generally associated with the suffix -15 designation. They give the cleanest weld metal, which is usually the lowest oxygen and inclusions and are more resistant to moisture and porosity. The weld metal tends to be tougher, more ductile, more crack resistant and have higher corrosion resistance. They also have good all-position characteristics and are often chosen for site work. They are normally usable only with direct current and should be the choice of the most demanding applications.

AC-DC...coatings can be used with alternating or direct current and have the suffix -16. The major component is rutile, also known an titania, with some limestone which is why the coating type is sometimes referred to as basic-rutile. These AC-DC electrodes are the most popular type, and have the following characteristics: excellent starting properties are obtained with all types of AC welding equipment. The arc is stable, smooth, with fine spray weld metal transfer and the bead is uniform, flat or slightly concave with straight-line feathered edges. Penetration is complete and the weld metal is free from porosity. Slag is easily and completely removed without secondary film which means less cleaning, grinding and polishing time. Arcaloy AC-DC electrodes give good out-of-position characteristics. The mechanical properties of AC-DC weld metals are similar to weld metal from lime coated electrodes except it can be stronger with good ductility.

Plus...coatings are also titania based, but in addition, contain a high proportion of silicates and other acid components. These electrodes are very easy to use on AC as well as DC and have the suffix -17. Arcaloy Plus coated electrodes were developed for application where the weld bead must be smooth and blend into the base metal to minimize grinding where a crevice can cause corrosion. The weld bead is concave and has minimal ripple. These Arcaloy Plus electrodes give a smooth spray transfer and produce very low levels of spatter. The acid slag tends to give the lowest carbon levels and higher silicon levels. This can be ideal for corrosion resistance, but for critical mechanical applications, the use of a lime or even an AC-DC coating is preferred.

ARCALOY 308L-15 AWS A5.4: E308-15/E308L-15

FEATURES

Arcaloy 308L-15 electrodes were developed for the welding of Type 304L stainless steels but can be used for many other stainless steels including Types 301, 302 & 304. They are used extensively for the welding of chemical plant equipment and may be used successfully for the welding of Types 321 and 347 stainless steels provided the service temperature is less than about 700°F(371°C). The basic coating of Arcaloy 308L-15 gives the highest resistance to cracking and excellent vertical welding characteristics. Operates on DC current only.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Strength	63 ksi, 430 MPa
Tensile Strength	90 ksi, 520 MPa
Elongation in 2”	45%

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 5
- ASME II SFA A5.4: E308-15/E308L-15
- AWS A5.4: E308-15/E308L-15
- QPL-22200/2; MIL-308L-15

WELD METAL ANALYSIS

C	0.03%
Mn	1.7%
Si	0.55%
Cr	20%
Ni	10%
Mo	0.1%
Cu	0.1%
Ferrite	6 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Shipbuilding
- Petrochemical
- General Fabrication
- Tank and Vessel Fabrication

ARCALOY 308L-15 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
256120130	AC 308L-15 3/32X12X10#HS	662303049287
251025300	AC 308L-15 5/32X14X10#HS	662303013097
251021804	AC 308L-15 1/8X14X10#HS	662303013066

ARCALOY 308L-16 AWS A5.4: E308-16/E308L-16

FEATURES

Arcaloy 308L-16 electrodes were developed for the welding of Type 304L stainless steels but can be used for many other stainless steels including Types 301, 302 & 304. They are used extensively for the welding of chemical plant equipment and may be used successfully for the welding of Types 321 and 347 stainless steels provided the service temperature is less than about 700°F(371°C). The basic-rutile thin coating of Arcaloy 308L-16 gives an excellent combination of welding performance in all positions and a high resistance to cracking. Operates on AC or DC current.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Strength	66 ksi, 460 MPa
Tensile Strength	90 ksi, 520 MPa
Elongation in 2”	45%

CLASSIFICATIONS AND APPROVALS

- AWS A5.4: E308-16/E308L-16
- CWB CSA W48 E308L-16
- ASME IX F No. 5
- ASME II SFA A5.4: E308-16/E308L-16
- QPL-22200/2; MIL-308L-16

WELD METAL ANALYSIS

C	0.03%
Mn	1.7%
Si	0.5%
Cr	20%
Ni	10%
Mo	0.1%
Cu	0.1%
Ferrite	6 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Tank and Vessel Fabrication
- Shipbuilding
- General Fabrication
- Petrochemical

ARCALOY 308L-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251013306	*AC 308L-16 3/32X9X6#HS	662303013011
251013207	AC 308L-16 3/32X12X10#HS	662303074586
251011805	AC 308L-16 1/8X14X10#HS	662303012991
251015301	AC 308L-16 5/32X14X10#HS	662303013028
251013108	AC 308L-16 3/16X14X10#HS	662303013004
251011409	AC 308L-16 1/4X14X10#HS	662303012984

*Special Order

ARCALOY 308/308H-15 AWS A5.4: E308-15/308H-15

FEATURES

Arcaloy 308/308H-15 electrodes were designed for the welding of Types 304H & 304 for high temperature strength and creep service. They can equally well be used for the welding of stainless steel Types 301, 302 and 305. In some cases where the creep ductility of 347 weld metal is a concern, Arcaloy 308/308H electrodes can be used. The basic coating of Arcaloy 308/308H-15 gives the highest resistance to cracking and excellent verical welding characteristics. Operates on DC current only.

*This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	65 ksi, 450 MPa
Tensile Strength	85 ksi, 585 MPa
Elongation in 2”	45%

CLASSIFICATIONS AND APPROVALS

- ASME II SFA A5.4: E308-15/308H-15
- AWS A5.4: E308-15/308H-15
- QPL-22200/2; MIL-308-15
- ASME IX F No. 5

WELD METAL ANALYSIS

C	0.05%
Mn	1.7%
Si	0.5%
Cr	20%
Ni	10%
Mo	0.1%
Cu	0.1%
Ferrite	5 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Petrochemical
- General Fabrication
- Tank and Vessel Fabrication

ARCALOY 308/308H-15 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252026497	AC 308/308H-15 3/32X12X10#HS	662303074609
252026513	AC 308/308H-15 1/8X14X10#HS	662303014926
252026521	AC 308/308H-15 5/32X14X10#HS	662303014933

ARCALOY 308/308H-16 AWS A5.4: E308-16/E308H-16

FEATURES

Arcaloy 308/308H-16 electrodes were designed for the welding Types 304H & 304 where temperature in excess of 700°F (371°C) requires additional creep strength. They can equally well be used for the welding of stainless steel Types 301, 302 and 305. In some cases where the creep ductility of 347 weld metal is a concern, Arcaloy 308/308H electrodes can be used. The basic-rutile thin coating of Arcaloy 308/308H-16 gives an excellent combination of welding performance in all positions and a high resistance to cracking. Operates on AC or DC current.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	66 ksi, 410 MPa
Tensile Strength	89 ksi, 610 MPa
Elongation in 2”	44%

CLASSIFICATIONS AND APPROVALS

- MIL-E-22200/2 MIL-308-16
- ASME II SFA E308-16/E308H-16
- AWS A5.4: E308-16/E308H-16
- ASME IX F No. 5
- A.B.S.- AWS A5.4: E308/308H-16

WELD METAL ANALYSIS

C	0.055%
Mn	1.7%
Si	0.45%
Cr	20%
Ni	10%
Mo	0.1%
Cu	0.1%
Ferrite	4 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Power Generation
- Petrochemical
- Tank and Vessel Fabrication
- Food and Beverage

ARCALOY 308/308H-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252026539	* AC 308/308H-16 3/32X9X6#HS	662303014940
252026562	AC 308/308H-16 3/32X12X10#HS	662303074593
252026547	AC 308/308H-16 1/8X14X10#HS	662303014957
252026554	AC 308/308H-16 5/32X14X10#HS	662303014964
252026612	AC 308/308H-16 3/16X14X10#HS	662303014988
252026620	AC 308/308H-16 1/4X14X10#HS	662303014995

*Special Order

ARCALOY 308L-17 PLUS AWS A5.4: E308-17/E308L-17

FEATURES

Arcaloy 308L-17 Plus electrodes have a heavy coating, produce a concave bead with minimum ripple and the slag is virtually self-cleaning. These electrodes are designed to weld Types 304, 304L, 321 and 347 for corrosion service at temperature up to about 600°F(315°C).The excellent wetting action and very fine ripple minimize crevice corrosion and grinding time. This is particularly useful in the food and drink industry where a smooth polished surface is required.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	58 ksi, 400 MPa
Tensile Strength	86 ksi, 550 - 600 MPa
Elongation in 2”	47%

CLASSIFICATIONS AND APPROVALS

- AWS A5.4: E308-17/E308L-17
- ASME IX F No. 5
- ASME II SFA A5.4: E308-17/E308L-17

WELD METAL ANALYSIS

C	0.02%
Mn	0.6%
Si	0.8%
Cr	19%
Ni	10%
Mo	0.1%
Cu	0.1%
Ferrite	6 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Rail Road Car
- General Fabrication
- Food and Beverage
- Shipbuilding

ARCALOY 308L-17 PLUS continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	60 - 85	40 - 60	40 - 60
1/8 (3.2)	90-120	70-80	60 - 85
5/32 (4.0)	140-165	80-90	95 - 120
3/16 (4.8)	180-210	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251035358	AC 308L-17 3/32X12X8#HS	662303028527
251035366	AC 308L-17 1/8X14X10#HS	662303028534
251035374	AC 308L-17 5/32X14X10#HS	662303028541
251035382	AC 308L-17 3/16X14X10#HS	662303028558

ARCALOY 309L-15 AWS A5.4: E309L-15/E309-15

FEATURES

Arcaloy 309L-15 is used for welding carbon and low alloy steels to stainless steels. This can be done provided the service temperature does not exceed about 700°F (371°C). Post weld heat treatment should only be taken with great care. Arcaloy 309L-15 can be used as the first layer of stainless steel on carbon or low alloy steel.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	60 ksi, 415 MPa
Tensile Strength	85 ksi, 590 MPa
Elongation in 2”	45%

CLASSIFICATIONS AND APPROVALS

- QPL MIL-E-22200/2 MIL-309L-15
- AWS A5.4: E309L-15/E309-15
- ASME IX F No. 5
- ASME II SFA A5.4: E309L-15/E309-15

WELD METAL ANALYSIS

C	0.035%
Mn	1.8%
Si	0.5%
Cr	24%
Ni	13.5%
Mo	0.3%
Cu	0.1%
Ferrite	9 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication

ARCALOY 309L-15 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251063319	AC 309L-15 3/32X12X10#HS	662303074623
251061800	AC 309L-15 1/8X14X10#HS	662303013462
251065306	AC 309L-15 5/32X14X10#HS	662303013493

ARCALOY 309L-16 AWS A5.4: E309L-16/E309-16

FEATURES

Arcaloy 309L-16 is used for welding carbon and low alloy steels to stainless steels. This can be done provided the service temperature does not exceed about 700°F (371°C). Post weld heat treatment should only be performed after due consideration.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	65 ksi, 450 MPa
Tensile Strength	85 ksi, 590 MPa
Elongation in 2”	37%

CLASSIFICATIONS AND APPROVALS

- ASME II SFA A5.4: E309L-16/E309-16
- AWS A5.4: E309L-16/E309-16
- ASME IX F No. 5
- Certified by CWB to CSA W48

WELD METAL ANALYSIS

C	0.03%
Mn	1.8%
Si	0.45%
Cr	23.5%
Ni	13.5%
Mo	0.3%
Cu	0.1%
Ferrite	9 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication

ARCALOY 309L-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35-50 (Amps	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251053302	* AC 309L-16 3/32X9X6#HS	662303013356
251053203	AC 309L-16 3/32X12X10#HS	662303074616
251051801	AC 309L-16 1/8X14X10#HS	662303013332
251055307	AC 309L-16 5/32X14X10#HS	662303013363
251053104	AC 309L-16 3/16X14X10#HS	662303013349
251051405	AC 309L-16 1/4X14X10#HS	662303013325

*Special Order

ARCALOY 309/309H-15 AWS A5.4: E309/309H-15

FEATURES

Arcaloy 309/309H-15 is used for welding base metal for all service temperatures designed for Type 309. It can be used for carbon and low alloy steel to stainless steel joints.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	65 ksi, 450 MPa
Tensile Strength	90 ksi, 620 MPa
Elongation in 2”	40%

CLASSIFICATIONS AND APPROVALS

- QPL-22200/2; MIL-309-15
- ASME IX F No. 5
- ASME II SFA A5.4: E309-15
- AWS A5.4: E309/309H-15

WELD METAL ANALYSIS

C	0.06%
Mn	1.8%
Si	0.5%
Cr	23.5%
Ni	13.5%
Mo	0.1%
Cu	0.1%
Ferrite	7 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Petrochemical

ARCALOY 309/309H-15 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251055927	AC 309/309H-15 1/8X14X10#HS	662303013417

ARCALOY 309/309H-16 AWS A5.4: E309-16/E309H-16

FEATURES

Arcaloy 309/309H-16 is used for welding base metal for all service temperatures designed for Type 309. Carbon content 0.04% minimum. It can be used for carbon and low alloy steels and stainless steel dissimilar joints.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	55 ksi, 380 MPa
Tensile Strength	90 ksi, 620 MPa
Elongation in 2”	40%

CLASSIFICATIONS AND APPROVALS

- ABS-AWS A5.4: E309-16
- QPL MIL-E-22200/2 MIL-309-16
- ASME II SFA E309-16
- ASME IX F No. 5
- A.B.S.- AWS A5.4: E309-16

WELD METAL ANALYSIS

C	0.06%
Mn	1.8%
Si	0.5%
Cr	24%
Ni	13.5%
Mo	0.1%
Cu	0.1%
Ferrite	7 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Petrochemical

ARCALOY 309/309H-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251055901	* AC 309/309H-16 3/32X9X6#HS	662303013394
251055893	AC 309/309H-16 3/32X12X10#HS	662303075637
251055919	AC 309/309H-16 1/8X14X10#HS	662303013400
251055943	AC 309/309H-16 5/32X14X10#HS	662303013431
251055950	AC 309/309H-16 3/16X14X10#HS	662303013448

*Special Order

ARCALOY 309L-17 PLUS AWS A5.4: E309L-17/E309-17

FEATURES

Arcaloy 309L-17 Plus electrodes have a heavy coating and produce a concave bead with minimal ripple. The slag is virtually self-cleaning. For welding carbon steel to stainless steel for service below about 600°F (315°C) and for the first layer when cladding.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	65 ksi, 450 MPa
Tensile Strength	85 ksi, 590 MPa
Elongation in 2”	37%

CLASSIFICATIONS AND APPROVALS

- AWS A5.4: E309L-17/E309-17
- ASME IX F No. 5
- ASME II SFA A5.4: E309L-17/E309-17

WELD METAL ANALYSIS

C	0.025%
Mn	0.6%
Si	0.7%
Cr	23.5%
Ni	13.5%
Mo	0.1%
Cu	0.1%
Ferrite	15 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication

ARCALOY 309L-17 PLUS continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	60 - 85	35 - 50	40 - 60
1/8 (3.2)	90-120	55 - 70	60 - 85
5/32 (4.0)	140-165	85 - 100	95 - 120
3/16 (4.8)	180-210	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258074269	AC 309L-17 1/8X14X10#HS	662303015794
258074251	AC 309L-17 3/32X12X8#HS	662303015787
258074277	AC 309L-17 5/32X14X10#HS	662303015800
258074285	AC 309L-17 3/16X14X10#HS	662303015817

ARCALOY 309LMo-16 AWS A5.4: E309LMo/E309Mo-16

FEATURES

Arcaloy 309LMo-16 is designed for applications requiring molybdenum with a standard 309L analysis. It is used primarily for welding type 316L and 316 clad steels, or welding molybdenum-containing austenitic stainless steel - to carbon steel, provided the service temperature is less than 600°F (315°C). Carbon content 0.04% maximum.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	77 ksi, 530 MPa
Tensile Strength	97 ksi, 670 MPa
Elongation in 2”	32%

CLASSIFICATIONS AND APPROVALS

- AWS A5.4: E309LMo-16/E309Mo-16
- ASME IX F No. 5
- ASME II SFA A5.4: E309LMo-16/E309Mo-16

WELD METAL ANALYSIS

C	0.03%
Mn	1.7%
Si	0.45%
Cr	23%
Ni	13.2%
Mo	2.5%
Cu	0.1%
Ferrite	20 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication

ARCALOY 309LMo-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251095360	AC 309LMO-16 3/32X12X10#HS	662303053062
251095345	AC 309LMO-16 1/8X14X10#HS	662303037765
251095329	AC 309LMO-16 5/32X14X10#HS	662303013615

ARCALOY 310-16 AWS A5.4: E310-16

FEATURES

Arcaloy 310 electrodes were developed for the welding of type 310 stainless steel. Arcaloy 310 weld deposit exhibits the same chemical analysis and oxidation resistance as the base plate metal. It is considered standard practice to weld types 410 and 430 with Arcaloy 310 or 309 where field welding is done and where it is not possible to preheat or anneal after welding.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	65 ksi, 450 MPa
Tensile Strength	90 ksi, 610 MPa
Elongation in 2”	38%

CLASSIFICATIONS AND APPROVALS

- QPL 22200/2; MIL 310-16
- ASME II SFA A5.4: E310-16
- ASME IX F No. 5
- AWS A5.4: E310-16

WELD METAL ANALYSIS

C	0.1%
Mn	1.8%
Si	0.5%
Cr	26%
Ni	21%
Mo	0.1%
Cu	0.1%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication

ARCALOY 310-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251103313	AC 310-16 3/32X12X10#HS	662303074654
251101804	AC 310-16 1/8X14X10#HS	662303013684
251105300	AC 310-16 5/32X14X10#HS	662303013714
251103107	AC 310-16 3/16X14X10#HS	662303013691

ARCALOY 312-16 AWS A5.4: E312-16

FEATURES

Arcaloy 312 electrodes were originally designed for welding of high tensile alloys to high temperature heat-resisting alloys on turbo-jet engines of that time. However, based upon performance, these electrodes have found wide acceptance for the welding of high carbon steels high yield steels and abrasion resisting steels and those steels to stainless steels. The high strength of the “all weld metal” deposit is usually reduced by dilution with a dissimilar base metal.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	85 ksi, 600 MPa
Tensile Strength	115 ksi, 800 MPa
Elongation in 2”	25%

CLASSIFICATIONS AND APPROVALS

- AWS A5.4: E312-16
- MIL-E-22200/2 MIL-312-16
- ASME II SFA A5.4: E312-16
- ASME IX F No. 5

WELD METAL ANALYSIS

C	0.11%
Mn	1.8%
Si	0.5%
Cr	29%
Ni	9.7%
Mo	0.1%
Cu	0.1%
Ferrite	50 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Pulp and Paper

ARCALOY 312-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251163317	AC 312-16 3/32X12X10#HS	662303074661
251161808	AC 312-16 1/8X14X10#HS	662303013936
251165304	AC 312-16 5/32X14X10#HS	662303013967
251163101	AC 312-16 3/16X14X10#HS	662303013943

ARCALOY 316LF5-15 AWS A5.4: E316-15/E316L-15

FEATURES

Arcaloy 316LF-15 is a 316L electrode designed to give a weld deposit with a minimum ferrite number of 5 FN. Carbon content is 0.04% maximum and can be used to weld Type 304L stainless steal where the presence of molybdenum is not detrimental.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Strength	62 ksi, 430 MPa
Tensile Strength	81 ksi, 560 MPa
Elongation in 2”	40%

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 5
- AWS A5.4: E316-15/E316L-15
- QPL-22200/2; MIL-316L-15
- ASME II SFA A5.4: E316-15/E316L-15

WELD METAL ANALYSIS

C	0.03%
Mn	1.5%
Si	0.5%
Cr	19%
Ni	12%
Mo	2.4%
Cu	0.2%
Ferrite	6 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Petrochemical
- General Fabrication
- Food and Beverage
- Chemical Industry

ARCALOY 316LF5-15 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252026000	AC 316LF5-15 3/32X12X10#HS	662303047665
251191805	AC 316LF5-15 1/8X14X10#HS	662303014124
251195301	AC 316LF5-15 5/32X14X10#HS	662303014155

ARCALOY 316LF5-16 AWS A5.4: E316-16/E316L-16

FEATURES

Arcaloy 316LF5-16 is an E316L-16 electrode where the composition has been balanced to give a weld deposit with a minimum ferrite content of 5 FN. It can be used to weld Type 304L stainless steel where the presence of molybdenum is not detrimental.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	65 ksi, 450 MPa
Tensile Strength	83 ksi, 570 MPa
Elongation in 2”	40%

CLASSIFICATIONS AND APPROVALS

- QPL MIL-E-22200/2 MIL-316L-16
- ASME II SFA A5.4: E316-16/E316L-16
- AWS A5.4: E316-16/E316L-16
- ASME IX F No. 5
- Certified by CWB to CSA W48

WELD METAL ANALYSIS

C	0.03%
Mn	1.5%
Si	0.4%
Cr	19%
Ni	12%
Mo	2.5%
Cu	0.2%
Ferrite	6 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Petrochemical
- General Fabrication
- Food and Beverage
- Chemical

ARCALOY 316LF5-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251183307	* AC 316LF5-16 3/32X9X6#HS	662303014032
251183315	AC 316LF5-16 3/32X12X10#HS	662303074685
251181806	AC 316LF5-16 1/8X14X10#HS	662303014018
251185302	AC 316LF5-16 5/32X14X10#HS	662303014049
251183109	AC 316LF5-16 3/16X14X10#HS	662303014025
251181400	AC 316LF5-16 1/4X14X10#HS	662303014001

*Special Order

ARCALOY 316/316H-16 AWS A5.4: E316/316H-16

FEATURES

Arcaloy 316/316H-16 should be used in applications where Type 316 stainless steel needs improved high temperature. In some cases an E16-8-2 filler metal should be used. It can also be used to weld Type 316 stainless steel for ambient temperature service.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	65 ksi, 490 MPa
Tensile Strength	85 ksi, 660 MPa
Elongation in 2”	40%

CLASSIFICATIONS AND APPROVALS

- ABS - AWS A5.4: E316/316H-16
- QPL MIL-E-22200/2 MIL-316-16
- ASME II SFA A5.4: E316-16/E316H-16
- AWS A5.4: E316-16/E316H-16
- ASME IX F No. 5

WELD METAL ANALYSIS

C	0.05%
Mn	1.6%
Si	0.4%
Cr	19%
Ni	12%
Mo	2.3%
Cu	0.2%
Ferrite	5.5 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Petrochemical

ARCALOY 316/316H-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251185641	AC 316/316H-16 3/32X12X10#HS	662303074692
251185674	AC 316/316H-16 1/8X14X10#HS	662303014087
251185682	AC 316/316H-16 5/32X14X10#HS	662303014094

ARCALOY 316L-17 PLUS AWS A5.4: E316-17/E316L-17

FEATURES

Arcaloy 316L-17 Plus electrodes have a heavy coating and produce a concave bead with minimal ripple. The slag is virtually self-cleaning. Molybdenum increases the resistance to pitting corrosion caused by corrosive media such as sulfuric and sulfurous acids, sulphites, chlorides and cellulose solutions. Ideal for welding Types 316 & 316L stainless steels when bead appearance is important.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	64 ksi, 441 MPa
Tensile Strength	83 ksi, 572 MPa
Elongation in 2”	45%

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 5
- ASME II SFA A5.4: E316-17/E316L-17
- AWS A5.4: E316-17/E316L-17

WELD METAL ANALYSIS

C	0.02%
Mn	0.6%
Si	0.6%
Cr	19%
Ni	12%
Mo	2.5%
Cu	0.1%
Ferrite	7 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Food and Beverage
- Shipbuilding
- Rail Road Car

ARCALOY 316L-17 PLUS continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	60 - 85	40 - 60	40 - 60
1/8 (3.2)	90-120	70-80	60 - 85
5/32 (4.0)	140-165	80-90	95 - 120
3/16 (4.8)	180-210	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251311007	AC 316L-17 3/32X12X8#HS	662303028565
251311015	AC 316L-17 1/8X14X10#HS	662303028572
251311023	AC 316L-17 5/32X14X10#HS	662303028589
251311031	AC 316L-17 3/16X14X10#HS	662303028596

ARCALOY 317L-16 AWS A5.4: E317-16/E317L-16

FEATURES

Arcaloy 317L-16 electrodes are recommended for welding type 317 and 317L with a maximum 0.04% carbon in the weld deposit. The higher molybdenum content of these electrodes as compared to Arcaloy type 316L further reduces the susceptibility of pitting corrosion

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Strength	65 ksi, 450 MPa
Tensile Strength	85 ksi, 590 MPa
Elongation in 2”	39%

CLASSIFICATIONS AND APPROVALS

- ASME II SFA A5.4: E317-16/E317L-16
- ASME IX F No. 5
- AWS A5.4: E317-16/E317L-16
- QPL MIL-E-22200/2 MIL-317L-16

WELD METAL ANALYSIS

C	0.03%
Mn	1.7%
Si	0.5%
Cr	19%
Ni	13%
Mo	3.5%
Cu	0.2%
Ferrite	7 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Petrochemical

ARCALOY 317L-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251243309	* AC 317L-16 3/32X9X6#HS	662303014322
251243317	AC 317L-16 3/32X12X10#HS	662303074715
251241808	AC 317L-16 1/8X14X10#HS	662303014308
251245304	AC 317L-16 5/32X14X10#HS	662303014339

*Special Order

ARCALOY 320LR-16 AWS A5.4: E320LR-16

FEATURES

Arcaloy 320LR-16 electrodes are designed for the welding of Carpenter 20Cb-3® and equivalent stainless steels. This electrode is specifically designed to resist the hot cracking and microfissuring often encountered when welding fully austenitic stainless steels. These properties are achieved by closely controlling the residual elements detrimental to the weld deposit.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Yield Stress	55 ksi, 390 MPa
Tensile Strength	80 ksi, 560 MPa
Elongation in 2”	35%

CLASSIFICATIONS AND APPROVALS

- AWS A5.4: E320LR-16
- ASME II SFA A5.4: E320LR-16
- ASME IX F No. 5

WELD METAL ANALYSIS

C	0.027%
Mn	1.7%
Si	0.2%
Cr	20%
Ni	33%
Mo	2.3%
Cu	3.5%
Nb	0.3%
Ferrite	0 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Petrochemical
- Chemical

ARCALOY 320LR-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251257002	AC 320LR-16 3/32X9X6#HS	662303014384
251257010	AC 320LR-16 1/8X14X10#HS	662303014391

ARCALOY 347-16 AWS A5.4: E347-16

FEATURES

Arcaloy 347 electrodes are especially designed for welding types 347 and 321 alloys. This chromium-nickel alloy is used where conditions of service are such as to require maximum resistance to corrosion. Type 347 alloy was developed to prevent carbide precipitation.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Tensile Strength	95 ksi, 655 MPa
Elongation in 2”	35%

CLASSIFICATIONS AND APPROVALS

- AWS A5.4: E347-16
- ASME II SFA A5.4: E347-16
- QPL-22200/2; MIL-347-16
- ASME IX F No. 5

WELD METAL ANALYSIS

C	0.05%
Mn	1.8%
Si	0.6%
Cr	20%
Ni	10%
Mo	0.1%
Cu	0.15%
Nb	0.65%
Ferrite	7 FN

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Shipbuilding
- General Fabrication
- Petrochemical

ARCALOY 347-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251293304	* AC 347-16 3/32X9X6#HS	662303014483
251293312	AC 347-16 3/32X12X10#HS	662303074739
251291803	AC 347-16 1/8X14X10#HS	662303014469
251295309	AC 347-16 5/32X14X10#HS	662303014490
251293106	AC 347-16 3/16X14X10#HS	662303014476

*Special Order

ARCALOY 410NiMo-16 AWS A5.4: E410NiMo-16

FEATURES

Arcaloy 410NiMo-16 is recommended for the welding of CA-6NM castings and similar martensitic stainless steels. These alloys are used for their strength, toughness and cavitation-erosion & sour crude oil corrosion resistance. It is necessary to preheat and post weld heat treat these weldments in all but the thinnest sections. The Mf temperature can be at or below room temerature which necessitates cooling after welding to that temperature and/or performing a double PWHT. If Arcaloy 410NiMo-16 is used for the welding of Type 410, the PWHT temperature must be lower in consideration of the 410NiMo weld metal. These elctrodes are made with mild steel core wire that makes them weld more like E7018 electrodes than those electrodes with stainless steel core wire. The rutile coating gives good slag removal and out of position weldability.

* This item is subject to Industry Alloy Surcharges

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.4
- ASME II SFA A5.4: E410NiMo-16
- AWS A5.4: E410NiMo-16

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Petrochemical
- Power Generation

TYPICAL MECHANICAL PROPERTIES

Yield Strength	115 ksi, 795 MPa
Tensile Strength	135 ksi, 825 MPa
Elongation in 2”	18%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -40°F (-40°C)	27 ft-lb, 37 J

WELD METAL ANALYSIS

C	0.03%
Mn	0.7%
Si	0.4%
Cr	12%
Ni	4.5%
Mo	0.5%
Ferrite	Fully Martensitic

ARCALOY 410NiMo-16 continued

WELDING PARAMETERS			
Diameter in (mm)	Flat Amps	Vertical Amps	Overhead Amps
1/16 (1.6)	20 - 35	15 - 25	20 - 30
5/64 (2.0)	30 - 50	25 - 35	30 - 40
3/32 (2.4)	40 - 70	35 - 50	40 - 60
1/8 (3.2)	65 - 100	55 - 70	60 - 85
5/32 (4.0)	100 - 145	85 - 100	95 - 120
3/16 (4.8)	130 - 190	100 - 115	125 - 150
1/4 (6.4)	205 - 290		

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
251445581	AC 410NIMO-16 3/32X14X10#HS	662303081591
251445508	AC 410NIMO-16 1/8X14X10#HS	662303014742
251445516	AC 410NIMO-16 5/32X14X10#HS	662303014759
251445532	AC 410NIMO-16 3/16X14X10#HS	662303041830

Additional Products

- 309LMo-15
- 309Nb-16
- 316/316H-15

For additional information on the above products, please visit us at www.esabna.com

ARCALOY 9N10 AWS A5.11: ENiCu-7

FEATURES

Acaloy 9N10 is used for joining nickel-copper alloy N04400 (Monel* 400) to itself and to carbon, low alloy and some stainless steels.*Monel is a registered trademark of the Special Metals Corporation.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Tensile Strength	75 ksi, 517 MPa
Yield Strength	45 ksi, 310 MPa
Elongation in 2”	40%

CLASSIFICATIONS AND APPROVALS

- AWS A5.11: ENiCu-7
- QPL-2220013; MIL-9N10
- ASME IX F No. 42
- ASME II SFA A5.11: ENiCu-7

WELD METAL ANALYSIS

C	0.04%
Mn	3.5%
Si	0.60%
Ni	65.0%
Ti	0.70%
Cu	28.0%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Process Piping
- Petrochemical

ARCALOY 9N10 continued

WELDING PARAMETERS			
Diameter in (mm)	Voltage Volts	Flat Amps	Vertical & Overhead Amps
3/32 (2.4)	24 - 28	70 - 85	65 - 75
1/8 (3.2)	26 - 30	85 - 110	80 - 90
5/32 (4.0)	28 - 32	110 - 140	100 - 120
3/16 (4.8)	28 - 32	120 - 160	110 - 130

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258076025	AC 9N10 1/8X14X10#HS	662303015923

ARCALOY 8N12 AWS A5.11: ENiCrFe-3

FEATURES

Arcaloy 8N12 is used to join UNS 06600 alloys e.g. Inconel* 600 and some other nickel alloys. It is used for many applications welding dissimilar joints between nickel alloys, stainless and low alloy steels. It should be used to join stainless steels to CrMo steels for service in the 700-1100°F(375-600°C) range. Inconel is a registered trademark of the Special Metal Corporation.

* This item is subject to Industry Alloy Surcharges

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 43
- AWS A5.11: ENiCrFe-3
- ASME II SFA A5.11: ENiCrFe-3
- QPL-2200/3; MIL-8N12

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Petrochemical
- Power Generation

TYPICAL MECHANICAL PROPERTIES

Tensile Strength	90 ksi, 621 MPa
Yield Strength	60 ksi, 414 MPa
Elongation in 2”	40%

CHARPY V-NOTCH PROPERTIES

Testing Temperature @ -320^{0}f (-196^{0}c)	
	90 ft-lb, 122 J

WELD METAL ANALYSIS

C	0.04%
Mn	6.0%
Si	0.70%
Cr	15.0%
Ni	69.0%
Nb	1.5%

ARCALOY 8N12 continued

WELDING PARAMETERS			
Diameter in (mm)	Voltage Volts	Flat Amps	Vertical & Overhead Amps
3/32 (2.4)	24 - 28	70 - 85	65 - 75
1/8 (3.2)	26 - 30	85 - 110	80 - 90
5/32 (4.0)	28 - 32	110 - 140	100 - 120
3/16 (4.8)	28 - 32	120 - 160	110 - 130

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258075977	AC 8N12 3/32X12X8#HS	662303015879
258075985	AC 8N12 1/8X14X10#HS	662303015886

NICKEL-ARC 55 AWS A5.15: ENiFe-CI-A

FEATURES

This electrode is made with a composite 55% nickel and 45% iron core, designed for welding cast iron (ie: nodular) to steel. Proper welding procedures should be followed.

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Tensile Strength	58 ksi, 400 MPa
Weld Hardness	165-218 BHN

CLASSIFICATIONS AND APPROVALS

- AWS A5.15: ENiFe-CI-A
- ASME SFA 5.15

WELD METAL ANALYSIS

C	1.3%
Mn	0.6%
Si	0.6%
Ni	48%
Al	1.4%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Mobile Machinery
- Rail Road Car
- General Cast Iron Repair and Fabrication

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
253043301	NA 55 3/32X9X6#HS	662303015138
253041826	NA 55 1/8X14X10#HS	662303015107
253045322	NA 55 5/32X14X10#HS	662303015152

NICKEL-ARC 99 AWS A5.15: ENi-CI-A

FEATURES

Nickel-Arc 99 is designed for welding gray, malleable and nodular cast iron. It uses pure nickel core wire for applications requiring high nickel deposit. Nickel-Arc 99 produces a weld deposit that is machinable. Proper Welding procedures should be followed

* This item is subject to Industry Alloy Surcharges

TYPICAL MECHANICAL PROPERTIES

Tensile Strength	40 ksi, 275 MPa
Weld Hardness	135-218 BHN

CLASSIFICATIONS AND APPROVALS

- AWS A5.15: ENi-CI-A
- ASME SFA 5.15

WELD METAL ANALYSIS

C	0.6%
Mn	0.3%
Si	2.8%
Ni	85%
Al	1.6%
Cu	2.4%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Mobile Machinery
- Rail Road Car
- General Cast Iron Repair and Fabrication

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
253053300	NA 99 3/32X9X6#HS	662303015282
253051825	NA 99 1/8X14X10#HS	662303015251
253055321	NA 99 5/32X14X10#HS	662303015305

WEAR-ARC Ni MANGANESE AWS A5.13: EFeMn-A

FEATURES

Wear-Arc Nickel Manganese weld deposit is crack resistant and forms a ductile, high-strength fusion bond on manganese steel. The austenitic structure of the weld provides excellent resistance to wear caused by heavy impact and compressive loads. Under conditions of continuous impact, the deposit surface work hardens to a BHN of 510. Wear-Arc Nickel Manganese is best suited for applications where severe impact and compressive forces are encountered continuously. Because of the sound, high-strength welds from this electrode, it should also be used for the attachment welding of wear plates, teeth, rounds, and shapes of manganese steel.

CLASSIFICATIONS AND APPROVALS

- AWS A5.13: EFeMn-A
- ASME SFA 5.13

WELDING PROCESS

- SMAW (Stick)

TYPICAL MECHANICAL PROPERTIES

As Welded	
Tensile Strength	116 ksi, 800 MPa
Yield Strength	62 ksi, 425 MPa
Hardness	
Two Layers on Manganese Steel	90 Rb
Work-Hardened Hardness	48 Rc
Elongation in 2”	45%

WELD METAL ANALYSIS

C	0.6%
Mn	14%
Si	0.6%
Ni	4%

INDUSTRIES

- Mobile Machinery
- Steel Industry
- General Fabrication
- Rail Road Car

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
259151421	WA NIMN 1/8X14X10#HS	662303069384
259155307	WA NIMN 5/32X14X10#HS	662303031329
259153104	WA NIMN 3/16X14X10#HS	662303031312

WEAR-ARC 3-IP

FEATURES

Wear-Arc 3-IP weld metal provides excellent resistance to wear caused by heavy impact and compressive loads, and is most suitable as a base alloy for hardsurfacing overlays. Wear-Arc 3-IP should be used where maximum machinability of a surface deposit is desired and as the final overlay. The ductility and compressive strength of Wear-Arc 3-IP weld metal is adequate for the wear problem of many applications. Typical applications are: steel mill wobblers and coupling boxes, bearing journals, steel mill roll necks and ends, forging hammer dies, and all carbon steel parts requiring buildup prior to hardsurfacing.

CLASSIFICATIONS AND APPROVALS

- No AWS Classification

WELDING PROCESS

- SMAW (Stick)

TYPICAL MECHANICAL PROPERTIES

As Welded	
Tensile Strength	102 ksi, 700 MPa
Yield Strength	92 ksi, 630 MPa
Hardness	
Two layers on 1020 steel	29 Rc
Elongation in 2”	24%
Reduction of Area	64%

WELD METAL ANALYSIS

C	0.2%
Mn	0.9%
Si	0.7%
Cr	2.3%
Mo	1.1%

INDUSTRIES

- Mobile Machinery
- Rail Road Car
- Steel Industry
- General Fabrication

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
259011807	WA 3-IP 1/8X14X10#HS	662303019730
259015303	WA 3-IP 5/32X14X10#HS	662303019754
259013100	WA 3-IP 3/16X14X10#HS	662303019747
259011401	WA 3-IP 1/4X18X10#HS	662303019723

WEAR-ARC 4-IP

FEATURES

Wear-Arc 4-IP is an all position, iron powder, low hydrogen hardsurfacing electrode providing sound overlays on carbon and low alloy steels, as well as many abrasion-resistant steels. The low hydrogen coating of this electrode promates excellent fusion with the above steels and on buildup alloys without underbead cracking. This product is designed to provide hard, deformation-resistant, crack-free weld metal for resistance to metal-to-metal wear involving impact, compression, and abrasion. Typical applications are: dragline bucket pins and links, dredge bucket lips, dredge driving tumblers, dredge spud points, can brake drums, mill brake drums, shovel idlers, cable sheaves, cable sheave shafts, elevator bucket lips, shovel rollers, shovel latch pins and keepers, tractor idlers, tractor rollers, wheels (mine car, skip car, etc.), ditcher drive segments, ditcher rollers, shovel boom heels.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Hardness	
Two layers on 1020 steel	55 Rc

WELD METAL ANALYSIS

C	0.4%
Mn	0.9%
Si	1.3%
Cr	2.2%
Mo	1.0%

CLASSIFICATIONS AND APPROVALS

- No AWS Classification

INDUSTRIES

- Mobile Machinery
- Rail Road Car
- Steel Industry
- General Fabrication

WELDING PROCESS

- SMAW (Stick)

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
259021806	WA 4-IP 1/8X14X10#HS	662303019815
259025302	WA 4-IP 5/32X14X10#HS	662303019839
259023109	WA 4-IP 3/16X14X10#HS	662303019822

WEAR-ARC 5-IP

FEATURES

Wear-Arc 5-IP is an all-position, low hydrogen hardsurfacing electrode providing sound overlays on carbon and low alloy steels, as well as many abrasion-resistant steels. Wear-Arc 5-IP is recommended for the reclamation of parts subject to wear caused by moderate to high impact and moderate abrasion. Typical applications are: dipper shovels, dipper lips, bulldozer trunnions, drag line bucket lips, classifier screens, bucket pins mud pumps, buckets and impellers.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Hardness	
(One layer on 1020 steel)	52 Rc
(Two layers on 1020 steel)	59 Rc

WELD METAL ANALYSIS

C	0.6%
Mn	1.0%
Si	.8%
Cr	5.75%
Mo	0.65%

CLASSIFICATIONS AND APPROVALS

- No AWS Classification

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Mobile Machinery
- Rail Road Car
- Steel Industry
- General Fabrication

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
259033116	WA 5-IP 1/8X14X10#HS	662303019877
259033124	WA 5-IP 5/32X14X10#HS	662303019884
259033132	WA 5-IP 3/16X14X10#HS	662303019891

WEAR-ARC 6-IP

FEATURES

The iron powder low hydrogen coating of Wear-Arc 6-IP electrodes promotes good bonds with manganese and carbon steels. Wear-Arc 6-IP is recommended for the reclamation of parts subject to wear caused by abrasion and light impact. This electrode is ideal for field work where parts cannot be positioned for downhand welding. Typical applications are: Shovel buckets and teeth, Dragline buckets and teeth, Pug mill paddles, Tamping tools, Screens, Asphalt mixer paddles, Crushing equipment, Granulators, Trunnions, Truck bodies.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Hardness	
(Two layers on 1020 steel)	58 Rc

WELD METAL ANALYSIS

C	3.0%
Mn	0.8%
Si	1.8%
Cr	6.5%

CLASSIFICATIONS AND APPROVALS

- No AWS Classification

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Mobile Machinery
- Rail Road Car
- Steel Industry
- General Fabrication

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
259031805	WA 6-IP 1/8X14X10#HS	662303019853
259035301	WA 6-IP 5/32X14X10#HS	662303019907
259033108	WA 6-IP 3/16X14X10#HS	662303019860

WEAR-ARC 12 IP

FEATURES

Wear-Arc 12-IP is designed for heavy impact and good abrasion resistance. The high alloy content of Wear-Arc 12-IP also provides good resistance to erosion and corrosion.Wear-Arc 12-IP is recommended to prolong the service life of new and worn parts subject to wear caused by abrasion and impact. Typical applications are: Dipper teeth and lips, dragline bucket lips, conveyor bucket lips, roll crushers, gyratory crusher parts, muller tires, impactors and hammer mill parts.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Hardness	
(Two layers on 1020 steel)	Rc 55

WELD METAL ANALYSIS

C	3.5%
Mn	2.7%
Si	1.8%
Cr	13%
Mo	1.1%

CLASSIFICATIONS AND APPROVALS

- No AWS Classification

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Rail Road Car
- Mobile Machinery
- General Fabrication
- Steel Industry

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
259041804	WA 12-IP 1/8X14X10#HS	662303019921
259045300	WA 12-IP 5/32X14X10#HS	662303019945
259043107	WA 12-IP 3/16X14X10#HS	662303019938
259041408	WA 12-IP 1/4X18X10#HS	662303019914

WEAR-ARC 40

FEATURES

Wear-Arc 40 is a coated electrode with a special core wire and the proper amount of alloys in the coating to produce a deposit of highly abrasive resistant chrome carbides in a matrix of iron and chromium. The use of a special core wire gives much better arc action and also allows the electrode to operate at higher current settings. Deposits resist galling and seizing, and take a high polish when subject to sliding abrasive action. The hardness and wear-resistant properties of this alloy are retained at temperatures up to 1000°F (538°C) which makes it suitable for many applications where intermittent high temperature service is involved. Wear-Arc 40 is designed for use on steel mill twist guides, steel mill entry guides, wire guides, conveyor chain, and agricultural tools. This electrode also gives excellent service on certain crushing and quarrying equipment where high abrasive wear is the primary wear factor. On many applications where heat and abrasion are the prime wear factors, Wear-Arc 40 alloy may be the most economical alloy.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Hardness	
(Two layers on 1020 steel)	57 Rc

WELD METAL ANALYSIS

C	4.5%
Mn	0.3%
Si	1.8%
Cr	30%

CLASSIFICATIONS AND APPROVALS

- No AWS Classification

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- Mobile Machinery
- Rail Road Car
- Steel Industry
- General Fabrication

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
259283109	WA 40 3/16X14X10#HS	662303019976

WEAR-ARC WH

FEATURES

The weld deposit of Wear-Arc WH is high in alloy content, extremely deformation resistant, and has 2-4 times greater wear resistance than work-hardened austenitic manganese steel. WH contains approximately 34% alloy, properly balanced to perform the dual purpose of a work-hardening, wear-resistant buildup alloy, and also a high strength welding alloy. The alloy is austenitic and produces tough, crack-resistant welds. Wear-Arc WH produces a dependable bond to manganese steel. Users of type 308, 309, 310, or 312 stainless steel electrodes for rebuilding and repair of equipment constructed of manganese steel find Wear-Arc WH to be a superior electrode for the job. Deposits of Wear-Arc WH, when subjected to high impact and compressive loads, develop a surface hardness of 48-50 Rockwell C and still retain a tough, resilient, deformation-resistant mass under the work-hardened surface.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Tensile Strength	97 ksi, 670 MPa
Yield Strength	77 ksi, 550 MPa
Hardness (Two layers on 1020 steel)	
	23 Rb
Work-Hardened Hardness (Two layers on	
1020 steel)	48 Rc
Elongation in 2”	36%
14% Mn Steel Plate Heat Treated	
Tensile Strength	86 ksi, 595 MPa
Yield Strength	50 ksi, 345 MPa
Hardness	16 Rb
Work-Hardened Hardness	48 Rc
Elongation in 2”	35 - 45%

CLASSIFICATIONS AND APPROVALS

- No AWS Classification

WELD METAL ANALYSIS

C	0.45%
Mn	4.2%
Si	0.8%
Cr	19.7%
Ni	10%

WELDING PROCESS

- SMAW (Stick)

INDUSTRIES

- General Fabrication
- Steel Industry
- Rail Road Car
- Mobile Machinery

WEAR-ARC WH continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
259141802	WA WH 1/8X14X8#HS	662303052805
259145308	WA WH 5/32X14X8#HS	662303031251
259143105	WA WH 3/16X14X8#HS	662303031244

Solid Wire and Rod Electrodes (GMAW)

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SPOOLARC 65 AWS A5.18: ER70S-2 H4

FEATURES

Spoolarc 65 is a triple deoxidized (Aluminum, Titanium, Zirconium) welding wire designed for welding over rust and mill scale. The less fluid weld puddle of Spoolarc 65 makes it easy to control when used out of position. Spoolarc 65 is the preferred wire for all position welding of small diameter pipe. It is available in forms suitable for MIG and TIG welding.

INDUSTRIES

- Power Generation
- Military Applications
- Piping Industries
- Shipbuilding

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded GMAW 98% Ar / 2% O_2	
	45 ft-lb, 61 J
As Welded GMAW 100% Argon	
	35 ft-lb, 47 J
As Welded GTAW Argon	170 ft-lb, 230 J

TYPICAL MECHANICAL PROPERTIES

As Welded GMAW 98% Ar / 2% O_2	
Yield Strength	70 ksi, 480 MPa
Tensile Strength	82 ksi, 565 MPa
Elongation in 2”	26%
As Welded GMAW 100% Argon	
Yield Strength	67 ksi, 460 MPa
Tensile Strength	79 ksi, 545 MPa
Elongation in 2”	26%
As Welded GTAW Argon	
Yield Strength	73 ksi, 505 MPa
Tensile Strength	82 ksi, 565 MPa
Elongation in 2”	31%

CLASSIFICATIONS AND APPROVALS

- MIL-E-23765/1: 70S-2
- ABS/AWS A5.18: ER70S-2 H4
- CAN/CSA-ISO14341,B-G 49A 3C G2 (ER49S-2)
- AWS/ASME SFA5.18: ER70S-2
- Certified by CWB to CSA W48

WELDING PROCESS

- GMAW (MIG)
- GTAW (TIG)

WELD METAL ANALYSIS

GMAW CO_2	
C	0.08%
Mn	0.9%
Si	0.3%
P	0.008%
S	0.007%
GTAW 100% Argon	
C	0.06%
Mn	1.0%
Si	0.5%
P	0.008%
S	0.007%
Typical Wire Analysis	
C	0.04%
Mn	1.1%
Si	0.5%
P	0.006%
S	0.009%
Al	0.09%
Ti	0.08%
Zr	0.04%

SPOOLARC 65 continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.023 (0.6)	100	23	400 (1016)	2.7 (1.2)
	106	23	450 (1143)	3.1 (1.4)
	111	24	500 (1270)	3.4 (1.6)
	117	24	550 (1397)	3.8 (1.7)
	122	25	600 (1524)	4.1 (1.9)
	125	25	630 (1600)	4.3 (2)
.030 (0.8)	160	24	500 (1270)	5.8 (2.6)
	173	25	550 (1397)	6.4 (2.9)
	187	25	600 (1524)	7 (3.2)
	200	26	650 (1651)	7.6 (3.4)
.035 (0.9)	180	25	400 (1016)	6.3 (2.9)
	197	26	450 (1143)	7.1 (3.2)
	213	26	500 (1270)	7.9 (3.6)
	230	27	550 (1397)	8.7 (4)
.045 (1.2)	260	25	300 (762)	7.9 (3.6)
	280	26	350 (889)	9.2 (4.2)
	300	28	400 (1016)	10.5 (4.8)
	320	29	450 (1143)	11.8 (5.4)
	340	30	500 (1270)	13.1 (6)
.052 (1.3)	275	26	265 (673)	9.3 (4.2)
	310	28	300 (762)	10.5 (4.8)
	360	31	350 (889)	12.2 (5.6)
	400	33	390 (991)	13.6 (6.2)
.062 (1.6)	290	26	180 (457)	9.1 (4.1)
	310	28	200 (508)	10.1 (4.6)
	340	31	230 (584)	11.6 (5.3)
	370	34	260 (660)	13.2 (6)
	390	36	280 (711)	14.2 (6.4)

SPOOLARC 65 continued

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	60	14	150 (381)	1.7 (0.8)
	80	15	200 (508)	2.2 (1)
	100	15	250 (635)	2.8 (1.3)
	120	16	300 (762)	3.3 (1.5)
	140	16	350 (889)	3.9 (1.8)
	144	16	350 (914)	4 (1.8)
.035 (0.9)	90	15	180 (457)	2.7 (1.2)
	113	16	220 (559)	3.3 (1.5)
	137	18	260 (660)	4 (1.8)
	160	19	300 (762)	4.6 (2.1)
.045 (1.2)	130	17	125 (318)	3.1 (1.4)
	163	18	160 (406)	4 (1.8)
	200	19	200 (508)	5 (2.3)
.052 (1.3)	150	17	135 (343)	4.5 (2.1)
	173	18	160 (406)	5.4 (2.4)
	200	20	190 (483)	6.4 (2.9)

SPOOLARC 65 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
104TF44	65 030X11#SPX44#CT	662303520809
1042F04	65 030X44#SP	662303500337
104TF45	65 035X11#SPX44#CT	662303520786
1048F05	65 035X33#SP	662303500863
1042F05	65 035X44#SP	662303500344
104UF65	65 035X550#OMP 20 2/PLT	662303668143
104EFDD	65 045X35#SP E23765/1C	662303501198
1042F07	65 045X44#SP	662303500351
104UF67	65 045X550#OMP 20 2/PLT	662303668150
104YF28	65 1/16X36X5#T/30#CT F2 AWS	662303523374
1047F28	65 1/16X36X15#CT F2	662303500740
1047F08	65 1/16X36X25#CT F1	662303500689
1041F08	65 1/16X36X50#CT	662303500245
1042F08	65 1/16X44#SP	662303500368
1044F28	65 1/16X65#CL	662303500481
104YF30	65 3/32X36X10#T/60#CT F2 AWS	662303523381
1047F30	65 3/32X36X20#CT F2	662303500757
1047F10	65 3/32X36X30#CT F1	662303500696
1041F10	65 3/32X36X50#CT	662303500252
104YF32	65 1/8X36X10#T/60#CT F2 AWS	662303523398
1047F32	65 1/8X36X30#CT F2	662303500764
1047F12	65 1/8X36X40#CT F1	662303500702
1041F12	65 1/8X36X50#CT	662303500269
1047F34	65 5/32X36X30#CT F2 AWS	662303669393
104UF48	65 1/16X900#OMP 2/PLT	662303084332

SPOOLARC 29S AWS .ASME SFA5.17: EM13K

FEATURES

Spoolarc 29S is a general purpose copper-coated solid wire suitable for many carbon steel welding applications using either the MIG/Gas Metal Arc Welding (GMAW) or the Submerged Arc Welding (SAW) processes. Spoolarc 29S contains moderate amounts of manganese and silicon to provide sufficient deoxidation over light mill scale. Shielding gas choices for Spoolarc 29S in the GMAW mode are 100% carbon dioxide, argon/carbon dioxide mixtures, argon/oxygen mixtures, and other argon based mixed gas blends. In the SAW mode, Spoolarc 29S can be combined with a variety of active and neutral bonded fluxes to achieve better welding performance over Spoolarc 81 wire. Spoolarc 29S is used in a wide variety of applications including heavy equipment, automotive parts, railcars, agricultural equipment, and sheet metal welding.

CLASSIFICATIONS AND APPROVALS

- AWS.ASME SFA5.17: EM13K
- AWS/ASME SFA5.18: ER70S-3
- ABS 3SA, 3YSA
- Certified by CWB to CSA W48
- CAN/CSA-ISO14341,B-G 49A 2C G3 (ER49S-3)

WELDING PROCESS

- SAW (Sub Arc)
- GMAW (MIG)

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Civil Construction
- Automotive

TYPICAL MECHANICAL PROPERTIES

As Welded GMAW CO_2	
Yield Strength	61 ksi, 420 MPa
Tensile Strength	73 ksi, 505 MPa
Elongation in 2”	32%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded GMAW CO_2	95 ft-lb, 129 J

WELD METAL ANALYSIS

GMAW 100% CO_2	
C	0.07%
Mn	0.8%
Si	0.3%
P	0.009%
S	0.009%
Typical Wire Analysis	
C	0.08%
Mn	1.2%
Si	0.6%
P	0.007%
S	0.008%
Cu	0.02%

SPOOLARC 29S continued

DEPOSITION TABLE				
Electrode Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)		
		98% Ar / 2% CO_2 *98% Eff.	75% Ar / 25% CO_2 *96% Eff.	Straight CO_2 *93% Eff.
.030 (0.8)	75	2.0 (0.91)	1.9 (0.86)	1.8 (0.82)
	100	2.6 (1.18)	2.6 (1.18)	2.5 (1.13)
	150	4.1 (1.86)	4.0 (1.81)	3.9 (1.77)
	200	6.8 (3.08)	6.7 (3.04)	6.5 (2.95)
.035 (0.9)	80	2.2 (1.00)	2.1 (0.95)	2.0 (0.91)
	100	2.7 (1.22)	2.7 (1.22)	2.6 (1.18)
	150	4.2 (1.90)	4.1 (1.86)	4.0 (1.81)
	200	6.2 (2.81)	6.0 (2.72)	5.9 (2.68)
	250	9.0 (4.08)	8.8 (3.09)	8.6 (3.90)
.045 (1.2)	100	2.1 (0.95)	2.0 (0.91)	1.9 (0.86)
	125	2.8 (1.27)	2.8 (1.27)	2.7 (1.22)
	150	3.6 (1.63)	3.5 (1.59)	3.4 (1.54)
	200	5.6 (2.54)	5.5 (2.49)	5.3 (2.40)
	250	7.8 (3.58)	7.6 (3.45)	7.4 (3.36)
	300	10.2 (4.63)	10.0 (4.53)	9.7 (4.40)
	350	13.2 (5.99)	12.9 (5.85)	12.5 (5.67)
1/16 (1.6)	250	6.5 (2.95)	6.4 (2.90)	6.2 (2.81)
	275	7.7 (3.49)	7.6 (3.45)	7.3 (3.31)
	300	9.0 (4.08)	8.8 (3.99)	8.5 (3.86)
	350	11.3 (5.13)	11.0 (6.21)	10.7 (4.85)
	400	14.0 (6.35)	13.7 (6.21)	13.3 (6.03)
	450	17.4 (7.89)	17.1 (7.76)	16.5 (7.48)

SPOOLARC 29S continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
131TF43	29S 025X11#SPX44#CT	662303669355
1318F04	29S 030X33#SP	662303515553
1318F05	29S 035X33#SP	662303506957
1312F04	29S 030X44#SP	662303506605
1312F05	29S 035X44#SP	662303506612
1318F45	29S 035X60#SP	662303506995
1314F25	29S 035X65#CL	662303506650
1319F05	29S 035X500#MP	66203507121
131UF65	29S 035X550#OMP 20 2/PLT	662303668112
131UF85	29S 035X550#OMP 20 4/PLT	662303667931
131UF45	29S 035X900#OMP 2/PLT	662303521431
131XF45	29S 035X900#OMP PBPLT	662303521905
1315F65	29S 035X1000#WFRL 80-100 5 AR	662303520564
1312F06	29S 040X44#SP	662303668228
131UF46D	29S 040X900#OMP	662303084110
1318F07	29S 045X33#SP	662303506964
1312F07	29S 045X44#SP	662303506629
1318F47	29S 045X60#SP	662303507008
1314F27	29S 045X65#CL	662303506667
131UF67	29S 045X550#OMP 20 2/PLT	662303668136
131UF87	29S 045X550#OMP 20 4/PLT	662303668303
1319F07	29S 045X600#MP	662303507138
131UF47	29S 045X900#OMP 2/PLT	662303521585
131XF47	29S 045X900#OMP PBPLT	662303521882
1315F67	29S 045X1000#WFRL 80-100 5 AR	662303520571
131UM27	29S 045X1050#OMP 2/PLT CALSON	662303522322
1312F01D	29S 052X44#SP	662303084752
1318F41	29S 052X60#SP	662303506988
1314F21	29S 052X65#CL	662303506643
131UF41	29S 052X900#OMP 2/PLT	662303521592
1315F61	29S 052X1000#WFRL 80-100 5 AR	662303520526

SPOOLARC 29S continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1318F48	29S 1/16X60#SP	662303513160
1314F28	29S 1/16X65#CL	662303506674
131LF48	29S 1/16X400#SOMP 8/PLT	662303668020
131UF48	29S 1/16X900#OMP 2/PLT	662303522209
1315F68	29S 1/16X1000#WFRL 80-100 5A	662303520588
1314F30	29S 3/32X65#CL	662303506698
1316F90	29S 3/32X1000#DR	662303669966
1316F92	29S 1/8X1000#DR	662303669973
1315F52	29S 1/8X2200#EC	662303670689
1315F54	29S 5/32X2200#EC	662303506698

SPOOLARC 82 AWS A5.18: ER70S-3 H4

FEATURES

Spoolarc 82 is a premium quality, general purpose MIG wire subjected to stringent quality control procedures required for certification to Military, Lloyds, and ABS specifications. Spoolarc 82 is recommended for pressure vessel and pipe fabrication, HVAC duct work, and general carbon steel structural welding.

CLASSIFICATIONS AND APPROVALS

- LR: 3S, 3YS (H15)
- MIL-E-23765/1: MIL-70S-3
- ABS/AWS A5.18: ER70S-3 H4
- CAN/CSA-ISO14341,B-G 49A 2C G3 (ER49S-3)
- AWS/ASME SFA5.18: ER70S-3
- Certified by CWB to CSA W48

WELDING PROCESS

- GTAW (TIG)
- GMAW (MIG)

INDUSTRIES

- Automotive
- General Fabrication
- Pipeline
- Mobile Machinery

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)
As Welded 100% CO_2 Shielding Gas
75 ft-lb, 102 J
As Welded 98% Ar / 2% O_2 Shielding Gas
83 ft-lb, 112 J

TYPICAL MECHANICAL PROPERTIES

As Welded 98% Ar / 2% O_2 Shielding Gas	
Yield Strength	62 ksi, 425 MPa
Tensile Strength	76 ksi, 525 MPa
Elongation in 2”	28%
As Welded 100% CO_2 Shielding Gas	
Yield Strength	60 ksi, 415 MPa
Tensile Strength	73 ksi, 505 MPa
Elongation in 2”	28%

WELD METAL ANALYSIS

100% CO_2 Shielding Gas	
C	0.07%
Mn	0.9%
Si	0.4%
P	0.006%
S	0.008%
98% Ar / O_2 Shielding Gas	
C	0.8%
Mn	1.0%
Si	0.5%
P	0.006%
S	0.008%
Typical Wire Analysis	
C	0.09%
Mn	1.2%
Si	0.5%
P	0.007%
S	0.005%
Cu	0.07%

SPOOLARC 82 continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	160	24	500 (1270)	5.8 (2.6)
	173	25	550 (1397)	6.4 (2.9)
	187	25	600 (1524)	7 (3.2)
	200	26	650 (1651)	7.6 (3.4)
.035 (0.9)	180	25	400 (1016)	6.3 (2.9)
	197	26	450 (1143)	7.1 (3.2)
	213	26	500 (1270)	7.9 (3.6)
	230	27	550 (1397)	8.7 (4)
.045 (1.2)	260	25	300 (762)	7.9 (3.6)
	280	26	350 (889)	9.2 (4.2)
	300	28	400 (1016)	10.5 (4.8)
	320	29	450 (1143)	11.8 (5.4)
	340	30	500 (1270)	13.1 (6)
.052 (1.3)	275	26	265 (673)	9.3 (4.2)
	310	28	300 (762)	10.5 (4.8)
	360	31	350 (889)	12.2 (5.6)
	400	33	390 (991)	13.6 (6.2)
.062 (1.6)	290	26	180 (457)	9.1 (4.1)
	310	28	200 (508)	10.1 (4.6)
	340	31	230 (584)	11.6 (5.3)
	370	34	260 (660)	13.2 (6)
	390	36	280 (711)	14.2 (6.4)

SPOOLARC 82 continued

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	60	14	150 (381)	1.7 (0.8)
	80	15	200 (508)	2.2 (1)
	100	15	250 (635)	2.8 (1.3)
	120	16	300 (762)	3.3 (1.5)
	140	16	350 (889)	3.9 (1.8)
	144	16	350 (914)	4 (1.8)
.035 (0.9)	90	15	180 (457)	2.7 (1.2)
	113	16	220 (559)	3.3 (1.5)
	137	18	260 (660)	4 (1.8)
	160	19	300 (762)	4.6 (2.1)
.045 (1.2)	130	17	125 (318)	3.1 (1.4)
	163	18	160 (406)	4 (1.8)
	200	19	200 (508)	5 (2.3)
.052 (1.3)	150	17	135 (343)	4.5 (2.1)
	173	18	160 (406)	5.4 (2.4)
	200	20	190 (483)	6.4 (2.9)

SPOOLARC 82 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1212F04	82 030X44#SP	662303504243
121EFBC	82 035X25#SP 23765/1E	662303505004
121EFBD	82 035X35#SP 23765/1E	662303505011
1212F05	82 035X44#SP	662303504250
121UF45	82 035X900#OMP 2/PLT	662303668914
1212F07	82 045X44#SP	662303504274
1218F47	82 045X60#SP	662303504748
121UF67	82 045X550#OMP 20 2/PLT	662303668174
121UF27	82 045X1050#OMP 2/PLT	662303668938
121UF21	82 052X1050#OMP 2/PLT	662303668921
1217F08	82 1/16X36X25#CT F1	662303504595
1218F48	82 1/16X60#SP	662303504755
1217F10	82 3/32X36X30#CT F1	662303504601
1217F32	82 1/8X36X20#CT F2	662303671068
1217F12	82 1/8X36X40#CT F1	662303504618

ESAB MIG-6 AWS A5.18

FEATURES

ESAB MIG-6 contains higher levels of deoxidizers (manganese and silicon). The high content of deoxidizers allow welding over heavier amounts of dirt,rust, and mill scale while providing a more fluid puddle and smoother bead profile.

CLASSIFICATIONS AND APPROVALS

- CAN/CSA-ISO 14341, B-G 49A 3C G6 (ER49S-6)
- Certified by CWB to CSA W48.01 ER49S-6
- AWS A5.18

WELDING PROCESS

- GMAW (MIG)

INDUSTRIES

- Shipbuilding
- Civil Construction
- Mobile Machinery
- General Fabrication
- Automotive

TYPICAL MECHANICAL PROPERTIES

As Welded GMAW 100% CO_2	
Yield Strength	61 ksi, 424 MPa
Tensile Strength	75 ksi, 518 MPa
Elongation in 2”	28%
As Welded GMAW 75% Ar / 25% CO_2	
Yield Strength	70 ksi, 483 MPa
Tensile Strength	84 ksi, 583 MPa
Elongation in 2”	26%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded GMAW 100% CO_2	
	57 ft-lb, 77 J
As Welded GMAW 75% Ar / 25% CO_2	
	67 ft-lb, 91 J

WELD METAL ANALYSIS

GMAW 100% CO_2	
C	0.073%
Mn	0.97%
Si	0.51%
P	0.009%
S	0.013%
GMAW 75% Ar / 25% CO_2	
C	0.075%
Mn	1.22%
Si	0.67%
P	0.010%
S	0.014%

ESAB MIG-6 continued

DEPOSITION TABLE - Spray Transfer Welding Parameters							
Diameter in (mm)	Electrode Unit in/lb (m/kg)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Opt. Amps	Opt. Volts	Opt. Wire Feed Speed ipm (cm/min)
.030 (0.8)	5000 280)	160 - 200	24-26	500 - 650 (1270 - 1651)	180	25	520 (1321)
.035 (0.9)	3670 (206)	180 - 230	25-27	400 - 550 (1016 - 1397)	200	26	480 (1219)
.045 (1.2)	2220 (124)	260 - 340	25-30	300 - 500 (762 - 1270)	300	27	350 (889)
.052 (1.4)	1665 (93)	275 - 400	26-33	265 - 390 (673 - 991)	325	28	310 (787)

DEPOSITION TABLE - Shortarc Transfer Welding Parameters							
Diameter in (mm)	Electrode Unit in/lb (m/kg)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Opt. Amps	Opt. Volts	Opt. Wire Feed Speed ipm (cm/min)
.030 (0.8)	5000 280)	60 - 140	14 - 16	150 - 350 (381 - 889)	100	15	220 (559)
.035 (0.9)	3670 (206)	90 - 160	15 - 19	180 - 300 (457 - 762)	130	17	250 (635)
.045 (1.2)	2220 (124)	130 - 200	17 - 19	125 - 200 (318 - 508)	160	18	150 (381)
.052 (1.4)	1665 (93)	150 - 200	17 - 20	135 - 190 (343-483)	160	18	140 (356)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1638C04	MIG-6 030X33#SP	662303517021
163TC05	MIG-6 035X10# SP 12”	662303074791
163TC85	MIG-6 035X33#AWS	662303520007
1632C25	MIG-6 035X44#SP 2772#/PLT	662303518608
1638C45A	MIG-6 035X60#SP	662303080082
1639C65	MIG-6 035X550#MP 2/PLT	662303518233
163TC87	MIG-6 045X33#AWS	662303520618
1632C27	MIG-6 045X44#SP 2772#/PLT	662303518615
1638C47A	MIG-6 045X60#SP	662303080099
1639C67	MIG-6 045X550#MP 2/PLT	662303518226
1639C01	MIG-6 052X550#MP 2/PLT	662303516888

SPOOLARC 86 AWS A5.18: ER70S-6 H4

FEATURES

Spoolarc 86 is a copper-coated solid wire containing high levels of manganese and silicon. Spoolarc 86 is suitable for many carbon steel welding applications using the MIG/Gas Metal Arc Welding (GMAW) process. The high levels of deoxidizers in Spoolarc 86 provide excellent tolerance of rust and mill scale. The high levels of manganese and silicon also provide excellent wetting action and a highly fluid weld puddle. Shielding gas choices for Spoolarc 86 in the GMAW mode are 100% carbon dioxide, argon/carbon dioxide mixtures, argon/oxygen mixtures, and other argon based mixed gas blends. Spoolarc 86 excels in HVAC duct work, heavy equipment fabrication, structural, and other general steel fabrication.

CLASSIFICATIONS AND APPROVALS

- LR: 3S, 3YS (H15)
- ABS/AWS A5.18: ER70S-6 H4
- CAN/CSA-ISO14341,B-G 49A 3C G6 (ER49S-6)
- AWS/ASME SFA5.18: ER70S-6
- AWS/ASME SFA5.17: EH11K
- Certified by CWB to CSA W48
- MIL-E-23765/1: MIL-70S-6

WELDING PROCESS

- GMAW (MIG)
- SAW (Sub Arc)
- GTAW (TIG)

INDUSTRIES

- Automotive
- Mobile Machinery
- General Fabrication
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	72 ksi, 497 MPa
Tensile Strength	86 ksi, 593 MPa
Elongation in 2”	27%
As Welded 100% CO_2	
Yield Strength	68 ksi, 469 MPa
Tensile Strength	82 ksi, 563 MPa
Elongation in 2”	30%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	
	67 ft-lb, 91 J
As Welded 100% CO_2	45 ft-lb, 61 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.070%
Mn	1.19%
Si	0.62%
P	0.012%
S	0.011%
100% CO_2	
C	0.090%
Mn	1.08%
Si	0.51%
P	0.014%
S	0.010%

SPOOLARC 86 continued

DEPOSITION TABLE				
Electrode Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)		
		98% Ar / 2% CO_2 *98% Eff.	75% Ar / 25% CO_2 *96% Eff.	Straight CO_2 *93% Eff.
.030 (0.8)	75	2.0 (0.91)	1.9 (0.86)	1.8 (0.82)
	100	2.6 (1.18)	2.6 (1.18)	2.5 (1.13)
	150	4.1 (1.86)	4.0 (1.81)	3.9 (1.77)
	200	6.8 (3.08)	6.7 (3.04)	6.5 (2.95)
.035 (0.9)	80	2.2 (1.00)	2.1 (0.95)	2.0 (0.91)
	100	2.7 (1.22)	2.7 (1.22)	2.6 (1.18)
	150	4.2 (1.90)	4.1 (1.86)	4.0 (1.81)
	200	6.2 (2.81)	6.0 (2.72)	5.9 (2.68)
	250	9.0 (4.08)	8.8 (3.09)	8.6 (3.90)
.045 (1.2)	100	2.1 (0.95)	2.0 (0.91)	1.9 (0.86)
	125	2.8 (1.27)	2.8 (1.27)	2.7 (1.22)
	150	3.6 (1.63)	3.5 (1.59)	3.4 (1.54)
	200	5.6 (2.54)	5.5 (2.49)	5.3 (2.40)
	250	7.8 (3.58)	7.6 (3.45)	7.4 (3.36)
	300	10.2 (4.63)	10.0 (4.53)	9.7 (4.40)
	350	13.2 (5.99)	12.9 (5.85)	12.5 (5.67)
1/16 (1.6)	250	6.5 (2.95)	6.4 (2.90)	6.2 (2.81)
	275	7.7 (3.49)	7.6 (3.45)	7.3 (3.31)
	300	9.0 (4.08)	8.8 (3.99)	8.5 (3.86)
	350	11.3 (5.13)	11.0 (6.21)	10.7 (4.85)
	400	14.0 (6.35)	13.7 (6.21)	13.3 (6.03)
	450	17.4 (7.89)	17.1 (7.76)	16.5 (7.48

SPOOLARC 86 continued

DEPOSITION TABLE - Subarc Deposition Data			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/8 (3.2)	400	11.0 (5)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	900	26.0 (11.8)	99

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1388F03	86 025X33#SP	662303512705
138TF44	86 030X11#SPX44#CT	662303520915
1388F04	86 030X33#SP	662303512859
1382F04	86 030X44#SP	662303507930
138TF45	86 035X11#SPX44#CT	662303520700
1388F05	86 035X33#SP	662303508241
1382F05	86 035X44#SP	662303507947
1388F45	86 035X60#SP	662303508319
1384F25	86 035X65#CL	662303508029
138LF45	86 035X400#SOMP 8/PLT	662303667641
1389F05	86 035X500#MP	662303508425
138UF65	86 035X550#OMP 20 2/PLT	662303521349
138UF85	86 035X550#OMP 20 4/PLT	662303668440
138XF65	86 035X550#OMP 20 PBPLT	662303668785
138UF45	86 035X900#OMP 2/PLT	662303521523
138XF45	86 035X900#OMP PBPLT	662303522148
1385F65	86 035X1000#WFRL 80-100 5 AR	662303520083

SPOOLARC 86 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1382F06	86 040X44#SP	662303515973
138LF46	86 040X400#SOMP 8/PLT	662303085001
138UF86	86 040X550#OMP 20 4/PLT	662303668389
138UF46	86 040X900#OMP 2/PLT	662303522490
1388F07	86 045X33#SP	662303508258
1382F07	86 045X44#SP	662303507954
1388F47	86 045X60#SP	662303508326
1384F27	86 045X65#CL	662303508036
138LF47	86 045X400#SOMP 8/PLT	662303667658
12Y9F07	86 045X500#MP 4/PLT	662303523084
138UF67	86 045X550#OMP 20 2/PLT	662303668082
138UF87	86 045X550#OMP 20 4/PLT	662303668457
138XF67	86 045X550#OMP 20 PBPLT	662303668792
1389F07	86 045X600#MP	662303508449
138UF47	86 045X900#OMP 2/PLT	662303521493
138UF47ED	86 045X900#OMP 2/PLT ENDLESS	662303669010
138XF47	86 045X900#OMP PBPLT	662303521578
1380F07	86 045X1000#RL	662303507886
1385F67	86 045X1000#WFRL 80-100 5 AR	662303520113
138UF27	86 045X1050#OMP 2/PLT	662303522513
138TF41	86 052X11#SP/44#CT	662303669409
138TF43	86 025X11#SPX44#CT	662303520649
1382F01	86 052X44#SP	662303513986
1388F41	86 052X60#SP	662303508302
138LF41	86 052X400 # SOMP 8/PLT	662303669799
138UF81	86 052X550#OMP 20 4/PLT	662303668846
138UF41	86 052X900#OMP 2/PLT	662303521394
138XF41	86 052X900#OMP PBPLT	662303668365
1385F61	86 052X1000 # WFRL 80-100 5 AR	662303671075
138YF28	86 1/16X36X10#T/60#CT F2 AWS	662303087913
1387F28	86 1/16X36X15#CT F2	662303084721

SPOOLARC 86 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1382F08	86 1/16X44#SP	662303507961
1384F28	86 1/16X65#CL	662303508043
1388F68	86 1/16X700#RL 80-100	662303508371
138UF48	86 1/16X900#OMP 2/PLT	662303521745
1380F08	86 1/16X1000#RL	662303507893
1385F68	86 1/16X1000#WFRL 80-100 5 AR	662303520601
138YF30	86 3/32X36X10#T/60#CT F2 AWS	662303671099
1387F30	86 3/32X36X20#CT F2	662303508227
1387F10	86 3/32X36X30#CT F1	662303508203
1381F10	86 3/32X36X50#CT F0	662303507916
1384F30	86 3/32X65#CL	662303508050
1388F90	86 3/32X250#RL	662303670337
138KF30	86 3/32X750#RL	662303670368
1386F90	86 3/32X1000#DR	662303669980
138YF32	86 1/8X36X10#T/60#CT F2 AWS	662303671082
1387F32	86 1/8X36X30#CT F2	662303508234
1387F12	86 1/8X36X40#CT F1	662303515485
1386F92	86 1/8X1000#DR	662303669997
1384F34	86 5/32X65#CL	662303508074
1388F94	86 5/32X250#RL	662303670344
138KF34	86 5/32X750#RL	662303670375
1386F14	86 5/32X800#DR	662303508142
1385F54	86 5/32X2200#EC	662303670672
1385F53	86 7/32XROD COIL	662303081478

OK Aristorod 12.50 (ER70S-6) AWS SFA5.18: ER70S-6

FEATURES

OK AristoRod 12.50 is a MIG wire featuring ESAB's proprietary ASC (Advanced Surface Characteristics) technology. The unique wire surface of AristoRod improves feedability and arc stability, provides extended corrosion resistance and arc starting properties, and reduces contact tip wear. AristoRod 12.50 contains sufficient levels of manganese and silicon to provide a fluid weld puddle with superb wetting action. The high levels of manganese and silicon also make AristoRod 12.50 a good choice for welding over moderate to high levels of rust and mill scale. Shielding gas choices for AristoRod 12.50 include 100% CO_2, argon/CO_2 mixtures, argon/O_2 mixtures, and other argon based mixed gas blends. AristoRod 12.50 is used to weld carbon steels typically used in structural, automotive, agricultural and heavy equipment, and other general fabrication.

CLASSIFICATIONS AND APPROVALS

- DNV III YMS
- CWB CSA W48: ER49S-6
- BV SA3YM
- ABS 3SA,3YSA
- DB 42.039.29
- AWS SFA5.18: ER70S-6
- GL 3YS
- LR 3S 3YS
- VdTUV 10052

WELDING PROCESS

- GMAW (MIG)

INDUSTRIES

- Automotive
- Mobile Machinery
- General Fabrication
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

90% Ar/10% CO_2	
Yield Strength	66 ksi
Tensile Strength	82 ksi
Elongation in 2"	27%
Reduction of Area	56%
CVN (@-20°F)	82
75% Ar/25% CO_2	
Yield Strength	66 ksi
Tensile Strength	82 ksi
Elongation in 2"	28%
Reduction of Area	61%
CVN (@-20°F)	44
100% CO_2	
Yield Strength	65 ksi
Tensile Strength	78 ksi
Elongation in 2"	25%
Reduction of Area	70%
CVN (@-20°F)	27

CHARPY V-NOTCH PROPERTIES

Testing Temperature -40°F (-40°C)	
As Welded 75% Ar / 25% CO_2	
	70 ft-lb, 51 J
Testing Temperature -4°F (-20°C)	
As Welded 75% Ar / 25% CO_2	
	51 ft-lb, 70 J

OK Aristorod 12.50 (ER70S-6) continued

WELD METAL ANALYSIS	
90% Ar/10% CO_2	
C	0.08%
Mn	1.22%
Si	0.730%
P	0.013%
S	0.012%
Cu	0.01%
75% Ar/25% CO_2	
C	0.08%
Mn	1.19%
Si	0.68%
P	0.012%
S	0.012%
Cu	0.02%
100% CO_2	
C	0.07%
Mn	1.00%
Si	0.56%
P	0.012%
S	0.011%
Cu	0.01%

OK ARISTOROD 12.50 (ER70S-6) continued

DEPOSITION TABLE				
Electrode Diameter in (mm)	Amps	Deposition Rate lbs./hr (kg/hr)		
		98% Ar 2% 02 *98% Eff.	75% Ar 25% 02 *96% Eff.	Straight CO_2 *96% Eff.
.030 (0.8)	75	2.0, 0.91	1.9, 0.86	1.8, 0.82
	100	2.6, 1.18	2.6, 1.18	2.5, 1.13
	150	4.1, 1.86	4.0, 1.81	3.9, 1.77
	200	6.8, 3.08	6.7, 3.04	6.5, 2.95
.035 (0.9)	80	2.2, 1.00	2.1, 0.95	2.0, 0.91
	100	2.7, 1.22	2.7, 1.22	2.6, 1.18
	150	4.2, 1.90	4.1, 1.86	4.0, 1.81
	200	6.2, 2.81	6.0, 2.72	5.9, 2.68
	250	9.0, 4.08	8.8, 3.99	8.6, 3.90
.045 (1.2)	100	2.1, 0.95	2.0, 0.91	1.9, 0.86
	125	2.8, 1.27	2.8, 1.27	2.7, 1.22
	150	3.6, 1.63	3.5, 1.59	3.4, 1.54
	200	5.6, 2.54	5.5, 2.49	5.3, 2.40
	250	7.8, 3.58	7.6, 3.45	7.4, 3.36
	300	10.2, 4.63	10.0, 4.53	9.7, 4.40
	350	13.2, 5.99	12.9, 5.85	12.5, 5.67
1/16 (1.6)	250	6.5, 2.95	6.4, 2.90	6.2, 2.81
	275	7.7, 3.49	7.6, 3.45	7.3, 3.31
	300	9.0, 4.08	8.8, 3.99	8.5, 3.86
	350	11.3, 5.13	11.0, 4.99	10.7, 4.85
	400	14.0, 6.35	13.7, 6.21	13.3, 6.03
	450	17.4, 7.89	17.1, 7.76	16.5, 7.48

OK ARISTOROD 12.50 (ER70S-6) continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1A5009691A	OK ARISTOROD12.50 035X40#AWS	662303083762
1A5009932A	OK AR12.50 035X550# OMP 4/PLT	662303669515
1A500994EA	OK AR12.50 035X900# OMP ED	662303669669
1A5011691A	OK ARISTOROD12.50 045X40#AWS	662303076054
1A5011932A	OK AR12.50 045X550# OMP 4/PLT	662303669522
1A501194EA	OK AR12.50 045X900# OMP ED	662303669652
1A5013691A	OK ARISTOROD12.50 052X40#AWS	662303076061
1A5013932A	OK AR12.50 052X550# OMP 4/PLT	662303669539
1A501394EA	OK AR12.50 052X900# OMP ED	662303669676
1A5013949A	OK ARISTOROD12.50 052X900#OMP	662303077365
1A5016949A	OK ARISTOROD12.50 1/16X900#OMP	662303077372
1A50149400	OK AR12.50 1.4MMX475KG OMP	662303671013

SPOOLARC 87HP AWS /ASME SFA5.18: ER70S-7

FEATURES

Spoolarc 87 HP is a high manganese carbon steel wire. It features an optimized manganese to silicon ratio to produce excellent appearing welds over a wide range of welding parameters. It also produces excellent weld metal mechanical properties. Spoolarc 87 HP is suitable for welding over moderate amounts of rust and scale. This wire is widely used for robotic welding applications in the automotive industry, and fabrication of heavy equipment and farm implements. Spoolarc 87 HP is also available as a TIG rod.

WELDING PROCESS

- GTAW (TIG)
- GMAW (MIG)

INDUSTRIES

- Shipbuilding
- Mobile Machinery
- General Fabrication
- Automotive

TYPICAL MECHANICAL PROPERTIES

As Welded GMAW 100% CO_2	
Yield Strength	68 ksi, 470 MPa
Tensile Strength	82 ksi, 565 MPa
Elongation in 2”	27%
As Welded GMAW 75% Ar / 25% CO_2	
Yield Strength	70 ksi, 480 MPa
Tensile Strength	82 ksi, 565 MPa
Elongation in 2”	29%

CLASSIFICATIONS AND APPROVALS

- AWS/ASME SFA5.18: ER70S-7
- CAN/CSA-ISO14341,B-G 49A 3C G7 (ER49S-7)
- Certified by CWB to CSA W48

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded GMAW 100% CO_2	
	55 ft-lb, 75 J
As Welded GMAW 75% Ar / 25% CO_2	
	62 ft-lb, 84 J

WELD METAL ANALYSIS

GMAW 100% CO_2	
C	0.09%
Mn	1.2%
Si	0.4%
P	0.008%
S	0.010%
GMAW 75% Ar / 25% CO_2	
C	0.09%
Mn	1.4%
Si	0.5%
P	0.008%
S	0.010%
Typical Wire Analysis	
C	0.08%
Mn	0.6%
Si	0.6%
P	0.009%
S	0.008%

SPOOLARC 87HP continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr, kg/hr
.023 (0.6)	100	23	400 (1016)	2.7 (1.2)
	106	23	450 (1143)	3.1 (1.4)
	111	24	500 (1270)	3.4 (1.6)
	117	24	550 (1397)	3.8 (1.7)
	122	25	600 (1524)	4.1 (1.9)
	125	25	630 (1600)	4.3 (2)
.030 (0.8)	160	24	500 (1270)	5.8 (2.6)
	173	25	550 (1397)	6.4 (2.9)
	187	25	600 (1524)	7 (3.2)
	200	26	650 (1651)	7.6 (3.4)
.035 (0.9)	180	25	400 (1016)	6.3 (2.9)
	197	26	450 (1143)	7.1 (3.2)
	213	26	500 (1270)	7.9 (3.6)
	230	27	550 (1397)	8.7 (4)
.045 (1.2)	260	25	300 (762)	7.9 (3.6)
	280	26	350 (889)	9.2 (4.2)
	300	28	400 (1016)	10.5 (4.8)
	320	29	450 (1143)	11.8 (5.4)
	340	30	500 (1270)	13.1 (6)
.052 (1.3)	275	26	265 (673)	9.3 (4.2)
	310	28	300 (762)	10.5 (4.8)
	360	31	350 (889)	12.2 (5.6)
	400	33	390 (991)	13.6 (6.2)
.062 (1.6)	290	26	180 (457)	9.1 (4.1)
	310	28	200 (508)	10.1 (4.6)
	340	31	230 (584)	11.6 (5.3)
	370	34	260 (660)	13.2 (6)
	390	36	280 (711)	14.2 (6.4)

SPOOLARC 87HP continued

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr, kg/hr
.030 (0.8)	60	14	150 (381)	1.7 (0.8)
	80	15	200 (508)	2.2 (1)
	100	15	250 (635)	2.8 (1.3)
	120	16	300 (762)	3.3 (1.5)
	140	16	350 (889)	3.9 (1.8)
	144	16	350 (914)	4 (1.8)
.035 (0.9)	90	15	180 (457)	2.7 (1.2)
	113	16	220 (559)	3.3 (1.5)
	137	18	260 (660)	4 (1.8)
	160	19	300 (762)	4.6 (2.1)
.045 (1.2)	130	17	125 (318)	3.1 (1.4)
	163	18	160 (406)	4 (1.8)
	200	19	200 (508)	5 (2.3)
.052 (1.3)	150	17	135 (343)	4.5 (2.1)
	173	18	160 (406)	5.4 (2.4)
	200	20	190 (483)	6.4 (2.9)

SPOOLARC 87HP continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1452F04	87HP 030X44#SP	662303508883
11FTF45	87HP 035X10LB 12 SP	662303515225
1458F05	87HP 035X33#SP	662303513771
1452F05	87HP 035X44#SP	662303508890
145UF85	87HP 035X550#OMP 20 4/PLT	662303668853
1452F07	87HP 045X44#SP	662303508906
145UF87	87HP 045X550#OMP 20 4/PLT	662303668822
145UF47	87HP 045X900#OMP 2/PLT	662303671792
1457F08	87HP 1/16X36X25#CT F1	662303509019
145UF48	87HP 1/16X900#OMP 2/PLT	662303668891
1457F10	87HP 3/32X36X30#CT F1	662303509026
1457F32	87HP 1/8X36X30#CT F2	662303509057
1457F12	87HP 1/8X36X40#CT F1	662303509033
1451F12	87HP 1/8X36X50#CT F0	662303508852
1451F14	87HP 5/32X36X50#CT F0	662303508869

SPOOLARC 75 AWS /ASME SFA 5.23 ENi1K

FEATURES

Spoolarc 75 is a copper-coated 1% nickel solid wire for carbon steel and low alloy welding applications using either the MIG/Gas Metal Arc Welding (GMAW) or Submerged Arc Welding (SAW) processes. Spoolarc 75 produces a deposit that meets the weathering requirements of AWS D1.1 and D1.5 and is designed to weld weathering steels and/or where improved low temperature impact toughness is specified.

Shielding gas choices for Spoolarc 75 are Ar/CO_2 mixtures containing a minimum of 75% Ar or the 98% Ar/2% O_2. In the SAW mode, Spoolarc 75 is typically used with a neutral flux such as ESAB OK Flux 429, 10.71, and 10.62. Spoolarac 75 is used for bridge and structural welding.

CLASSIFICATIONS AND APPROVALS

- AWS/ASME SFA 5.23: ENi1K
- AWS/ASME SFA 5.28: ER80S-Ni1

WELDING PROCESS

- SAW (Sub Arc)
- GMAW (MIG)

INDUSTRIES

- Mobile Machinery
- Shipbuilding
- General Fabrication
- Bridge Construction

TYPICAL MECHANICAL PROPERTIES

As Welded 98% Ar / 2% O_2	
Yield Strength	70 ksi, 485 MPa
Tensile Strength	81 ksi, 560 MPa
Elongation in 2”	31%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -50°F (-45°C)
As Welded 98% Ar / 2% CO_2
100 ft-lb, 135 J

WELD METAL ANALYSIS

C	0.08%
Mn	0.89%
Si	0.46%
P	0.004%
S	0.008%
Cr	0.02%
Ni	0.90%
Mo	0.01%
Cu	0.07%

SPOOLARC 75 continued

DEPOSITION TABLE - Subarc Deposition Data			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
3/32 (2.4)	400	13.2 (6)	99
	500	17.0 (7.7)	99
	600	22.0 (10)	99
1/8 (3.2)	400	11.0 (5)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
13P2F05	75 035X44#SP	662303522353
13P2F07	75 045X44#SP	662303522360
13P4F29	75 5/64X65#CL	662303521530
13P4F30	75 3/32X65#CL	662303521448
13P5F30	75 3/32X200#CL	662303670443
13P6F90	75 3/32X1000#DR	662303670801
13P4F32	75 1/8X65#CL	662303521455
13P6F92	75 1/8X1000#DR	662303670184
13P4F34	75 5/32X65#CL	662303521646
13P6F94	75 5/32X1000#DR	662303670191

SPOOLARC 83 AWS /ASME SFA5.28: ER80S-D2/ER90S-D2

FEATURES

Spoolarc 83 contains 0.5% Mo to provide higher deposit strength in both the as welded and stress relieved conditions. It contains high levels of Manganese and Silicon to provide good wetting and good rust and scale tolerance. Spoolarc 83 is also used for all-position welding of high tensile pipe and tubing commonly found in earthmoving and construction equipment. It is available in forms suitable for MIG and TIG welding.

CLASSIFICATIONS AND APPROVALS

- Certified by CWB to CSA W48
- AWS/ASME SFA5.28: ER80S-D2/ER90S-D2
- CAN/CSA-ISO14341,B-G 55A 3 G4M31 (ER80S-3
- MIL-E-23765/2; 80S-3
- AWS/ASME SFA5.23: EA3K

INDUSTRIES

- General Fabrication
- Mobile Machinery
- Automotive
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded 98% Ar / 2% O_2 Shielding Gas	
Yield Strength	95 ksi, 655 MPa
Tensile Strength	110 ksi, 750 MPa
Elongation in 2”	22%
As Welded 100% CO_2 Shielding Gas	
Yield Strength	77 ksi, 530 MPa
Tensile Strength	92 ksi, 635 MPa
Elongation in 2”	23%

WELDING PROCESS

- GTAW (TIG)
- GMAW (MIG)
- SAW (Sub Arc)

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded 100% CO_2 Shielding Gas	
	44 ft-lb, 60 J
As Welded 98% Ar / 2% O_2 Shielding Gas	
	87 ft-lb, 118 J

WELD METAL ANALYSIS

100% CO_2 Shielding Gas	
C	0.08%
Mn	1.16%
Si	0.34%
P	0.008%
S	0.012%
Mo	0.39%
98% Ar / O_2 Shielding Gas	
C	0.09%
Mn	1.65%
Si	0.60%
P	0.013%
S	0.012%
Mo	0.43%
Typical Wire Analysis	
C	0.07%
Mn	1.78%
Si	0.66%
P	0.009%
S	0.008%
Mo	0.49%

SPOOLARC 83 continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	160	24	500 (1270)	5.8 (2.6)
	173	25	550 (1397)	6.4 (2.9)
	187	25	600 (1524)	7 (3.2)
	200	26	650 (1651)	7.6 (3.4)
.035 (0.9)	180	25	400 (1016)	6.3 (2.9)
	197	26	450 (1143)	7.1 (3.2)
	213	26	500 (1270)	7.9 (3.6)
	230	27	550 (1397)	8.7 (4)
.045 (1.2)	260	25	300 (762)	7.9 (3.6)
	280	26	350 (889)	9.2 (4.2)
	300	28	400 (1016)	10.5 (4.8)
	320	29	450 (1143)	11.8 (5.4)
	340	30	500 (1270)	13.1 (6)
.052 (1.3)	275	26	265 (673)	9.3 (4.2)
	310	28	300 (762)	10.5 (4.8)
	360	31	350 (889)	12.2 (5.6)
	400	33	390 (991)	13.6 (6.2)
.062 (1.6)	290	26	180 (457)	9.1 (4.1)
	310	28	200 (508)	10.1 (4.6)
	340	31	230 (584)	11.6 (5.3)
	370	34	260 (660)	13.2 (6)
	390	36	280 (711)	14.2 (6.4)

SPOOLARC 83 continued

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	60	14	150 (381)	1.7 (0.8)
	80	15	200 (508)	2.2 (1)
	100	15	250 (635)	2.8 (1.3)
	120	16	300 (762)	3.3 (1.5)
	140	16	350 (889)	3.9 (1.8)
	144	16	350 (914)	4 (1.8)
.035 (0.9)	90	15	180 (457)	2.7 (1.2)
	113	16	220 (559)	3.3 (1.5)
	137	18	260 (660)	4 (1.8)
	160	19	300 (762)	4.6 (2.1)
.045 (1.2)	130	17	125 (318)	3.1 (1.4)
	163	18	160 (406)	4 (1.8)
	200	19	200 (508)	5 (2.3)
.052 (1.3)	150	17	135 (343)	4.5 (2.1)
	173	18	160 (406)	5.4 (2.4)
	200	20	190 (483)	6.4 (2.9)

SPOOLARC 83 continued

DEPOSITION TABLE - Subarc Deposition Data			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/16 (1.6)	400	13.0 (5.90)	99
	500	17.0 (7.71)	99
5/65 (2.0)	300	10.8 (4.90)	99
	400	14.5 (6.58)	99
	500	18.2 (8.26)	99
3/32 (2.4)	400	13.2 (5.99)	99
	500	17.0 (7.71)	99
	600	22.0 (9.98)	99
1/8 (3.2)	400	11.0 (4.99)	99
	500	14.5 (6.58)	99
	600	18.0 (8.16)	99
	700	21.2 (9.62)	99
5/32 (4.0)	500	12.5 (5.67)	99
	600	16.0 (7.26)	99
	700	19.5 (23.2)	99
	800	23.0 (10.43)	99
	900	26.0 (11.79)	99
3/16 (4.8)	600	13.9 (6.31)	99
	700	17.5 (7.94)	99
	800	21.0 (9.53)	99
	900	25.0 (11.34)	99
	1,000	29.2 (13.25)	99
	1,100	34.0 (15.42)	99

SPOOLARC 83 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1262F04	83 030X44#SP	662303505660
126TF45	83 035X11#SPX44#CT	662303520670
1268F05	83 035X33#SP	662303506032
1262F05	83 035X44#SP	662303505677
1262F05S	83 035X44#SP	662303670474
1268F45	83 035X60#SP	662303506087
126UF65S	83 035X550# OMP 20 2/PLT	662303086732
126UF65	83 035X550#OMP 20 2/PLT	662303668198
126UF45	83 035X900#OMP 2/PLT	662303668594
1268F07	83 045X33#SP	662303506049
1262F07	83 045X44#SP	662303505684
1262F07S	83 045X44#SP	662303670481
1268F47	83 045X60#SP	662303506094
126UF67S	83 045X550 # OMP 20 2/PLT	662303086749
126UF67	83 045X550#OMP 20 2/PLT	662303668181
126UF47	83 045X900#OMP 2/PLT	662303668419
126XF47	83 045X900#OMP PBPLT	662303080075
1268F41	83 052X60#SP	662303668662
126UF61	83 052X550 # OMP 20 2/PLT	662303670702
126UF61S	83 052X550 # OMP 20 2/PLT	662303670498
126UF41	83 052X900#OMP 2/PLT	662303668600
1267F28	83 1/16X36X15#CT F2	662303084561
1262F08	83 1/16X44#SP	662303505691
1261F08	83 1/16X36X50#CT	662303505615
1268F48	83 1/16X60#SP	662303506100
1264F28	83 1/16X65#CL	662303505790
126UF48	83 1/16X900#OMP 2/PLT	662303668396

SPOOLARC 83 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1267F30	83 3/32X36X20#CT F2	662303505998
1261F10	83 3/32X36X50#CT	662303505622
1264F30	83 3/32X65#CL	662303669805
1267F32	83 1/8X36X30#CT F2	662303506001
1261F12	83 1/8X36X50#CT	662303505639
1264F32	83 1/8X65#CL	662303505820
1266F92	83 1/8X1000#DR	662303670146
1266F94	83 5/32X1000#DR	662303670153
126KF34	83 5/32X750#RL	662303669850
1264F35	83 3/16X65#CL	662303669881
126KF35	83 3/16X750#RL	662303669867
1266F15	83 3/16X800#DR	662303085902

SPOOLARC 95 AWS /ASME SFA5.28: ER100S-1

FEATURES

Spoolarc 95 is Military grade high strength wire used to weld HY-80 steels. Applications for Spoolarc 95 include military tanks, ships and submarines.

TYPICAL MECHANICAL PROPERTIES

Yield Strength	95,000 ksi, 655 MPa
Tensile Strength	105,000 ksi, 725 MPa
Elongation in 2”	23%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded 75% Ar / 25% O_2	
	93 ft-lb, 126 J
Testing Temperature -60°F (-51°C)	
As Welded 75% Ar / 25% O_2	
	65 ft-lb, 88 J

CLASSIFICATIONS AND APPROVALS

- Certified by CWB to CSA W48
- MIL-E-23765/2; MIL-E-100S-1
- AWS/ASME SFA5.28: ER100S-1
- AWS/ASME SFA5.23:EM2

WELDING PROCESS

- GTAW (TIG)
- GMAW (MIG)

WELD METAL ANALYSIS

C	0.07%
Mn	1.40%
Si	0.35%
P	0.008%
S	0.007%
Cr	0.20%
Ni	1.80%
Mo	0.35%

INDUSTRIES

- Heavy Fabrication
- Military Applications
- Shipbuilding
- Mining

SPOOLARC 95 continued

DEPOSITION TABLE - Spray Transfer Deposition Table			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/16 (1.6)	400 A	13.0 (5.90)	99
	500 A	17.0 (7.71)	99
5/64 (2.0)	300 A	10.8 (4.90)	99
	400 A	14.5 (6.58)	99
	500 A	18.2 (8.26)	99
3/32 (2.4)	400 A	13.2 (5.99)	99
	500 A	17.0 (7.71)	99
	600 A	22.0 (9.98)	99
1/8 (3.2)	400 A	11.0 (4.99)	99
	500 A	14.5 (6.58)	99
	600 A	18.0 (8.16)	99
	700 A	21.2 (9.62)	99
5/32 (4.0)	500 A	12.5 (5.67)	99
	600 A	16.0 (7.26)	99
	700 A	19.5 (23.2)	99
	800 A	23.0 (0.43)	99
	900 A	26.0 (11.79)	99
3/16 (4.8)	600 A	13.9 (6.31)	99
	700 A	17.5 (7.94)	99
	800 A	21.0 (9.53)	99
	900 A	25.0 (11.34)	99
	1000 A	29.2 (3.25)	99
	1100 A	34.0 (15.42)	99

SPOOLARC 95 continued

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	60	14	150 (381)	1.7 (0.8)
	80	15	200 (508)	2.2 (1)
	100	15	250 (635)	2.8 (1.3)
	120	16	300 (762)	3.3 (1.5)
	140	16	350 (889)	3.9 (1.8)
	144	16	350 (914)	4 (1.8)
.035 (0.9)	90	15	180 (457)	2.7 (1.2)
	113	16	220 (559)	3.3 (1.5)
	137	18	260 (660)	4 (1.8)
	160	19	300 (762)	4.6 (2.1)
.045 (1.2)	130	17	125 (318)	3.1 (1.4)
	163	18	160 (406)	4 (1.8)
	200	19	200 (508)	5 (2.3)
.052 (1.3)	150	17	135 (343)	4.5 (2.1)
	173	18	160 (406)	5.4 (2.4)
	200	20	190 (483)	6.4 (2.9)

SPOOLARC 95 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
2298F65	95 CU 035X35#SP	662303520410
229UF85	95 CU 035X550#OMP 4/PLT	662303085360
2298F67	95 CU 045X35#SP	662303511043
229UF87	95 CU 045X550#OMP 4/PLT	662303668976
2298F68	95 CU 1/16X35#SP	662303520403
2291F10	95 CU 3/32X36	662303510916
2294F30	95 CU 3/32X65#CL	662303510978
2314F32	95 BARE 1/8X65#CL	662303511357
2294F32	95 CU 1/8X65#CL	662303510985
2314F34	95 BARE 5/32X65#CL	662303511364
2294F34	95 CU 5/32X65#CL	662303510992
2298F74	95 CU 5/32X700#RL	662303670931
2296F94	95 CU 5/32X1000#DR	662303670269

SPOOLARC 120 AWS /ASME SFA 5.28: ER120S-1

FEATURES

Spoolarc 120 is designed for welding high strength quenched and tempered steels. Weld metal mechanical properties produce high tensile strengths, in excess of 120 ksi (825 MPa). Applications for Spoolarc 120 include military tanks, ships, submarines and other similar fabrication.

CLASSIFICATIONS AND APPROVALS

- AWS/ASME SFA 5.28: ER120S-1
- AWS/ASME SFA 5.23 EM4

WELDING PROCESS

- GMAW (MIG)
- GTAW (TIG)
- SAW (Sub Arc)

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded GMAW 98% Ar / 2% O_2	
Yield Strength	112 ksi, 775 MPa
Tensile Strength	123 ksi, 840 MPa
Elongation in 2”	19%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -60°F (-51°C)	
As Welded GMAW 98% Ar / 2% O_2	
	75 ft-lb, 102 J
Testing Temperature 0°F (-18°C)	
As Welded GMAW 98% Ar / 2% O_2	
	100 ft-lb, 136 J

WELD METAL ANALYSIS

GMAW 98% Ar / 2% O_2	
C	0.07%
Mn	1.3%
Si	0.35%
P	0.007%
S	0.008%
Cr	0.4%
Ni	2.6%
Mo	0.45%
Typical Wire Analysis	
C	0.05%
Mn	1.6%
Si	0.3%
P	0.005%
S	0.004%
Cr	0.3%
Ni	2.3%
Mo	0.5%

SPOOLARC 120 continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	160	24	500 (1270)	5.8 (2.6)
	173	25	550 (1397)	6.4 (2.9)
	187	25	600 (1524)	7 (3.2)
	200	26	650 (1651)	7.6 (3.4)
.035 (0.9)	180	25	400 (1016)	6.3 (2.9)
	197	26	450 (1143)	7.1 (3.2)
	213	26	500 (1270)	7.9 (3.6)
	230	27	550 (1397)	8.7 (4)
.045 (1.2)	260	25	300 (762)	7.9 (3.6)
	280	26	350 (889)	9.2 (4.2)
	300	28	400 (1016)	10.5 (4.8)
	320	29	450 (1143)	11.8 (5.4)
	340	30	500 (1270)	13.1 (6)
.052 (1.3)	275	26	265 (673)	9.3 (4.2)
	310	28	300 (762)	10.5 (4.8)
	360	31	350 (889)	12.2 (5.6)
	400	33	390 (991)	13.6 (6.2)
.062 (1.6)	290	26	180 (457)	9.1 (4.1)
	310	28	200 (508)	10.1 (4.6)
	340	31	230 (584)	11.6 (5.3)
	370	34	260 (660)	13.2 (6)
	390	36	280 (711)	14.2 (6.4)

SPOOLARC 120 continued

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	60	14	150 (381)	1.7 (0.8)
	80	15	200 (508)	2.2 (1)
	100	15	250 (635)	2.8 (1.3)
	120	16	300 (762)	3.3 (1.5)
	140	16	350 (889)	3.9 (1.8)
	144	16	350 (914)	4 (1.8)
.035 (0.9)	90	15	180 (457)	2.7 (1.2)
	113	16	220 (559)	3.3 (1.5)
	137	18	260 (660)	4 (1.8)
	160	19	300 (762)	4.6 (2.1)
.045 (1.2)	130	17	125 (318)	3.1 (1.4)
	163	18	160 (406)	4 (1.8)
	200	19	200 (508)	5 (2.3)
.052 (1.3)	150	17	135 (343)	4.5 (2.1)
	173	18	160 (406)	5.4 (2.4)
	200	20	190 (483)	6.4 (2.9)

SPOOLARC 120 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
2118F25	120 CU 035X11#SP	662303521752
2112F25	120 CU 035X35#SP	662303518318
2112F27	120 CU 045X35#SP	662303512729
211UF67	120 CU 045X550#OMP 20 2/PLT	662303669157
2117F08	120 CU 1/16X36X25#CT F1	662303669058
2112F28	120 CU 1/16X35#SP	662303520380
2117F10	120 CU 3/32X36X30#CT F1	662303669041
2114F30	120 CU 3/32X65#CL	662303668471
2117F12	120 CU 1/8X36X40#CT F1	662303670436
2114F32	120 CU 1/8X65#CL	662303510183
2116F94	120 CU 5/32X1000#DR	662303670818

SPOOLARC 140

FEATURES

Spoolarc 140 is a high strength wire designed to weld HY-130 steels. Meets MIL 140S-1 chemistry requirements. Applications for Spoolarc 140 include Military grade material as well as castings and some heat-treatable steels.

CLASSIFICATIONS AND APPROVALS

- No AWS Classification

WELDING PROCESS

- SAW (Sub Arc)
- GMAW (MIG)

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Shipbuilding
- Military Applications

TYPICAL MECHANICAL PROPERTIES

As Welded GMAW 98% Ar / 2% O_2	
Yield Strength	135 ksi, 930 MPa
Tensile Strength	145 ksi, 990 MPa
Elongation in 2”	16%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 72°F (22°C)	
As Welded GMAW 98% Ar / 2% O_2	
	65 ft-lb, 47 J
Testing Temperature 30°F (-1°C)	
As Welded GMAW 98% Ar / 2% O_2	
	55 ft-lb, 40 J

WELD METAL ANALYSIS

GMAW 98% Ar / 2% O_2	
C	0.1%
Mn	1.5%
Si	0.3%
Cr	0.7%
Ni	2.6%
Mo	0.85%
Typical Wire Analysis	
C	0.08%
Mn	1.7%
Si	0.4%
P	0.005%
S	0.006%
Cr	0.9%
Ni	2.4%
Mo	0.6%

SPOOLARC 140 continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	160	24	500 (1270)	5.8 (2.6)
	173	25	550 (1397)	6.4 (2.9)
	187	25	600 (1524)	7 (3.2)
	200	26	650 (1651)	7.6 (3.4)
.035 (0.9)	180	25	400 (1016)	6.3 (2.9)
	197	26	450 (1143)	7.1 (3.2)
	213	26	500 (1270)	7.9 (3.6)
	230	27	550 (1397)	8.7 (4)
.045 (1.2)	260	25	300 (762)	7.9 (3.6)
	280	26	350 (889)	9.2 (4.2)
	300	28	400 (1016)	10.5 (4.8)
	320	29	450 (1143)	11.8 (5.4)
	340	30	500 (1270)	13.1 (6)
.052 (1.3)	275	26	265 (673)	9.3 (4.2)
	310	28	300 (762)	10.5 (4.8)
	360	31	350 (889)	12.2 (5.6)
	400	33	390 (991)	13.6 (6.2)
.062 (1.6)	290	26	180 (457)	9.1 (4.1)
	310	28	200 (508)	10.1 (4.6)
	340	31	230 (584)	11.6 (5.3)
	370	34	260 (660)	13.2 (6)
	390	36	280 (711)	14.2 (6.4)

SPOOLARC 140 continued

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
.030 (0.8)	60	14	150 (381)	1.7 (0.8)
	80	15	200 (508)	2.2 (1)
	100	15	250 (635)	2.8 (1.3)
	120	16	300 (762)	3.3 (1.5)
	140	16	350 (889)	3.9 (1.8)
	144	16	350 (914)	4 (1.8)
.035 (0.9)	90	15	180 (457)	2.7 (1.2)
	113	16	220 (559)	3.3 (1.5)
	137	18	260 (660)	4 (1.8)
	160	19	300 (762)	4.6 (2.1)
.045 (1.2)	130	17	125 (318)	3.1 (1.4)
	163	18	160 (406)	4 (1.8)
	200	19	200 (508)	5 (2.3)
.052 (1.3)	150	17	135 (343)	4.5 (2.1)
	173	18	160 (406)	5.4 (2.4)
	200	20	190 (483)	6.4 (2.9)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
2148F67	140 CU 045X35#SP	662303510367
2148F68	140 CU 1/16X35#SP	662303510374

OK AUTROD 16.95

FEATURES

A continous solid corrosion resisting chromium-nickel-magnganese wire for welding of austenitic stainless alloys of 18% Cr, 8% Ni, 7% Mn types.

OK Autrod 16.95 has a general corrosion resistance similar to that of the corresponding parent metal. The higher silicon content improves the welding properties, such as wetting. The product is a modified variant of ER307, basically with a higher Mn content to make the weld metal less sensitive to hot cracking. When used for joining dissimilar materials the corrosion resistance is of secondary importance. The alloy is used in a wide range of applications across the industry such as joining of austenitic, manganese, work hardenable steels as well as armourplate and heat resistant steels.

CLASSIFICATIONS AND APPROVALS

- VdTUV
- UDT

WELDING PROCESS

- GMAW (MIG)

INDUSTRIES

- Armor Plating

TYPICAL MECHANICAL PROPERTIES

Yield Strength	65 ksi, 450 MPa
Tensile Strength	93 ksi, 640 MPa
Elongation in 2”	41%
CVN at 20°F	96 ft-lb, 130 J

WELD METAL ANALYSIS

C	0.1%
Mn	6.5%
Si	1%
Cr	18.5%
Ni	8.5%
P	.01%
S	.02%
Mo	0.1%
Cu	0.1%

OK AUTROD 16.95 continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	160 - 210	24 - 28	265 - 550 (673-1397)	6.5 - 9.6 (2.95 - 4.35)
0.035 (0.9)	170 - 255	24 - 30	240 - 468 (610-1189)	7.8 - 12.7 (2.54 - 5.76)
0.045 (1.2)	200 - 300	24 - 30	192 - 360 (488 - 914)	6.8 - 13.6 (3.08 - 6.17)
1/16 (1.6)	215 - 325	24 - 32	120 - 192 (305 - 488)	7.3 - 14.5 (3.31 - 6.58)

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	40 - 120	15 - 20	156 - 312 (396-792)	1.4 - 3.8 (0.64 - 1.72)
0.035 (0.9)	60 - 140	15 - 21	156 - 312 (396-792)	1.6 - 5.4 (0.73 - 2.45)
0.045 (1.2)	100 - 210	17 - 22	140 - 280 (356 - 711)	2.4 - 6.0 (1.09 - 2.72)
1/16 (1.6)	230 - 375	23 - 31	550 - 900 (1397 - 2286)	11.5 - 19 (5.2 - 8.6)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
169509932A	ES OK 16.95 035X500#OMP 2/PLT	662303084615
169510982A	ES OK 16.95 040X33#BAWS	662303085865
169510932A	ES OK 16.95 040X500# OMP 2/PLT	662303087647
169511950A	ES OK 16.95 045X250# OMP 2/PLT	662303086541
169511932A	ES OK 16.95 045X500#OMP 2/PLT	662303084608
169509982A	ES OK 16.95 .9X15KG BAWS	662303079543
169511982A	ES OK 16.95 1.2X15KG BAWS	662303081980
169516R150	ES OK 16.95 1.6X1000X5KG CT	662303085681
169516982A	ES OK 16.95 1.6X15KG BAWS	662303085803
169532R150	ES OK 16.95 3.2X1000X5KG CT E2	662303087807

OK Autrod 308LSi AWS A5.9: 308si/307Lsi

FEATURES

A continuous solid corrosion resisting chroumium-nickel wire for welding of austenitic chromium nickel alloys of 18% Cr - 8% Ni-type.

OK Autrod 308LSi has a good general corrosion resistance. The aloy has a low carbon content which makes this alloy particularly recommended where there is a risk of intergranular corrosion. The higher silicon content improves the welding properties, such as wetting. The alloy is widely used in the chemical and fod processing industries as well as for pipes, tubes and boilers.

TYPICAL MECHANICAL PROPERTIES

GMAW using 98% Argon / 2% Oxygen	
Yield Stress	54 ksi, 370 MPa
Tensile Strength	90 ksi, 620 MPa
Elongation in 2”	36%

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 6
- Certified by CWB - AWS A5.9
- ASME SFA 5.9 ER308Si/308LSi
- AWS A5.9: ER308Si/ER308LSi
- VdTUV
- DNV

WELD METAL ANALYSIS

C	.01%
Mn	1.8%
Si	.8%
S	.015%
Cr	20%
Ni	10%
Mo	.1%
Cu	.1%
P	.015%

WELDING PROCESS

- GMAW (MIG)

INDUSTRIES

- General Fabrication
- Automotive
- Food and Beverage

OK Autrod ER308LSi continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	160 - 210	24 - 28	265 - 550 (673-1397)	6.5 - 9.6 (2.95 - 4.35)
0.035 (0.9)	170 - 255	24 - 30	240 - 468 (610-1189)	7.8 - 12.7 (2.54 - 5.76)
0.045 (1.2)	200 - 300	24 - 30	192 - 360 (488 - 914)	6.8 - 13.6 (3.08 - 6.17)
0.62 (1.6)	215 - 325	24 - 32	120 - 192 (305 - 488)	7.3 - 14.5 (3.31 - 6.58)

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	40 - 120	15 - 20	156 - 312 (396-792)	1.4 - 3.8 (0.64 - 1.72)
0.035 (0.9)	60 - 140	15 - 21	156 - 312 (396-792)	1.6 - 5.4 (0.73 - 2.45)
0.045 (1.2)	100 - 210	17 - 22	140 - 280 (356 - 711)	2.4 - 6.0 (1.09 - 2.72)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
161208982A	ES OK ER308LSI 030X33#BAWS	662303089184
161209932A	ES OK ER308LSI 035X550#OMP	662303089191
161209982A	ES OK ER308LSI 035X33#BAWS	662303082833
161210982A	ES OK ER308LSI 040X33#BAWS	662303071837
161211932A	ES OK ER308LSI 045X550#OMP	662303076849
161211982A	ES OK ER308LSI 045X33#BAWS	662303079871
161216982A	ES OK ER308LSI 1/16X33#BAWS	662303089207

OK Autrod ER309LSi AWS A5.9: ER309Si/309LSi

FEATURES

A continous solid corrosion resistant chromium-nickel wire for welding of similar steels, wrought and cast steels of 23% Cr-12% Ni types. The alloy is also used for welding of buffer layers on CMn steels and welding of dissimilar joints. When using the wire for buffer layers and dissimilar joints it is necessary to control the dilution of the weld.

OK Autrod 309LSi has a good general corrosion resistance. The higher silicon content improves the welding properties, such as wetting.

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.9 ER309LSi/ER309Si
- AWS A5.9: ER309Si/309LSi
- Certified by CWB - AWS A5.9
- ASME IX F No. 6

WELDING PROCESS

- GMAW (MIG)
- GTAW (TIG)

INDUSTRIES

- Automotive
- General Fabrication
- Process
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

Yield Strength	64 ksi, 440 MPa
Tensile Strength	87 ksi, 600 MPa
Elongation in 2”	41%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -76°F (-60°C)	
	96 ft-lb, 130 J
Testing Temperature -166°F (-110°C)	
	66 ft-lb, 90 J
Testing Temperature 68°F (20°C)	
	118 ft-lb, 160 J

WELD METAL ANALYSIS

C	.02%
Mn	1.8%
Si	0.8%
Cr	24%
Ni	13%
Mo	.1%
Cu	.1%
P	.01%
S	.005%

OK Autrod ER309LSi continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	160 - 210	24 - 28	265 - 550 (673-1397)	6.5 - 9.6 (2.95 - 4.35)
0.035 (0.9)	170 - 255	24 - 30	240 - 468 (610-1189)	7.8 - 12.7 (2.54 - 5.76)
0.045 (1.2)	200 - 300	24 - 30	192 - 360 (488 - 914)	6.8 - 13.6 (3.08 - 6.17)
0.62 (1.6)	215 - 325	24 - 32	120 - 192 (305 - 488)	7.3 - 14.5 (3.31 - 6.58)

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	40 - 120	15 - 20	156 - 312 (396-792)	1.4 - 3.8 (0.64 - 1.72)
0.035 (0.9)	60 - 140	15 - 21	156 - 312 (396-792)	1.6 - 5.4 (0.73 - 2.45)
0.045 (1.2)	100 - 210	17 - 22	140 - 280 (356 - 711)	2.4 - 6.0 (1.09 - 2.72)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258026954	AB ER309LSI 030X10#PSP/60CT	662303041090
258027002	AB ER309LSI 030X33#PSP	662303034962
258026962	AB ER309LSI 035X10#PSP/60CT	662303041106
258027119	AB ER309LSI 035X30#PSP	662303083243
258027010	AB ER309LSI 035X33#BAWS	662303027612
258027093	AB ER309LSI 035X250#OMP 2/PLT	662303667894
258123017	AB ER309LSI 035X500#OMP	662303667900
258026970	AB ER309LSI 045X10#PSP/60CT	662303041113
258027028	AB ER309LSI 045X33#BAWS	662303026431
258027101	AB ER309LSI 045X250#OMP 2/PLT	662303523572
258027085	AB ER309LSI 045X500#OMP	662303667740

OK Autrod ER316LSi AWS A5.9: ER316Si/316LSi

FEATURES

A continuous solid corrosion resisting chroumium-nickel-molybdenium wire for welding of austenitic stainless alloys of 18% Cr - 10% Ni - 3% Mo types.

OK Autrod 316LSi has a good general corrosion resistance, in particularly the alloy has very good resistance against corrosion in acid and chlorinated environments. The alloy has a low carbon content which makes it particularly recommended where there is a risk of intergranular corrosion. The higher silicon content improves the welding properties, such as wetting. The alloy is widely used in the chemical and food processing industries as well as in ship building and various types of architectural structures.

CLASSIFICATIONS AND APPROVALS

- Certified by CWB - AWS A5.9
- ASME IX F No. 6
- ASME SFA 5.9 ER316Si/316LSi
- AWS A5.9: ER316Si/316LSi
- DNV
- VdTUV

WELDING PROCESS

- GMAW (MIG)

INDUSTRIES

- Food and Beverage
- Automotive
- General Fabrication
- Process

TYPICAL MECHANICAL PROPERTIES

Yield Strength	64 ksi, 440 MPa
Tensile Strength	90 ksi, 620 MPa
Elongation in 2”	37%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -76°F (-60°C)	
	70 ft-lb, 95 J
Testing Temperature -320°F (-196°C)	
	40 ft-lb, 55 J
Testing Temperature 68°F (20°C)	
	89 ft-lb, 120 J

WELD METAL ANALYSIS

C	<.02%
Mn	1.8%
Si	.8%
Cr	18.5%
Ni	12%
Mo	2.7%
Cu	.1%
P	.015%
S	.015%

OK Autrod ER 316LSi continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	160 - 210	24 - 28	265 - 550 (673-1397)	6.5 - 9.6 (2.95 - 4.35)
0.035 (0.9)	170 - 255	24 - 30	240 - 468 (610-1189)	7.8 - 12.7 (2.54 - 5.76)
0.045 (1.2)	200 - 300	24 - 30	192 - 360 (488 - 914)	6.8 - 13.6 (3.08 - 6.17)
0.62 (1.6)	215 - 325	24 - 32	120 - 192 (305 - 488)	7.3 - 14.5 (3.31 - 6.58)

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	40 - 120	15 - 20	156 - 312 (396-792)	1.4 - 3.8 (0.64 - 1.72)
0.035 (0.9)	60 - 140	15 - 21	156 - 312 (396-792)	1.6 - 5.4 (0.73 - 2.45)
0.045 (1.2)	100 - 210	17 - 22	140 - 280 (356 - 711)	2.4 - 6.0 (1.09 - 2.72)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258173020	AB ER316LSI 030X10#PSP/60CT	662303027841
258176106	AB ER316LSI 030X33#PSP	662303027872
258175520	AB ER316LSI 035X10#PSP/60CT	662303027858
258171149	AB ER316LSI 035X30#PSP	662303083861
258173517	AB ER316LSI 035X33#BAWS	662303026455
258174515	AB ER316LSI 045X33#BAWS	662303026370
258175678	AB ER316LSI 045X500#OMP	662303667771
258125582	AB ER316LSI 1/16X36X10#T/30CT	662303087142
258125509	AB ER316LSI 1/8X36X10#T/30CT	662303087166

OK Autrod 2209 AWS A5.9: ER2209

FEATURES

A continuous solid corrosion resisting Duplex wire for welding of austenitic-ferritic stainless alloys of 22% Cr, 5% Ni, 3% Mo types.

OK Autrod 2209 has a high general corrosion resistance. In media containing chloride and hydrogen sulphide the alloy has a high resistance to intergranular, pitting and especially to stress corrosion. The alloy is used in a variety of applications across all industrial segments.

CLASSIFICATIONS AND APPROVALS

- AWS A5.9: ER2209
- ASME SFA 5.9: ER2209

WELDING PROCESS

- GMAW (MIG)

INDUSTRIES

- Pipeline
- General Fabrication
- Power Generation
- Petrochemical
- Process

CHARPY V-NOTCH PROPERTIES

Testing Temperature -4°F (-20°C)	
	63 ft-lb, 85 J
Testing Temperature -76°F (-60°C)	
	44 ft-lb, 60 J
Testing Temperature 68°F (20°C)	
	73 ft-lb, 100 J

TYPICAL MECHANICAL PROPERTIES

Yield Strength	87 ksi, 600 MPa
Tensile Strength	110 ksi, 765 MPa
Weld Metal Hardness, a.w.	240 HB
Elongation in 2”	28%

WELD METAL ANALYSIS

C	.01%
Mn	1.6%
Si	0.6%
Cr	23%
Ni	9%
Mo	3%
N	.1%
P	45 FN
S	.01%
Cu	.3%
Typical wire analysis	
C	.025%
Mn	1.8%
Si	.65%
P	.025%
S	.020%
Cr	23.5%
Ni	9.5%
Mo	3.5%
Cu	.2%
N	.2%

OK Autrod 2209 continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	160 - 210	24 - 28	265 - 550 (673-1397)	6.5 - 9.6 (2.95 - 4.35)
0.035 (0.9)	170 - 255	24 - 30	240 - 468 (610-1189)	7.8 - 12.7 (2.54 - 5.76)
0.045 (1.2)	200 - 300	24 - 30	192 - 360 (488 - 914)	6.8 - 13.6 (3.08 - 6.17)
0.62 (1.6)	215 - 325	24 - 32	120 - 192 (305 - 488)	7.3 - 14.5 (3.31 - 6.58)

DEPOSITION TABLE - Shortarc Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
0.030 (0.8)	40 - 120	15 - 20	156 - 312 (396-792)	1.4 - 3.8 (0.64 - 1.72)
0.035 (0.9)	60 - 140	15 - 21	156 - 312 (396-792)	1.6 - 5.4 (0.73 - 2.45)
0.045 (1.2)	100 - 210	17 - 22	140 - 280 (356 - 711)	2.4 - 6.0 (1.09 - 2.72)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1686129820	ES OK ER2209 1.2X15KG SP	662303085605
168624R150	ES OK ER2209 2.4X1000X5KG CT	662303070618
168632R150	ES OK ER2209 3.2X1000X5KG CT	662303070625

Additional Products

- OK Autrod 310
- OK Autrod 312
- OK Autrod 347si
- OK Autrod 2209
- OK Autrod 409Nb

For additional information on the above products, please visit us at www.esabna.com

ESAB ER4043 AWS A5.10: ER4043

FEATURES

ESAB 4043 is one of the oldest and most widely used welding and brazing alloys. It can be classified as a general purpose type filler alloy. The silicon additions result in improved fluidity to make the alloy a preffered choice by welders. This alloy is less sensitive to weld cracking and produces brighter, almost smut free welds.

CLASSIFICATIONS AND APPROVALS

- AWS A5.10: ER4043

WELDING PROCESS

- GTAW (TIG)
- GMAW (MIG)

INDUSTRIES

- General Fabrication
- Automotive
- Mobile Machinery
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded Base Alloy 2014-T6	
Yield Strength	28 ksi, 195 MPa
Tensile Strength	34 ksi, 235 MPa
Elongation in 2”	4%
Base Alloy 6061-T4	
Yield Strength	18 ksi, 125 MPa
Tensile Strength	27 ksi, 185 MPa
Elongation in 2”	8%
Base Alloy 6061-T6	
Yield Strength	18 ksi, 125 MPa
Tensile Strength	27 ksi, 185 MPa
Elongation in 2”	8%
Base Alloy 6063-T4	
Yield Strength	10 ksi, 70 MPa
Tensile Strength	20 ksi, 140 MPa
Elongation in 2”	12%
Other Typical Mechanical Properties	
Melting Range	1065^{0}F to 1170^{0}F
	574^{0}C to 632^{0}C
Density	.097 lbs/cu in.
Anodize Color	Gray

WELD METAL ANALYSIS

(Single Values Minimum)	
Mn	0.05%
Si	4.5-6.0%
Ti	0.20%
Cu	0.30%
Mg	0.05%
Zn	0.10%
Be	0.0008%
Fe	0.8%

ESAB ER4043 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
5202F84	4043HQ 030X1#SP/18#CT	662303058166
180408245A	4043 030X14#PSP	662303080310
5202F04	4043HQ 030X14#SP	662303055868
5202F85	4043HQ 035X1#SP/18#CT	662303058173
180409215A	4043 035X1#PSP/18#CT	662303080297
180409243A	4043 035X16#PSP	662303080327
5202F05	4043HQ 035X16#SP	662393012611
180410944A	4043 040X311#OMP	662303080884
5202F87	4043HQ 3/64X1#SP/18#CT	662393012444
5021F07	4043HQ 3/64X36X10#TX60#CT	662303059255
5202F07	4043HQ 3/64X16#SP	662393012437
180412242A	4043 3/64X20#PSP	662303080358
5206F87	4043HQ 3/64X20#SP	662303055875
5203F07	4043HQ 3/64X167#RL/501#PLT	662303068721
5202F88	4043HQ 1/16X1#SP/18#CT	662303068707
180416R15A	4043 1/16X39X11#CT/33#CT	662303080464
5202F08	4043HQ 1/16X16#SP	662303068684
180416242A	4043 1/16X20#PSP	662303080365
5206F88	4043HQ 1/16X20#SP	662303068745
5203F08	4043HQ 1/16X167#RL/501#PLT	662303068738
180416944A	4043 1/16X311#OMP	
5021F08	4043HQ 1/16X36X10T/40CT	662303058135
180424R15A	4043 3/32X39X11#CT/33#CT	662303080471
5202F10	4043HQ 3/32X16#SP	662303068691
5021F10	4043HQ 3/32X36X10T/40CT	662303055783
180432R15A	4043 1/8X39X11#CT/33#CT	662303080488
5021F12	4043HQ 1/8X36X10T/40CT	662303055844
180440R15A	4043 5/32X39X11#CT/33#CT	662303080495
5021F14	4043HQ 5/32X36X10T/40CT	662303058197
5021F15	4043HQ 3/16X36X10T/40CT	662303066239

ESAB ER5356 AWS A5.10: ER5356

FEATURES

ESAB 5356 is a non-heat treable solid aluminum wire for moderate high strength applications. Principle alloy elements include Mangnesium, Manganese, Chromium and Titanium.

CLASSIFICATIONS AND APPROVALS

- AWS A5.10: ER5356

WELDING PROCESS

- GTAW (TIG)
- GMAW (MIG)

INDUSTRIES

- Mobile Machinery
- Shipbuilding
- Automotive
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded Base Alloy 6061-T6	
Yield Strength	19 ksi, 210 MPa
Tensile Strength	30 ksi, 2105 MPa
Elongation in 2”	11%
Base Alloy 6063-T6	
Yield Strength	12 ksi, 85 MPa
Tensile Strength	20 ksi, 140 MPa
Elongation in 2”	12%
Base Alloy 7005-T6	
Yield Strength	30 ksi, 205 MPa
Tensile Strength	46 ksi, 315 MPa
Elongation in 2”	10%
Base Alloy 7039-T64	
Yield Strength	25 ksi, 170 MPa
Tensile Strength	44 ksi, 305 MPa
Elongation in 2”	13%
Other Typical Mechanical Properties	
Melting Range	1060^{0}F to 1175^{0}F
	571^{0}C to 635^{0}C
Density	.096 lbs/cu in.
Anodize Color	White

WELD METAL ANALYSIS

(Single Values Minimum)	
Mn	0.05-0.20%
Si	0.25%
Cr	0.05-0.20%
Ti	0.06-0.20%
Cu	0.10%
Mg	4.5-5.5%
Zn	0.10%
Be	0.0008%
Fe	0.40%

ESAB ER5356 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
181508215A	5356 030X1#PSP/18#CT	662303080372
181508245A	5356 030X14#PSP	662303080402
181509215A	5356 035X1#PSP/18#CT	662303080389
181509243A	5356 035X16#PSP	662303080419
181516R15A	5356 1/16X39X11#CT/33#CT	662303080518
181516242A	5356 1/16X20#PSP	662303080457
181512215A	5356 3/64X1#PSP/18#CT	662303080396
181512242A	5356 3/64X20#PSP	662303080440
181512944A	5356 3/64X311#OMP	662303080792
181524R15A	5356 3/32X39X11#CT/33#CT	662303080525
181532R15A	5356 1/8X39X11#CT/33#CT	662303080532
181540R15A	5356 5/32X39X11#CT/33#CT	662303080549

Additional Products

- ER1100
- ER4047
- ER5183
- ER5654
- Spoolarc Easy Grind

For additional information on the above products, please visit us at www.esabna.com

ARCALOY ER625 AWS A5.14: ERNiCrMo-3

FEATURES

Arcaloy ER625 is a Ni-Cr-Mo alloy designed for use for cladding iron and joining similar steels or dissimilar steels such as stainless and low alloy materials. The low iron content present in this product is advantageous to control dilution. The ER625 alloy provides maximum resistance to stress corrosion cracking, pitting and crevice corrosion.

* This item is subject to Industry Alloy Surcharges

WELD METAL ANALYSIS

C	0.01%
Mn	0.030%
Si	0.059%
P	0.004%
S	0.002%
Cr	22.5%
Ni	65%
Mo	8.7%
Al	0.1%
Ti	0.18%
Cu	0.051%
Nb	3.6%
Fe	0.310%

CLASSIFICATIONS AND APPROVALS

- AWS A5.14: ERNiCrMo-3
- ASME II SFA 5.14 ERNiCrMo-3
- ASME IX F No. 43

WELDING PROCESS

- GMAW (MIG)

INDUSTRIES

- Cryogenic
- Process
- Petrochemical

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
256196015	AB ER625 035X33#PSP	662303050016
256196007	AB ER625 045X33#PSP	662303042325
256196114	AB ER625 1/8X36X10 30/CT	662303086893

ARCALOY ER276 AWS A5.14: ERNiCrMo-4

FEATURES

Arcaloy ER276 is a Ni-Cr-Mo alloy designed for joining or cladding nickel based alloys and stainless steels. The higher Moly content offers maximum pitting and crevice corrosion protection.

* This item is subject to Industry Alloy Surcharges

WELD METAL ANALYSIS

C	0.007%
Mn	0.45%
Si	0.05%
P	0.007%
S	0.002%
Cr	16%
Ni	58%
Mo	16%
Al	0.1%
Co	0.02%
V	<0.01%
Cu	0.01%
Fe	5.7%
W	3.8%

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 44
- ASME II SFA 5.14 ERNiCrMo-4
- AWS A5.14: ERNiCrMo-4

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Process
- Pulp and Paper

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
256071705	AB ER276 1/16X36X10T/30CT INK	662303049881
256071713	AB ER276 3/32X36X10T/30CT INK	662393012079
256071721	AB ER276 1/8X36X10T/30CT INK	662393012123

SPOOLARC 65 AWS A5.18: ER70S-2 H4

FEATURES

Spoolarc 65 is a triple deoxidized (Aluminum, Titanium, Zirconium) welding wire designed for welding over rust and mill scale. The less fluid weld puddle of Spoolarc 65 makes it easy to control when used out of position. Spoolarc 65 is the preferred wire for all position welding of small diameter pipe. It is available in forms suitable for MIG and TIG welding.

INDUSTRIES

- Power Generation
- Military Applications
- Piping Industries
- Shipbuilding

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded GMAW 98% Ar / 2% O_2	
	45 ft-lb, 61 J
As Welded GMAW CO_2	35 ft-lb, 47 J
As Welded GTAW Argon	170 ft-lb, 230 J

TYPICAL MECHANICAL PROPERTIES

As Welded GMAW 98% Ar / 2% O_2	
Yield Strength	70 ksi, 480 MPa
Tensile Strength	82 ksi, 565 MPa
Elongation in 2”	26%
As Welded GMAW CO_2	
Yield Strength	67 ksi, 460 MPa
Tensile Strength	79 ksi, 545 MPa
Elongation in 2”	26%
As Welded GTAW Argon	
Yield Strength	73 ksi, 505 MPa
Tensile Strength	82 ksi, 565 MPa
Elongation in 2”	31%

CLASSIFICATIONS AND APPROVALS

- MIL-E-23765/1: 70S-2
- ABS/AWS A5.18: ER70S-2 H4
- CAN/CSA-ISO14341,B-G 49A 3C G2 (ER49S-2)
- AWS/ASME SFA5.18: ER70S-2
- Certified by CWB to CSA W48

WELDING PROCESS

- GTAW (TIG)

WELD METAL ANALYSIS

GMAW CO_2	
C	0.08%
Mn	0.9%
Si	0.3%
P	0.008%
S	0.007%
GTAW Argon	
C	0.06%
Mn	1.0%
Si	0.5%
P	0.008%
S	0.007%
Typical Wire Analysis	
C	0.04%
Mn	1.1%
Si	0.5%
P	0.006%
S	0.009%
Al	0.09%
Ti	0.08%
Zr	0.04%

SPOOLARC 65 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
104TF44	65 030X11#SPX44#CT	662303520809
104TF45	65 035X11#SPX44#CT	662303520786
104YF28	65 1/16X36X5#T/30#CT F2 AWS	662303523374
1047F28	65 1/16X36X15#CT F2	662303500740
1047F08	65 1/16X36X25#CT F1	662303500689
1041F08	65 1/16X36X50#CT	662303500245
104YF30	65 3/32X36X10#T/60#CT F2 AWS	662303523381
1047F30	65 3/32X36X20#CT F2	662303500757
1047F10	65 3/32X36X30#CT F1	662303500696
1041F10	65 3/32X36X50#CT	662303500252
104YF32	65 1/8X36X10#T/60#CT F2 AWS	662303523398
1047F32	65 1/8X36X30#CT F2	662303500764
1047F12	65 1/8X36X40#CT F1	662303500702
1041F12	65 1/8X36X50#CT	662303500269
1047F34	65 5/32X36X30#CT F2 AWS	662303669393

SPOOLARC 82 AWS A5.18: ER70S-3 H4

FEATURES

Spoolarc 82 is a premium quality, general purpose MIG wire subjected to stringent quality control procedures required for certification to Military, Lloyds, and ABS specifications. Spoolarc 82 is recommended for pressure vessel and pipe fabrication, HVAC duct work, and general carbon steel structural welding.

WELDING PROCESS

- GTAW (TIG)

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded CO_2 Shielding Gas	
	75 ft-lb, 102 J
As Welded 98% Ar / 2% O_2 Shielding Gas	
	83 ft-lb, 112 J

TYPICAL MECHANICAL PROPERTIES

As Welded 98% Ar / 2% O_2 Shielding Gas	
Yield Strength	62 ksi, 425 MPa
Tensile Strength	76 ksi, 525 MPa
Elongation in 2”	28%
As Welded CO_2 Shielding Gas	
Yield Strength	60 ksi, 415 MPa
Tensile Strength	73 ksi, 505 MPa
Elongation in 2”	28%

CLASSIFICATIONS AND APPROVALS

- LR: 3S, 3YS (H15)
- MIL-E-23765/1: MIL-70S-3
- ABS/AWS A5.18: ER70S-3 H4
- CAN/CSA-ISO14341,B-G 49A 2C G3 (ER49S-3)
- AWS/ASME SFA5.18: ER70S-3
- Certified by CWB to CSA W48

INDUSTRIES

- Automotive
- General Fabrication
- Pipeline
- Mobile Machinery

WELD METAL ANALYSIS

CO_2 Shielding Gas	
C	0.07%
Mn	0.9%
Si	0.4%
P	0.006%
S	0.008%
98% Ar / O_2 Shielding Gas	
C	0.8%
Mn	1.0%
Si	0.5%
P	0.006%
S	0.008%
Typical Wire Analysis	
C	0.09%
Mn	1.2%
Si	0.5%
P	0.007%
S	0.005%
Cu	0.07%

SPOOLARC 82 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1217F08	82 1/16X36X25#CT F1	662303504595
1217F10	82 3/32X36X30#CT F1	662303504601
1217F32	82 1/8X36X20#CT F2	662303671068
1217F12	82 1/8X36X40#CT F1	662303504618

SPOOLARC 86 AWS A5.18: ER70S-6 H4

FEATURES

Spoolarc 86 is a copper-coated solid wire containing high levels of manganese and silicon. Spoolarc 86 is suitable for many carbon steel welding applications using the MIG/Gas Metal Arc Welding (GMAW) process. The high levels of deoxidizers in Spoolarc 86 provide excellent tolerance of rust and mill scale. The high levels of manganese and silicon also provide excellent wetting action and a highly fluid weld puddle. Shielding gas choices for Spoolarc 86 in the GMAW mode are 100% carbon dioxide, argon/carbon dioxide mixtures, argon/oxygen mixtures, and other argon based mixed gas blends. Spoolarc 86 excels in HVAC duct work, heavy equipment fabrication, structural, and other general steel fabrication.

CLASSIFICATIONS AND APPROVALS

- LR: 3S, 3YS (H15)
- ABS/AWS A5.18: ER70S-6 H4
- CAN/CSA-ISO14341,B-G 49A 3C G6 (ER49S-6)
- AWS/ASME SFA5.18: ER70S-6
- AWS/ASME SFA5.17: EH11K
- Certified by CWB to CSA W48
- MIL-E-23765/1: MIL-70S-6

WELDING PROCESS

- SAW (Sub Arc)
- GTAW (TIG)

INDUSTRIES

- Automotive
- Mobile Machinery
- General Fabrication
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% O_2	
Yield Strength	72 ksi, 497 MPa
Tensile Strength	86 ksi, 593 MPa
Elongation in 2”	27%
As Welded CO_2	
Yield Strength	68 ksi, 469 MPa
Tensile Strength	82 ksi, 563 MPa
Elongation in 2”	30%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	
	67 ft-lb, 91 J
As Welded CO_2 Shielding Gas	
	45 ft-lb, 61 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.070%
Mn	1.19%
Si	0.62%
P	0.012%
S	0.011%
CO_2	
C	0.090%
Mn	1.08%
Si	0.51%
P	0.014%
S	0.010%

SPOOLARC 86 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
138YF28	86 1/16X36X10#T/60#CT F2 AWS	662303087913
1387F28	86 1/16X36X15#CT F2	662303084721
138YF30	86 3/32X36X10#T/60#CT F2 AWS	662303671099
138YF32	86 1/8X36X10#T/60#CT F2 AWS	662303671082
1387F32	86 1/8X36X30#CT F2	662303508234

SPOOLARC 83 AWS /ASME SFA5.28: ER80S-D2/ER90S-D2

FEATURES

Spoolarc 83 contains 0.5% Mo to provide higher deposit strength in both the as welded and stress relieved conditions. It contains high levels of Manganese and Silicon to provide good wetting and good rust and scale tolerance. Spoolarc 83 is also used for all-position welding of high tensile pipe and tubing commonly found in earthmoving and construction equipment. It is available in forms suitable for MIG and TIG welding.

CLASSIFICATIONS AND APPROVALS

- Certified by CWB to CSA W48
- AWS/ASME SFA5.28: ER80S-D2/ER90S-D2
- CAN/CSA-ISO14341,B-G 55A 3 G4M31 (ER80S-3
- MIL-E-23765/2; 80S-3
- AWS/ASME SFA5.23: EA3K

INDUSTRIES

- General Fabrication
- Mobile Machinery
- Automotive
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded 98% Ar / 2% O_2 Shielding Gas	
Yield Strength	95 ksi, 655 MPa
Tensile Strength	110 ksi, 750 MPa
Elongation in 2”	22%
As Welded CO_2 Shielding Gas	
Yield Strength	77 ksi, 530 MPa
Tensile Strength	92 ksi, 635 MPa
Elongation in 2”	23%

WELDING PROCESS

- GTAW (TIG)

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded CO_2 Shielding Gas	
	44 ft-lb, 60 J
As Welded 98% Ar / 2% O_2 Shielding Gas	
	87 ft-lb, 118 J

WELD METAL ANALYSIS

CO_2 Shielding Gas	
C	0.08%
Mn	1.16%
Si	0.34%
P	0.008%
S	0.012%
Mo	0.39%
98% Ar / O_2 Shielding Gas	
C	0.09%
Mn	1.65%
Si	0.60%
P	0.013%
S	0.012%
Mo	0.43%
Typical Wire Analysis	
C	0.07%
Mn	1.78%
Si	0.66%
P	0.009%
S	0.008%
Mo	0.49%

SPOOLARC 83 continued

DEPOSITION TABLE - Spray Transfer Welding Parameters				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)
023 (0.6)	100	23	400 (1016)	2.7 (1.2)
	106	23	450 (1143)	3.1 (1.4)
	111	24	500 (1270)	3.4 (1.6)
	117	24	550 (1397)	3.8 (1.7)
	122	25	600 (1524)	4.1 (1.9)
	125	25	630 (1600)	4.3 (2)
.030 (0.8)	160	24	500 (1270)	5.8 (2.6)
	173	25	550 (1397)	6.4 (2.9)
	187	25	600 (1524)	7 (3.2)
	200	26	650 (1651)	7.6 (3.4)
.035 (0.9)	180	25	400 (1016)	6.3 (2.9)
	197	26	450 (1143)	7.1 (3.2)
	213	26	500 (1270)	7.9 (3.6)
	230	27	550 (1397)	8.7 (4)
.045 (1.2)	260	25	300 (762)	7.9 (3.6)
	280	26	350 (889)	9.2 (4.2)
	300	28	400 (1016)	10.5 (4.8)
	320	29	450 (1143)	11.8 (5.4)
	340	30	500 (1270)	13.1 (6)
.052 (1.3)	275	26	265 (673)	9.3 (4.2)
	310	28	300 (762)	10.5 (4.8)
	360	31	350 (889)	12.2 (5.6)
	400	33	390 (991)	13.6 (6.2)
.062 (1.6)	290	26	180 (457)	9.1 (4.1)
	310	28	200 (508)	10.1 (4.6)
	340	31	230 (584)	11.6 (5.3)
	370	34	260 (660)	13.2 (6)
	390	36	280 (711)	14.2 (6.4)

SPOOLARC 83 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
126TF45	83 035X11#SPX44#CT	662303520670
1267F28	83 1/16X36X15#CT F2	662303084561
1261F08	83 1/16X36X50#CT	662303505615
1267F30	83 3/32X36X20#CT F2	662303505998
1261F10	83 3/32X36X50#CT	662303505622
1267F32	83 1/8X36X30#CT F2	662303506001
1261F12	83 1/8X36X50#CT	662303505639

SPOOLARC 95 AWS /ASME SFA5.28: ER100S-1

FEATURES

Spoolarc 95 is Military grade high strength wire used to weld HY-80 steels. Applications for Spoolarc 95 include military tanks, ships and submarines.

TYPICAL MECHANICAL PROPERTIES

Yield Strength	95,000 ksi, 655 MPa
Tensile Strength	105,000 ksi, 725 MPa
Elongation in 2”	23%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
	93 ft-lb, 126 J
Testing Temperature -60°F (-51°C)	
	65 ft-lb, 88 J

CLASSIFICATIONS AND APPROVALS

- Certified by CWB to CSA W48
- MIL-E-23765/2; MIL-E-100S-1
- AWS/ASME SFA5.28: ER100S-1
- AWS/ASME SFA5.23:EM2

WELDING PROCESS

- GTAW (TIG)

WELD METAL ANALYSIS

C	0.07%
Mn	1.40%
Si	0.35%
P	0.008%
S	0.007%
Cr	0.20%
Ni	1.80%
Mo	0.35%

INDUSTRIES

- Heavy Fabrication
- Military Applications
- Shipbuilding
- Mining

SPOOLARC 95 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
229DF48	95 CU 1/16X18X20#CT F1 MIL	
229DF10	95 CU 3/32X36X30#CT F1 MIL	
229DF12	95 CU 1/8X36X40# CT F1 MIL	

SPOOLARC 120 AWS /ASME SFA 5.28: ER120S-1

FEATURES

Spoolarc 120 is designed for welding high strength quenched and tempered steels. Weld metal mechanical properties produce high tensile strengths, in excess of 120 ksi (825 MPa). Applications for Spoolarc 120 include military tanks, ships, submarines and other similar fabrication.

CLASSIFICATIONS AND APPROVALS

- AWS/ASME SFA 5.28: ER120S-1
- AWS/ASME SFA 5.23 EM4

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded GMAW 98% Ar / 2% O_2	
Yield Strength	112 ksi, 775 MPa
Tensile Strength	123 ksi, 840 MPa
Elongation in 2”	19%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -60°F (-51°C)	
As Welded GMAW 98% Ar / 2% O_2	
	75 ft-lb, 102 J
Testing Temperature 0°F (-18°C)	
As Welded GMAW 98% Ar / 2% O_2	
	100 ft-lb, 136 J

WELD METAL ANALYSIS

GMAW 98% Ar / 2% O_2	
C	0.07%
Mn	1.3%
Si	0.35%
P	0.007%
S	0.008%
Cr	0.4%
Ni	2.6%
Mo	0.45%
Typical Wire Analysis	
C	0.05%
Mn	1.6%
Si	0.3%
P	0.005%
S	0.004%
Cr	0.3%
Ni	2.3%
Mo	0.5%

SPOOLARC 120 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
2117F08	120 CU 1/16X36X25#CT F1	662303669058
2117F10	120 CU 3/32X36X30#CT F1	662303669041
2117F12	120 CU 1/8X36X40#CT F1	662303670436

TIGROD ER80S-B2 AWS A5.28: ER80S-B2

FEATURES

TIGROD ER80S-B2 is a chrome-moly TIG rod used for joining creep resistant steels of the 0.5% Cr - 0.5% Mo, 1% Cr - 0.5% Mo, and 1.25% Cr - 0.5% Mo grades. These copper-coated rods are primarily used to fabricate and repair power piping and boilers in the power generation industry.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr @ 1150°F (620°C)	
Yield Stress	81 ksi, 559 MPa
Tensile Strength	95 ksi, 655 MPa
Elongation in 2”	29%
Stress Relieved 1 hr @ 1350°F (732°C)	
Yield Stress	82 ksi, 566 MPa
Tensile Strength	95 ksi, 655 MPa
Elongation in 2”	24%
Stress Relieved 1 hr @ 1375°F (746°C)	
Yield Stress	80 ksi, 552 MPa
Tensile Strength	93 ksi, 642 MPa
Elongation in 2”	26%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.28
- AWS A5.28: ER80S-B2

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Process
- Petrochemical

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
250JF48	TIG80SB2 1/16X36X10#T/30#CT E2	662303523442
250JF50	TIG80SB2 3/32X36X10#T/30#CT E2	662303523411
250JF52	TIG80SB2 1/8X36X10#T/30#CT E2	662303523428
250JF54	TIG80SB2 5/32X36X10#T/30#CT E2	662303523435

TIGROD ER80S-B6 AWS A5.28: ER80S-B6

FEATURES

TIGROD ER80S-B6 is a Chrome-Moly TIG rod for joining 5% Cr - 0.5% Mo steels such as ASTM A200-T5, A335-P5 and A387-Gr5. These copper coated rods are primarily used to fabricate and repair power piping, pressure vessels, heat exchanges and boilers used in the power generation industry. All ESAB ER80S-B6 TIGROD is embossed on both ends with the alloy identification. This grade of rod was reviously classified as ER502.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr @ 1350°F (732°C)	
Yield Strength	82 ksi, 566 MPa
Tensile Strength	95 ksi, 656 MPa
Elongation% in 2”	24%
Stress Relieved 1 hrs @ 1375°F (746°C)	
Yield Strength	80 ksi, 552 MPa
Tensile Strength	93 ksi, 642 MPa
Elongation% in 2”	26%

CLASSIFICATIONS AND APPROVALS

- AWS A5.28: ER80S-B6
- ASME SFA 5.28

WELD METAL ANALYSIS

C	0.08%
Mn	0.5%
Si	0.4%
P	0.007%
S	0.01%
Cr	5.8%
Mo	0.5%
X-Factor	< 15

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Process
- Petrochemical

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
252JF48	TIG80SB6 1/16X36X10#T/30#CT E2	662303523527
252JF50	TIG80SB6 3/32X36X10#T/30#CT E2	662303523510
252JF52	TIG80SB6 1/8X36X10#T/30#CT E2	662303523503
252JF54	TIG80SB6 5/32X36X10#T/30#CT E2	662303523497

TIGROD ER80S-B8 AWS A5.28: ER80S-B8

FEATURES

ER80S-B8 is a solid wire for TIG welding requiring creep strength. This 9% chromium - 1% Molybdenum TIG rod is used to weld 9% chromium - 1% Molybdenum steels (ASTM Section IX, P No 5B, Group 1) such as ASTM A335 Grade P9 or ASTM A213 Grade T9. Tigrod products are embossed on opposite ends with the alloy identification.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hrs @ 1375°F (746°C)	
Yield Strength	78 ksi, 538 MPa
Tensile Strength	97 ksi, 670 MPa
Elongation% in 2”	24%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.28
- AWS A5.28: ER80S-B8

WELD METAL ANALYSIS

C	0.07%
Mn	0.5%
Si	0.4%
P	0.005%
S	0.003%
Cr	9.0%
Mo	1.0%
X-Factor	< 15

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Power Generation

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
259971281	TIG80SB8 1/16X36X10#T/30#CT E2	662303082635
259971299	TIG80SB8 3/32X36X10#T/30#CT E2	662303082642
259971307	TIG80SB8 1/8X36X10#T/30#CT E2	662303082659
259971315	TIG80SB8 5/32X36X10#T/30#CT E2	662303082666

TIGROD ER90S-B3 AWS A5.28: ER90S-B3

FEATURES

TIGROD ER90S-B3 is a chrome-moly TIG rod used for joining 2.5% Cr - 1% Mo creep resistant steels. These copper-coated rods are primarily used to fabricate and repair power piping, pressure vessels, heat exchangers and boilers in the power generation industry.

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.28
- AWS A5.28: ER90S-B3

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Process
- Petrochemical
- Power Generation

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr @ 1275°F (690°C)	
Yield Strength	79 ksi, 545 MPa
Tensile Strength	94 ksi, 649 MPa
Elongation% in 2”	27%
Stress Relieved 1 hr @ 1300°F (705°C)	
Yield Strength	76 ksi, 524 MPa
Tensile Strength	93 ksi, 642 MPa
Elongation% in 2”	25%

WELD METAL ANALYSIS

C	0.08%
Mn	0.6%
Si	0.5%
P	0.009%
S	0.009%
Cr	2.4%
Mo	0.9%
X-Factor	< 15

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
251JF48	TIG90SB3 1/16X36X10#T/30#CT E2	662303523459
251JF50	TIG90SB3 3/32X36X10#T/30#CT E2	662303523466
251JF52	TIG90SB3 1/8X36X10#T/30#CT E2	662303523473
251JF54	TIG90SB3 5/32X36X10#T/30#CT E2	662303523480

TIGROD ER90S-B9 AWS A5.28: ER90S-B9

FEATURES

Tigrod ER90S-B9 is a solid wire for TIG welding of creep resisting, modified 9% chromium steels, such as ASTM A335 Grade P91 ir ASTM A213 T91. Tigrod products are embossed on opposite ends (E2) with the alloy identification.

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.28
- AWS A5.28: ER90S-B9

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Pipeline
- Power Generation
- Process
- Petrochemical

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr @ 1275°F (690°C)	
Yield Strength	80 ksi, 552 MPa
Tensile Strength	94 ksi, 649 MPa
Elongation% in 2”	27%
Stress Relieved 1 hr @ 1300°F (705°C)	
Yield Strength	76 ksi, 524 MPa
Tensile Strength	93 ksi, 642 MPa
Elongation% in 2”	25%

WELD METAL ANALYSIS

C	0.1%
Mn	0.6%
Si	0.5%
P	0.01%
S	0.01%
Cr	2.4%
Mo	0.9%
X-Factor	< 15

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
259967289	TIG90SB9 1/16X36X10#T/30#CT E2	662303069353
259967198	TIG90SB9 3/32X36X10#T/30#CT E2	662303069360
259967206	TIG90SB9 1/8X36X10#T/30#CT E2	662303069346
259971141	TIG90SB9 5/32X36X10#T/30#CT E2	662303070052

OK TIGROD 308L AWS A5.9: ER308L

FEATURES

Bare corrosion resisting chromium-nickel rods.

OK Tigrod 308L has a good general corrosion resistance. It also has a low carbon content which makes this alloy particularly recommended where there is a risk of intergranular corrosion. The alloy is widely used in the chemical and food processing industries as well as for pipes, tubes and boilers.

For joining of stainless steels of 18% Cr - 8% Ni-type with low carbon content and Nb-stabilized steels of the same type if the service temperature will not exceed 350°C.

OK Tigrod 308L can also be used for welding of Cr-steels except in sulphur rich environments.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	65 ksi, 450 MPa
Tensile Strength	87 ksi, 600 MPa
Elongation% in 2”	45%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 68°F (20°C)	
	148 ft-lb, 200 J
Testing Temperature -321°F (-196°C)	
	81 ft-lb, 110 J

CLASSIFICATIONS AND APPROVALS

- SFA AWS 5.9: ER308L

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Chemical
- Food Processing
- Pipe Fabrication

OK TIGROD 308L AWS A5.9: ER308L

WELD METAL ANALYSIS	
C	0.01%
Si	0.4%
Mn	1.8%
P	0.020%
S	0.015%
Cr	20%
Ni	10%
Mo	0.1%
Cu	0.1%
N	0.08% Max.

TYPICAL WIRE ANALYSIS	
C	0.30%
Si	0.65%
Mn	2.0%
P	0.030%
S	0.020%
Cr	21.0%
Ni	11.0%
Mo	0.3%
Cu	0.3%
N	0.08%
Others tot	0.50%

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
161016R15A	ES OK ER308L 1/16X39X11 CT E2	662303089214
161032R15A	ES OK ER308L 1/8X39X11 CT E2	662303089221
161040R15A	ES OK ER308L 5/32X39X11 CT E2	662303089238

OK TIGROD 309L AWS A5.9: ER309L

FEATURES

Bare corrosion resisting chromium-nickel welding rod for welding of similar steels of 244% Cr, 13% Ni types. The alloy is also used for welding of buffer layers on CMn steels and welding of dissimilar joints. When using the wire for buffer layers and dissimilar joints it is necessary to control the dilution of the weld.

OK Tigrod 309L has a good general corrosion resistance. When used for joining dissimilar materials the corrosion resistance is of secondary importance.

CLASSIFICATIONS AND APPROVALS

- SFA AWS 5.9: ER309L

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Process
- General Fabrication
- Automotive
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	62 ksi, 430 MPa
Tensile Strength	86 ksi, 590 MPa
Elongation% in 2”	40%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 68°F (20°C)	
	118 ft-lb, 160 J
Testing Temperature -76°F (-60°C)	
	96 ft-lb, 130 J
Testing Temperature -166^{0}F (-110^{0}C)	
	66 ft-lb, 90 J

OK TIGROD 309L AWS A5.9: ER309L

WELD METAL ANALYSIS	
C	0.015%
Si	0.4%
Mn	1.7%
P	0.020%
S	0.015%
Cr	24%
Ni	13.0%
Mo	0.1%
Cu	0.1%

TYPICAL WIRE ANALYSIS	
C	0.30%
Si	0.65%
Mn	2.2%
P	0.030%
S	0.020%
Cr	25.0%
Ni	14.0%
Mo	0.3%
Cu	0.3%
N	0.11%
Others tot	0.50%

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
165316R15A	ES OK ER309L 1/16X39X11 CT E2	662303089245
165323R15A	ES OK ER309L 3/32X39X11 CT E2	662303089252
165340R15A	ES OK ER309L 5/32X39X11 CT E2	662303089269

OK TIGROD 316L AWS A5.9: ER316L

FEATURES

Bare corrosion resisting chromium-nickel-molybdenium welding rods for welding of austenitic stainless alloys of 18% Cr - 8% Ni and 18% Cr - 10% Ni - 3% Mo-types.

OK Tigrod 316L has a good general corrosion resistance, particularly against corrosion in acid and chlorinated environments. The alloy has a low carbon content which makes it particularly recommended where there is a risk of intergraular corrosion. The alloy is widely used in the chemical and food processing industries as well as in shipbuilding and various types of architectural structures.

CLASSIFICATIONS AND APPROVALS

- SFA AWS 5.9: ER316L

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Chemical
- Food Processing
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	68 ksi, 470 MPa
Tensile Strength	94 ksi, 650 MPa
Elongation% in 2”	32%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 68°F (20°C)
129 ft-lb, 1750 J
Testing Temperature -76°F (-60°C)
111 ft-lb, 150 J
Testing Temperature -166^{0}F (-110^{0}C)
89 ft-lb, 121 J
Testing Temperature -164^{0}F (-108^{0}C)
89 ft-lb, 121 J

OK TIGROD 316L AWS A5.9: ER316L

WELD METAL ANALYSIS	
C	0.01%
Si	0.4%
Mn	1.8%
P	0.02%
S	0.01%
Cr	19%
Ni	13%
Mo	2.6%
Cu	0.1%

TYPICAL WIRE ANALYSIS	
C	0.30%
Si	0.65%
Mn	2.0%
P	0.030%
S	0.020%
Cr	20.0%
Ni	13.0%
Mo	3.0%
Cu	0.3%
N	0.08%
Others tot	0.50%

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
163024R15A	ES OK ER316L 3/32X39X11 CT E2	662303089276
163032R15A	ES OK ER316L 1/8X39X11 CT E2	662303089283
163040R15A	ES OK ER316L 5/32X39X11 CT E2	662303089290

Additional Products

- OK Tigrod 2209
- OK Tigrod 2509

For additional information on the above products, please visit us at www.esabna.com

ESAB ER4043 AWS A5.10: ER4043

FEATURES

ESAB 4043 is one of the oldest and most widely used welding and brazing alloys. It can be classified as a general purpose type filler alloy. The silicon additions result in improved fluidity to make the alloy a preffered choice by welders. This alloy is less sensitive to weld cracking and produces brighter, almost smut free welds.

CLASSIFICATIONS AND APPROVALS

- AWS A5.10: ER4043

WELDING PROCESS

- GTAW (TIG)
- GMAW (MIG)

INDUSTRIES

- General Fabrication
- Automotive
- Mobile Machinery
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded Base Alloy 2014-T6	
Yield Strength	28 ksi, 195 MPa
Tensile Strength	34 ksi, 235 MPa
Elongation in 2”	4%
Base Alloy 6061-T4	
Yield Strength	18 ksi, 125 MPa
Tensile Strength	27 ksi, 185 MPa
Elongation in 2”	8%
Base Alloy 6061-T6	
Yield Strength	18 ksi, 125 MPa
Tensile Strength	27 ksi, 185 MPa
Elongation in 2”	8%
Base Alloy 6063-T4	
Yield Strength	10 ksi, 70 MPa
Tensile Strength	20 ksi, 140 MPa
Elongation in 2”	12%
Other Typical Mechanical Properties	
Melting Range	1065^{0}F to 1170^{0}F
	574^{0}C to 632^{0}C
Density	.097 lbs/cu in.
Anodize Color	Gray

WELD METAL ANALYSIS

(Single Values Minimum)	
Mn	0.05%
Si	4.5-6.0%
Ti	0.20%
Cu	0.30%
Mg	0.05%
Zn	0.10%
Be	0.0008%
Fe	0.8%

ESAB ER4043 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
5202F84	4043HQ 030X1#SP/18#CT	662303058166
180408245A	4043 030X14#PSP	662303080310
5202F04	4043HQ 030X14#SP	662303055868
180409215A	4043 035X1#PSP/18#CT	662303080297
5202F85	4043HQ 035X1#SP/18#CT	662303058173
180409243A	4043 035X16#PSP	662303080327
5202F05	4043HQ 035X16#SP	662393012611
180410944A	4043 040X311#OMP	662303080884
5202F87	4043HQ 3/64X1#SP/18#CT	662393012444
5021F07	4043HQ 3/64X36X10#TX60#CT	662303059255
5202F07	4043HQ 3/64X16#SP	662393012437
180412242A	4043 3/64X20#PSP	662303080358
5206F87	4043HQ 3/64X20#SP	662303055875
5203F07	4043HQ 3/64X167#RL/501#PLT	662303068721
5202F88	4043HQ 1/16X1#SP/18#CT	662303068707
180416R15A	4043 1/16X39X11#CT/33#CT	662303080464
5202F08	4043HQ 1/16X16#SP	662303068684
180416242A	4043 1/16X20#PSP	662303080365
5206F88	4043HQ 1/16X20#SP	662303068745
5203F08	4043HQ 1/16X167#RL/501#PLT	662303068738
180416944A	4043 1/16X311#OMP	
5021F08	4043HQ 1/16X36X10T/40CT	662303058135
180424R15A	4043 3/32X39X11#CT/33#CT	662303080471
5202F10	4043HQ 3/32X16#SP	662303068691
5021F10	4043HQ 3/32X36X10T/40CT	662303055783
180432R15A	4043 1/8X39X11#CT/33#CT	662303080488
5021F12	4043HQ 1/8X36X10T/40CT	662303055844
180440R15A	4043 5/32X39X11#CT/33#CT	662303080495
5021F14	4043HQ 5/32X36X10T/40CT	662303058197
5021F15	4043HQ 3/16X36X10T/40CT	662303066239

ESAB ER5356 AWS A5.10: ER5356

FEATURES

ESAB 5356 is a non-heat treable solid aluminum wire for moderate high strength applications. Principle alloy elements include Mangnesium, Manganese, Chromium and Titanium.

CLASSIFICATIONS AND APPROVALS

- AWS A5.10: ER5356

WELDING PROCESS

- GTAW (TIG)
- GMAW (MIG)

INDUSTRIES

- Mobile Machinery
- Shipbuilding
- Automotive
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded Base Alloy 6061-T6	
Yield Strength	19 ksi, 210 MPa
Tensile Strength	30 ksi, 205 MPa
Elongation in 2”	11%
Base Alloy 6063-T6	
Yield Strength	12 ksi, 85 MPa
Tensile Strength	20 ksi, 140 MPa
Elongation in 2”	12%
Base Alloy 7005-T6	
Yield Strength	30 ksi, 205 MPa
Tensile Strength	46 ksi, 315 MPa
Elongation in 2”	10%
Base Alloy 7039-T64	
Yield Strength	25 ksi, 170 MPa
Tensile Strength	44 ksi, 305 MPa
Elongation in 2”	13%
Other Typical Mechanical Properties	
Melting Range	1060^{0}F to 1175^{0}F
	571^{0}C to 635^{0}C
Density	.096 lbs/cu in.
Anodize Color	White

WELD METAL ANALYSIS

(Single Values Minimum)	
Mn	0.05-0.20%
Si	0.25%
Cr	0.05-0.20%
Ti	0.06-0.20%
Cu	0.10%
Mg	4.5-5.5%
Zn	0.10%
Be	0.0008%
Fe	0.40%

ESAB ER5356 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
181508215A	5356 030X1#PSP/18#CT	662303080372
181508245A	5356 030X14#PSP	662303080402
181509215A	5356 035X1#PSP/18#CT	662303080389
181509243A	5356 035X16#PSP	662303080419
181512215A	5356 3/64X1#PSP/18#CT	662303080396
181512242A	5356 3/64X20#PSP	662303080440
181512944A	5356 3/64X311#OMP	662303080792
181516R15A	5356 1/16X39X11#CT/33#CT	662303080518
181516242A	5356 1/16X20#PSP	662303080457
181524R15A	5356 3/32X39X11#CT/33#CT	662303080525
181532R15A	5356 1/8X39X11#CT/33#CT	662303080532
181540R15A	5356 5/32X39X11#CT/33#CT	662303080549

ARCALOY ER82 AWS A5.14: ERNiCr-3

FEATURES

Arcaloy ER82 is used for TIG, MIG, and SAW welding of base materials such as ASTM 3, B166, B167, and B168 alloys which have UNS Number N0660. It is one of the most used nickel alloys whose applications range from cryogenic to high temperatures. This filler metal can also be used for dissimilar welding applications between various nickel alloy and stainless or carbon steels, as well as for overlaying.

* This item is subject to Industry Alloy Surcharges

WELD METAL ANALYSIS

C	0.04%
Mn	3.0%
Si	0.2%
P	0.002%
S	0.002%
Cr	20%
Ni	73%
Mo	0.1%
Ti	0.36%
Co	0.02%
Cu	0.01%
Nb	2.5%
Fe	1.2%

CLASSIFICATIONS AND APPROVALS

- AWS A5.14: ERNiCr-3
- ASME II F No. 43
- ASME II SFA 5.14 ERNiCr-3

WELDING PROCESS

- GTAW (TIG)

INDUSTRIES

- Petrochemical
- Process
- Power Generation

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
256196544	AB ER82 1/16X36X10T/30CT INK	662303073886
256196551	AB ER82 3/32X36X10T/30CT INK	662303073893
256196569	AB ER82 1/8X36X10T/30CT INK	662303073909

Additional Products

- ESAB Tigrod 16.95 (ER307Si)
- ER308LSi
- Arcaloy ER309L
- ER309LSi
- ER312
- ER316LSi
- Arcaloy ER82
- Arcaloy ERNiCo-7

For additional information on the above products, please visit us at www.esabna.com

Cored Wire Electrodes (FCAW & MCAW)

Cored Wire Electrodes (FCAW & MCAW) - Section Three

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Carbon Steel Electrodes for Flux Cored Arc Welding

E-X X T - X M J HZ

- Electrode
- Min. Tensile Strength, ksi
- 0: Flat & Horizontal
  1: All-Position
- Tubular or Flux Cored
- Usability, Performance, Impacts
- M = Ar/CO_2 (if present)
- Impacts (20 ft-lb @ -40°C)
- Optional Hydrogen Designation

AWS Classification	ShieldingGas[a]	Polarity	V-notch impact
EXXT-1 (Multiple-pass)	CO_2	DCEP	20 ft-lb @0°F
EXXT-1M (Multiple-pass)	Ar/CO_2	DCEP	20 ft-lb @0°F
EXXT-2 (Single-pass)	CO_2	DCEP	None
EXXT-2M (Single-pass)	Ar/CO_2	DCEP	None
EXXT-3 (Single-pass)	None	DCEP	None
EXXT-4 (Multiple-pass)	None	DCEP	None
EXXT-5 (Multiple-pass)	CO_2	DCEP/DCEN[b]	20 ft-lb @-20°F
EXXT-5M (Multiple-pass)	Ar/CO_2	DCEP/DCEN[b]	20 ft-lb @-20°F
EXXT-6 (Multiple-pass)	None	DCEP	20 ft-lb @-20°F
EXXT-7 (Multiple-pass)	None	DCEN	None
EXXT-8 (Multiple-pass)	None	DCEN	20 ft-lb @-20°F
EXXT-9 (Multiple-pass)	CO_2	DCEP	20 ft-lb @-20°F
EXXT-9M (Multiple-pass)	Ar/CO_2	DCEP	20 ft-lb @-20°F
EXXT-10 (Single-pass)	None	DCEN	None
EXXT-11 (Multiple-pass)	None	DCEN	None
EXXT-12 (Multiple-pass)	CO_2	DCEP	20 ft-lb @-20°F
EXXT-12M (Multiple-pass)	Ar/CO_2	DCEP	20 ft-lb @-20°F
EXXT-13 (Single-pass)	None	DCEN	None
EXXT-14 (Single-pass)	None	DCEN	None
EXXT-G (Multiple-pass)	None	(c)	None
EXXT-GS (Single-pass)	None	(c)	None

(a) Ar/CO_2 (75-80% Ar/Bal. CO_2)

(b) DCEN (Electrode Negative) for improved out-of-position welding

(c) As agreed by supplier and user

Dual Shield 700X AWS A5.20: E70T-1CH8/T-9CH8

FEATURES

Dual Shield 700X is a high deposition, deep penetration wire for joining of heavy structural steel components. Designed for flat and horizontal position welding using CO_2 shielding gas, this X Series wire provides high deposition rates, high efficiency and excellent performance. The bead contour, smooth ripple and slag chemistry allow easy slag removal even in narrow groves.

TYPICAL MECHANICAL PROPERTIES

Shielding Gas CO_2	
Yield Strength	79 ksi, 545 MPa
Tensile Strength	87 ksi, 600 MPa
Elongation (In 2", 51 mm)	29%

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E70T-1CH8/T-9CH8
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S.- 2SA,2YSA
- DNV III YMS
- L.R. - 3S,3YS

CHARPY V-NOTCH PROPERTIES

Shielding Gas CO_2	
Testing Temperature	
0°F (-18°C)	49 ft-lb, 66 J
-20°F (-28.9°C)	33 ft-lb, 45 J

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

Shielding Gas CO_2	
C	0.035%
Mn	1.50%
Si	0.55%
P	0.011%
S	0.015%

INDUSTRIES

- Earth Moving Equipment
- Heavy Equipment
- Large Steel Components

Dual Shield 700X continued

DEPOSITION TABLE							
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	TTW Dist. in (mm)	Deposition Rate lb/hr (kg/hr)	Efficiency (%)
1/16 (1.6)	149	23	100 (254)	CO_2	3/4 (19)	2.8 (1.3)	80
	168	24	120 (305)	CO_2	3/4 (19)	3.5 (1.6)	80
	187	24	140 (356)	CO_2	3/4 (19)	4.2 (1.9)	80
	205	25	160 (406)	CO_2	3/4 (19)	4.9 (2.2)	80
	223	25	180 (457)	CO_2	3/4 (19)	5.6 (2.5)	80
	240	25	200 (508)	CO_2	3/4 (19)	6.3 (2.9)	80
	257	26	220 (559)	CO_2	3/4 (19)	7.0 (3.2)	81
	273	26	240 (610)	CO_2	3/4 (19)	7.7 (3.5)	81
	289	26	260 (660)	CO_2	3/4 (19)	8.4 (3.8)	81
3/32 (2.4)	290	27	150 (381)	CO_2	1 (25.4)	12.7 (5.8)	86.9
	350	28	200 (508)	CO_2	1 (25.4)	16.9 (7.7)	86.3
	410	29	250 (635)	CO_2	1 (25.4)	21.1 (9.6)	86.0
	475	32	300 (762)	CO_2	1 (25.4)	25.0 (11.3)	84.8

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 1/16”				Gas: CO_2 3/32”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
135-500	25-34	180-460	3/4-1	100-325	26-34	290-610	1-$1^{1/2}$

Dual Shield 700X continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245019526	DS 700X 1/16X60#CL	662303082345
245019559	DS 700X 1/16X850# RL	662303087371
245019542	DS 700X 5/64X60# CL	662303087401
245019567	DS 700X 5/64X850# RL	662303087395
245019575	DS 700X 3/32X250# SPOP 4/PLT	662303087722
242202349	DS 700X 3/32X500# POP	662303087319
245019518	DS 700X 3/32X60#CL	662303082338
245019534	DS 700X 3/32X850#RL	662303084158

DUAL SHIELD R-70 Ultra

AWS A5.20: E70T-1C-DH8/T-1M/T-9C-DH8/T-9M

FEATURES

This flux cored welding wire produces smoother arc characteristics and lower welding fumes than many competitive flux cored wires. Dual Shield R-70 Ultra is also designed to have a greater tolerance of mill scale and surface oxides. The notch toughness in the as welded condition is also improved. Bead contour is flat to slightly convex and slag coverage is complete. Dual Shield R-70 Ultra wire is designed for flat and horizontal single or multi-pass applications on low or medium carbon steels using 100% CO_2 shielding gas. Areas of application include railcar, heavy equipment, and general fabrication.

CLASSIFICATIONS AND APPROVALS

- Seismic Certified “D”
- AWS A5.20: E70T-1C-DH8/T-1M/T-9C-DH8/T-9M
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S.- 2SA,2YSA
- QPL-24403/1: MIL-70T-1C
- D.N.V.- II YMS(H15)
- L.R.- 2S,2YS(H15)

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- General Fabrication
- Civil Construction
- Shipbuilding
- Mobile Machinery
- Rail Road Car

TYPICAL MECHANICAL PROPERTIES

As Welded CO_2	
Yield Strength	70 ksi, 485 MPa
Tensile Strength	82 ksi, 565 MPa
Reduction in Area	63%
Elongation in 2”	26%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded CO_2	28 ft-lb, 38 J
Testing Temperature -20°F (-29°C)	
As Welded CO_2	25 ft-lb, 34 J

WELD METAL ANALYSIS

CO_2	
C	0.02%
Mn	1.4%
Si	0.5%
P	0.014%
S	0.008%

DUAL SHIELD R-70 Ultra continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)	Efficiency (%)
.045 (1.2)	145	28	200 (508)	CO_2	3.7 (1.7)	76
	190	29	300 (762)	CO_2	5.6 (2.5)	80
	225	29	400 (1016)	CO_2	7.6 (3.4)	82
	255	32	500 (1270)	CO_2	9.6 (4.4)	82
	300	33	600 (1524)	CO_2	11.6 (5.3)	84
.052 (1.4)	140	25	150 (381)	CO_2	3.9 (1.8)	79
	180	26	200 (508)	CO_2	5.1 (2.3)	80
	250	34	300 (762)	CO_2	7.4 (3.4)	80
	300	35	400 (1016)	CO_2	10.3 (4.7)	84
	340	36	500 (1270)	CO_2	13.4 (6.1)	85
	390	35	600 (1524)	CO_2	16.1 (7.3)	86
1/16 (1.6)	195	26	150 (381)	CO_2	5.0 (2.3)	78
	265	28	250 (635)	CO_2	8.7 (4.0)	83
	325	30	300 (762)	CO_2	10.6 (4.8)	85
	365	31	350 (889)	CO_2	12.4 (5.6)	84
	385	31	400 (1016)	CO_2	14.1 (6.4)	84
	450	33	500 (1270)	CO_2	17.7 (8.0)	85
5/64 (2.0)	170	27	125 (317.5)	CO_2	6.5 (3.0)	80
	200	27	150 (381)	CO_2	8.0 (3.6)	83
	235	28	200 (508)	CO_2	10.8 (4.9)	84
	280	29	250 (635)	CO_2	13.6 (6.2)	85
	320	30	300 (762)	CO_2	16.2 (7.4)	84
3/32 (2.4)	220	27	100 (254)	CO_2	8.4 (3.8)	88
	290	27	150 (381)	CO_2	12.7 (5.8)	87
	350	28	200 (508)	CO_2	16.9 (7.6)	86
	410	29	250 (635)	CO_2	21.1 (9.6)	86
	475	32	300 (762)	CO_2	25.0 (11.3)	85

DUAL SHIELD R-70 Ultra continued

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 .045”				Gas: CO_2 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	23-26	135-205	3/8-1/2	110-230	23-26	125-235	1/2-5/8
260-380	25-27	175-230	1/2-3/4	230-340	25-29	215-290	5/8-3/4
380-520	26-30	180-265	3/4-1	340-470	29-31	250-350	3/4-1

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 1/16”				Gas: CO_2 5/64”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
110-200	25-28	165-270	5/8-3/4	125-200	27-31	285-375	3/4-1
200-300	27-30	245-345	3/4-1	200-300	28-32	375-475	1-11/4
300-420	28-32	290-415	1-11/4				

FULL RANGE WELDING PARAMETERS			
Gas: CO_2 3/32”			
WFS ipm	Volts	Amps	Tip to Work in
70-200	27-30	235-500	$1\text{-}1^{1/4}$
200-275	30-34	500-630	$1^{1/4}\text{-}1^{1/2}$

DUAL SHIELD R-70 Ultra continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242201184	DS R-70 ULT 045X33#AWS	662303000363
242202307	DS R-70 ULT 045X60#CL	662303000950
242201176	DS R-70 ULT 1/16X33#AWS	662303000356
242201168	DS R-70 ULT 1/16X60#CL	662303000349
242202323	DS R-70 ULT 1/16X600#OMP	662303076634
242202935	DS R-70 ULT 5/64X500#POP	662303068370
242200970	DS R-70 ULT 5/64X60#CL	662303000240
242200947	DS R-70 ULT 3/32X60#CL	662303000226
242201218	DS R-70 ULT 3/32X250#SPOP	662303084264
242202372	DS R-70 ULT 3/32X500#POP	662303000998
242200996	DS R-70 ULT 3/32X600#RL	662303000264
242202489	DS R-70 ULT 3/32X850#WR 29	662303076207

DUAL SHIELD 111-RB AWS A5.20: E70T-1C

FEATURES

Dual Shield 111-RB is a low slag, high deposition flux cored electrode designed for joining structural components made of low carbon steel. The electrode is designed to be used with 100% CO_2 gas shielding. Dual Shield 111-RB can achieve deposition efficiency above 88%. This increases the amount of deposit achieved over a given period of time, as compared to a standard Dual Shield E70T-1 electrode.

TYPICAL MECHANICAL PROPERTIES

As Welded CO_2	
Yield Strength	67 ksi, 483 MPa
Tensile Strength	80 ksi, 565 MPa
Reduction in Area	65%
Elongation in 2”	28%

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E70T-1C
- ASME SFA 5.20
- A.B.S.- 2SA,2YSA
- MIL-E-24403/1 70T-1C
- D.N.V.- II YMS
- L.R.- 2S,2YS
- B.V.- SA2YM
- G.L.- 2YS

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded CO_2	29 ft-lb, 38 J

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

CO_2	
C	0.05%
Mn	1.5%
Si	0.4%
P	0.014%
S	0.015%

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Civil Construction
- Shipbuilding

DUAL SHIELD 111-RB continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)	Efficiency (%)
.045 (1.2)	150	28	200 (508)	CO_2	4.2 (1.91)	86
	210	29	300 (762)	CO_2	6.3 (2.86)	86
	250	30	400 (1016)	CO_2	8.5 (3.86)	87
	290	33	500 (1270)	CO_2	10.7 (4.85)	87
	330	34	600 (1524)	CO_2	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	CO_2	4.4 (2)	87
	245	28	250 (635)	CO_2	7.3 (3.31)	86
	310	33	350 (889)	CO_2	10.2 (4.63)	85
	360	36	450 (1143)	CO_2	13.3 (6.03)	85
	430	37	600 (1524)	CO_2	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (381)	CO_2	6.1 (2.77)	87
	300	30	250 (635)	CO_2	10.2 (4.63)	87
	365	33	300 (762)	CO_2	12.3 (5.58)	86
	410	33	350 (889)	CO_2	14 (6.35)	88
	450	33	400 (1016)	CO_2	16 (7.3)	87
	500	39	500 (1270)	CO_2	20.1 (9.11)	87
5/64 (2.0)	250	26	112 (284)	CO_2	6.4 (2.9)	85
	350	28	176 (447)	CO_2	10.5 (4.76)	85
	450	31	258 (655)	CO_2	14.8 (6.71)	85
3/32 (2.4)	350	30	124 (315)	CO_2	9.6 (4.35)	84
	400	30	166 (422)	CO_2	12.7 (5.76)	85
	450	31	197 (500)	CO_2	15 (6.8)	86
	500	32	237 (602)	CO_2	18.5 (8.39)	86
	550	34	278 (706)	CO_2	21.3 (9.66)	88

DUAL SHIELD 111-RB continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
170	19.0	170	3/4	226	30	300	1
250	30.0	250	1	369	32.0	400	1
300	32	300	1	422	32	450	1
350	32	350	1				

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 3/32”			
WFS ipm	Volts	Amps	Tip to Work in
217	32	450	1
245	32	475	1
270	32	500	1
346	33	550	1

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242215051	DS 111-RB 045X33#AWS	662303002015
242215085	DS 111-RB 052X33#AWS	662303079130
242215101	DS 111-RB 052X600#OMP	662303082949
242215028	DS 111-RB 1/16X15#PSP	662303080181
242215069	DS 111-RB 1/16X33#AWS	662303002022
242516052	DS 111-RB 1/16X60#CL	662303049621
242516094	DS 111-RB 1/16X600#OMP	662303083830
242516086	DS 111-RB 5/64X60#CL	662303083663
242516078	DS 111-RB 3/32X60#CL	662303069322
242516011	DS 111-RB 3/32X250# SPOP 4/PLT	662303086336

DUAL SHIELD 710X AWS A5.20: E71T-1C-DH8/T-1M/T-9C-DH8/T-9M

FEATURES

Dual Shield 710X is an all-position flux cored wire for general purpose welding. It provides outstanding operator appeal with an easily controlled arc, improved operation at both lower and higher current levels, minimal spatter and easily removed slag. Dual Shield 710X can be used with either 100% CO_2 or a 75/25 Argon CO_2 gas mix, however pure CO_2 is recommended in applications where weld joint restraint is high.

Applications include rail car, barges, civil construction, light equipment and general fabrication.

CLASSIFICATIONS AND APPROVALS

- Seismic Certified “D”
- AWS A5.20: E71T-1C-DH8/T-1M/T-9C-DH8/T-9M
- AWS A5.20: E71T-1M/T-9M H8
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- ABS - 3SA, 3YSA
- DNV III YMS
- L.R. - 3S,3YS

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Civil Construction
- Light Equipment
- Barges
- General Fabrication
- Shipbuilding
- Rail Road Car

TYPICAL MECHANICAL PROPERTIES

As Welded Shielding Gas CO_2	
Yield Strength	75 ksi, 520 MPa
Tensile Strength	87 ksi, 625 MPa
Elongation	28%
As Welded Shielding Gas 75% Ar / 25% CO_2	
Yield Strength	83 ksi, 570 MPa
Tensile Strength	93 ksi, 640 MPa
Elongation	27%

CHARPY V-NOTCH PROPERTIES

Shielding Gas CO_2	
Testing Temperature	
0°F (-18°C)	57 ft-lb, 77 J
-20°F (-29°C)	49 ft-lb, 66 J
Shielding Gas 75% Ar / 25% CO_2	
Testing Temperature	
0°F (-18°F)	75 ft-lb, 102 J
-20°F (-29°C)	50 ft-lb, 68 J

WELD METAL ANALYSIS

Shielding Gas CO_2	
C	0.03%
Mn	1.4%
Si	0.5%
P	0.007%
S	0.009%
Ni	0.4%
Shielding Gas 75% Ar / 25% CO_2	
C	0.03%
Mn	1.5%
Si	0.6%
P	0.005%
S	0.009%
Ni	0.4%

DUAL SHIELD 710X continued

DEPOSITION TABLE - Vertical Up						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)	Efficiency (%)
.045 (1.2)	140	23	190 (483)	CO_2	3.3 (1.5)	81
	154	23	220 (559)	CO_2	3.9 (1.77)	81
	167	24	250 (635)	CO_2	4.5 (2.04)	82
	180	24	280 (711)	CO_2	5.1 (2.31)	82
	193	25	310 (787)	CO_2	5.6 (2.54)	82
	205	26	340 (864)	CO_2	6.2 (2.81)	83
	217	26	370 (940)	CO_2	6.8 (3.08)	83
.052 (1.4)	153	24	160 (406)	CO_2	4.0 (1.81)	81
	159	24	170 (432)	CO_2	4.0 (1.81)	81
	166	25	180 (457)	CO_2	4.5 (2.04)	81
	172	25	190 (483)	CO_2	4.8 (2.17)	81
	178	25	200 (508)	CO_2	5.0 (2.27)	81
	184	25	210 (533)	CO_2	5.3 (2.4)	81
	190	26	220 (559)	CO_2	5.5 (2.5)	81
	196	26	230 (584)	CO_2	5.8 (2.63)	82
	201	26	240 (610)	CO_2	6.0 (2.72)	82
	207	26	250 (635)	CO_2	6.3 (2.86)	82
1/16 (1.6)	187	24	140 (356)	CO_2	4.2 (1.9)	80
	205	25	160 (406)	CO_2	4.9 (2.22)	80
	223	25	180 (457)	CO_2	5.6 (2.54)	80
	240	25	200 (508)	CO_2	6.3 (2.86)	80
	257	26	220 (559)	CO_2	7.0 lbs/hr	81
	273	26	240 (610)	CO_2	7.7 lbs/hr	81
	289	26	260 ipm	CO_2	8.4 lbs/hr	81

DUAL SHIELD 710X continued

VERTICAL UP WELDING PARAMETERS

Gas: CO_2 .045"			Gas: CO_2 .052"			Gas: CO_2 1/16"		
WFS ipm	Volts	Amps	WFS ipm	Volts	Amps	WFS ipm	Volts	Amps
184	21.7	128	160	21.0	124	144	21.9	168
208	22.3	140	169	21.6	137	159	22.5	181
232	23.0	153	178	22.1	149	174	23.1	195
256	23.6	165	187	22.7	162	189	23.7	209
280	24.3	178	196	23.2	174	204	24.3	222
304	24.9	190	205	23.8	187	220	25.0	236
328	25.6	203	214	24.3	200	235	25.6	249
352	26.2	215	223	24.9	212	250	26.2	263
376	26.9	228	232	25.4	225			
400	27.5	240	241	26.0	237			
			250	26.5	250			

FULL RANGE WELDING PARAMETERS

Gas: CO_2 .045"				Gas: CO_2 .052"			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
170-290	23-26	135-205	3/8-1/2	130-280	23-26	125-235	1/2-5/8
290-350	25-27	175-230	1/2-3/4	280-400	25-29	215-290	5/8-3/4
350-550	26-30	180-265	3/4-1	400-600	29-31	250-350	3/4-1

FULL RANGE WELDING PARAMETERS

Gas: CO_2 1/16"			
WFS ipm	Volts	Amps	Tip to Work in
135-265	25-28	165-270	5/8-3/4
265-400	27-30	245-345	3/4-1
400-500	28-32	290-415	1-1 1/4

DUAL SHIELD 710X continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245019344	DS 710X 045X15#PSP	662303083977
245019252	DS 710X 045X33#AWS	662303082147
245019294	DS 710X 045X60#CL	662303083472
245019310	DS 710X 045X600#OMP	662303083502
245019351	DS 710X 052X15#PSP	662303084004
245019260	DS 710X 052X33#AWS	662303082154
245019286	DS 710X 052X60#CL	662303083205
245019336	DS 710X 052X600#OMP	662303083823
245019369	DS 710X 1/16X15#PSP	662303084011
245019278	DS 710X 1/16X33#AWS	662303082161
245019302	DS 710X 1/16X60#CL	662303083489
245019328	DS 710X 1/16X600#OMP	662303083519

DUAL SHIELD 710X-M AWS A5.20: E71T-1MD/T-9MD H8

FEATURES

Dual Shield 710X-M provides outstanding operator appeal with an easily controlled arc, improved operation at both lower and higher current levels, minimal spatter and easily removed slag. Dual Shield 710X-M is designed to be used with 75/25 Argon CO_2 gas mix, however pure CO_2 may also be used.

CLASSIFICATIONS AND APPROVALS

- Seismic Certified “D”
- AWS A5.20: E71T-1MD/T-9MD H8
- AWS A5.20: E71T-1C/T-9C H8
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- ABS-35A, 3YSA
- MIL-E-24403A MIL-71T-1M
- DNV-111 YMS
- LR-3Y40S (H10)
- GL

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Barges
- General Fabrication
- Light Equipment
- Rail Road Car
- Civil Construction
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

Shielding Gas 75 Ar / 25 CO_2	
Yield Strength	74 ksi, 510 MPa
Tensile Strength	83 ksi, 570 MPa
Elongation (In 2”, 51 mm)	29%
As Welded Shielding Gas CO_2	
Yield Strength	68 ksi, 470 MPa
Tensile Strength	77 ksi, 530 MPa
Elongation (In 2”, 51 mm)	30%

CHARPY V-NOTCH PROPERTIES

Shielding Gas 75 Ar / 25 CO_2	
Testing Temperature	
0°F (-18°C)	72 ft-lb, 97 J
-20°F (-29°C)	56 ft-lb, 76 J
Shielding Gas CO_2	
Testing Temperature	
0°F (-18°F)	60 ft-lb, 81 J
-20°F (-29°C)	33 ft-lb, 45 J

WELD METAL ANALYSIS

Shielding Gas 75 Ar / 25 CO_2	
C	0.04%
Mn	1.3%
Si	0.5%
P	0.012%
S	0.008%
Shielding Gas CO_2	
C	0.04%
Mn	1.0%
Si	0.3%
P	0.012%
S	0.008%

DUAL SHIELD 710X-M continued

DEPOSITION TABLE - Full Range						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	TTW Dist. in (mm)	Deposition Rate lb/hr (kg/hr)
.045 (1.2)	240	26.5	450 (1143)	75/25	0.625 (16)	11.5 (5.2)
.052 (1.40	125	20.0	125 (317.5)	75/25	0.75 (19)	3.0 (1.4)

VERTICAL UP WELDING PARAMETERS								
Gas: 75/25 .045”			Gas: 75/25 .052”			Gas: 75/252 1/16”		
WFS ipm	Volts	Amps	WFS ipm	Volts	Amps	WFS ipm	Volts	Amps
150	19.0	110	125	20.0	125	144	21.9	194
180	19.8	123	165	20.6	157	159	22.5	215
210	20.5	136	200	21.3	187	174	23.1	230
240	21.3	149	225	22.0	197	189	23.7	240
270	22.0	162	250	22.6	200	204	24.3	257
300	22.8	175	275	23.3	220	220	25.0	260
330	23.5	188	300	23.9	241	235	25.6	270
360	24.3	201	325	24.6	249	250	26.2	293
390	25.0	214	350	25.2	256			
420	25.8	227	375	25.7	263			
450	26.5	240	400	26.3	286			

DUAL SHIELD 710X-M continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
140-240	22-26	130-200	3/8-1/2	125-270	24-28	135-250	1/2-5/8
240-305	24-27	165-225	1/2-3/4	270-370	27-30	225-295	5/8-3/4
305-470	27-29	185-265	3/4-1	370-540	28-32	245-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
140-240	24-28	185-285	5/8-3/4
240-320	27-30	250-340	3/4-1
320-460	28-32	285-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245019807	DS 710XM 045X33#AWS	662303085063
245019245	DS 710X-M 045X60# CL	662303086862
245019237	DS 710X-M 045X600# OMP	662303085070
245019815	DS 710XM 052X33#AWS	662303085070
245019880	DS 710X-M 052X60# CL	662303087388
245019849	DS 710X-M 052X600# OMP 2/PLT	662303086374
245019823	DS 710XM 1/16X33#AWS	662303085087
245019872	DS 710X-M 1/16X50# CL	662303087210
245019831	DS 710X-M 1/16x60#CL	000000000000
245019864	DS 710X-M 1/16X600# OMP	662303086848
245019856	DS 710X-M 5/64X33# AWS	662303086534

DUAL SHIELD 7100 ULTRA AWS A5.20: E71T-1CH8/T-9M-D

FEATURES

Like many other Dual Shield products, Dual Shield 7100 Ultra operates in a wider parameter range and generates less welding fumes than many similar welding wires. The low spatter levels and easy slag removal minimizes post weld cleanup. Dual Shield 7100 Ultra can be used with either 100% CO_2 or 75% Ar/25% CO_2. This versatility in gas selection provides the fabricator greater flexibility in choosing both wire and gas. Applications include railcar and earth moving equipment, as well as general structural steel fabrication.

CLASSIFICATIONS AND APPROVALS

- Seismic Certified “D”
- AWS A5.20: E71T-1CH8/T-9M-D
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S.- 3SA,3YSA
- D.N.V.- III YMS
- L.R.- 3S,3YS(H10)
- B.V.- SA3YM(H)
- TUV
- DEUTSCHE BAHN

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Civil Construction
- Mobile Machinery
- Shipbuilding
- General Fabrication
- Bridge Construction
- Rail Road Car
- Automotive
- Process

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	78 ksi, 540 MPa
Tensile Strength	88 ksi, 605 MPa
Elongation in 2”	26%
As Welded CO_2	
Yield Strength	75 ksi, 515 MPa
Tensile Strength	85 ksi, 585 MPa
Elongation in 2”	26%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded CO_2	43 ft-lb, 58 J
As Welded 75% Ar / 25% CO_2	
	42 ft-lb, 57 J
Testing Temperature -20°F (-29°C)	
As Welded CO_2	25 ft-lb, 34 J
As Welded 75% Ar / 25% CO_2	
	35 ft-lb, 47 J

WELD METAL ANALYSIS

CO_2	
C	0.02%
Mn	1.3%
Si	0.5%
P	0.010%
S	0.013%
75% Ar / 25% CO_2	
C	0.03%
Mn	1.6%
Si	0.6%
P	0.010%
S	0.012%

DUAL SHIELD 7100 ULTRA continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)	Efficiency %
0.035 (0.9)	105	24	250 (635)	CO-2	2.8 (1.3)	85.5
	140	25	400 (1016)	CO-2	4.6 (2.1)	87.0
	165	25.5	475 (1206.5)	CO-2	5.5 (2.5)	87.5
	185	27	550 (1397)	CO-2	6.3 (2.9)	87.6
.045 (1.2)	192	25.5	300 (762)	CO-2	5.5 (2.5)	79.3
	230	27	400 (1016)	CO-2	7.4 (3.3)	81.8
	275	28.5	500 (1270)	CO-2	9.6 (4.4)	83.1
.052 (1.4)	150	23.5	150 (381)	CO-2	3.6 (1.6)	75.8
	190	24	200 (508)	CO-2	4.9 (2.2)	77.8
	250	25.5	300 (762)	CO-2	7.7 (3.5)	81.7
	300	27	400 (1016)	CO-2	10.3 (4.7)	82.5
1/16 (1.6)	195	24	150 (381)	CO_2	5.5 (2.5)	85.0
	290	25.5	250 (635)	CO_2	9.2 (4.2)	86.5
	325	26.5	300 (762)	CO_2	10.9 (4.9)	85.9
	352	27	350 (889)	CO_2	13.1 (6.0)	88.1
	382	28.5	400 (1016)	CO_2	14.7 (6.7)	86.8

DUAL SHIELD 7100 ULTRA continued

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 .052”				Gas: CO_2 1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
110-230	23-26	125-235	1/2-5/8	110-200	25-28	165-270	5/8-3/4
230-340	25-29	235-290	5/8-3/4	200-300	27-30	270-345	3/4-1
340-470	29-31	290-350	3/4-1	300-420	28-32	345-415	1-1 1/4

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 .035”				Gas: CO_2 .042”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
220-330	23-25	110-135	3/8-1/2	150-260	23-26	135-205	1/2-5/8
330-440	24-28	135-160	1/2-5/8	260-380	25-27	205-230	5/8-3/4
440-550	26-30	160-185	5/8-3/4	380-520	26-30	230-265	3/4-1

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
248001141	DS 7100 ULT 035X15#PSP	662303083274
248000622	DS 7100 ULT 035X33#AWS	662303007188
248005035	DS 7100 ULT 045X15#PSP	662303076276
248000044	DS 7100 ULT 045X33#AWS	662303006808
248000119	DS 7100 ULT 045X60#CL	662303006846
248000267	DS 7100 ULT 045X600#OMP	662303075156
248000010	DS 7100 ULT 052X33#AWS	662303006778
248000127	DS 7100 ULT 052X60#CL	662303006853
248000283	DS 7100 ULT 052X600#OMP	662303075163
248000028	DS 7100 ULT 1/16X33#AWS	662303006785
248000101	DS 7100 ULT 1/16X60#CL	662303006839
248000291	DS 7100 ULT 1/16X600#OMP	662303075170

DUAL SHIELD 7100 LC

AWS A5.20: E71T-1CDH8/T-1MDH8/T-9CDH8/T-9MDH8

FEATURES

Dual Shield 7100 LC provides outstanding operator appeal with its easily controlled arc, improved operation at lower current levels, minimal spatter and easily removed slag. Dual Shield 7100 LC can be used with CO_2 or 75% Ar – 25% CO_2 shielding, however pure CO_2 is recommended in applications where restraint is high.

CLASSIFICATIONS AND APPROVALS

- Seismic Certified "D"
- AWS A5.20: E71T-1CHD8/T-1MDH8/ T-9CDH8/T-9MDH8
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S.- 3SA,3YSA(H10)
- D.N.V.- III YMS(H10)
- L.R.- 3S,3YS(H10)

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- Process
- Rail Road Car
- Shipbuilding
- Civil Construction
- General Fabrication
- Bridge Construction

TYPICAL MECHANICAL PROPERTIES

As Welded CO_2	
Yield Strength	79 ksi, 545 MPa
Tensile Strength	89 ksi, 615 MPa
Reduction in Area	52%
Elongation in 2"	23%
As Welded using 75% Ar - 25% CO_2	
Yield Strength	93 ksi, 640 MPa
Tensile Strength	96 ksi, 660 MPa
Reduction in Area	56%
Elongation in 2"	25%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded CO_2	68 ft-lb, 92 J
As Welded 75% Ar - 25% CO_2	
	50 ft-lb, 61 J
Testing Temperature -20°F (-29°C)	
As Welded CO_2	41 ft-lb, 56 J
As Welded 75% Ar - 25% CO_2	
	41 ft-lb, 56 J

WELD METAL ANALYSIS

CO_2	
C	0.03%
Mn	1.4%
Si	0.5%
P	0.010%
S	0.010%
75% Ar / 25% CO_2	
C	0.03%
Mn	1.6%
Si	0.6%
P	0.010%
S	0.010%

DUAL SHIELD 7100 LC continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	145	24.5	200 (508)	CO_2	3.6 (1.6)	81.2
	190	26	300 (762)	CO_2	5.4 (2.5)	81.4
	235	27.5	400 (1016)	CO_2	7.3 (3.3)	82.5
	265	29	500 (1270)	CO_2	9.3 (4.2)	82.8
.052 (1.3)	145	25	150 (381)	CO_2	3.4 (1.5)	74.3
	180	25.5	200 (508)	CO_2	4.5 (2.0)	74.6
	235	27.5	300 (762)	CO_2	7.0 (3.2)	78.2
	285	28.5	400 (1016)	CO_2	9.8 (4.4)	81.3
	230	29.5	500 (1270)	CO_2	12.2 (5.5)	82.3
	370	30.2	600 (1524)	CO_2	14.7 (6.7)	82.7
0.062 (1.6)	195	24.5	150 (381)	CO_2	4.5 (2.0)	73.7
	285	26	250 (635)	CO_2	8.1 (3.7)	79.4
	320	28	300 (762)	CO_2	9.7 (4.4)	79.9
	345	30	350 (889)	CO_2	11.5 (5.2)	80.7
	385	32	400 (1016)	CO_2	13.4 (6.1)	82.6
	445	32.5	500 (1270)	CO_2	16.7 (7.6)	82.8

DUAL SHIELD 7100 LC continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
170-290	23-26	135-205	3/8-1/2	130-280	23-26	125-235	1/2-5/8
290-350	25-27	175-230	1/2-3/4	280-400	25-29	215-290	5/8-3/4
350-550	26-30	180-265	3/4-1	400-600	29-31	250-350	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
135-265	25-28	165-270	5/8-3/4
265-400	27-30	245-345	3/4-1
400-500	28-32	290-415	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
248000952	DS 7100 LC 045X33# AWS BK	662303048082
248001182	DS 7100 LC 045X33# SP	662303086152
248000937	DS 7100 LC 045X33#AWS	662303048075
248000895	DS 7100 LC 045X60#CL	662303059118
248001117	DS 7100 LC 045X600#OMP	662303078546
248001091	DS 7100 LC 052X15#PSP	662303076306
248001158	DS 7100 LC 052X33# PSP	662303086169
248000960	DS 7100 LC 052X33#AWS	662303048334
248001042	DS 7100 LC 052X60#CL	662303059125
248001166	DS 7100 LC 052X250# SOMP	662303086176
248001109	DS 7100 LC 1/16X15#PSP	662303076313
248001067	DS 7100 LC 1/16X33# PSP	662303086145
248000903	DS 7100 LC 1/16X33#AWS	662303046057
248000929	DS 7100 LC 1/16X60#CL	662303046392
248001174	DS 7100 LC 1/16X250# SOMP	662303086183
248001083	DS 7100 LC 1/16X600#OMP	662303076160

DUAL SHIELD 70 ULTRA PLUS AWS A5.20: E71T-1M/T-9M

FEATURES

Dual Shield 70 Ultra Plus is an all-position wire that is uniquely designed to provide high deposition, outstanding all position performance and a fume emission rate approaching that of solid wires. It is optimized for use with 90% Ar/10% CO_2 shielding but works well with mixes ranging from 75% Ar/25% CO_2 to 95% Ar/5% CO_2. Among the outstanding features of Dual Shield 70 Ultra Plus are a very wide operating window, very high out of position deposition rates (vertical up and overhead at over 12 lb/hr), and welds that are virtually spatter free. Dual Shield 70 Ultra Plus may be used in a variety of applications including railcar, automotive, heavy equipment, and general structural steel fabrication. It is especially recommended in applications where reduction of welding fume is a priority.

CLASSIFICATIONS AND APPROVALS

- Seismic Certified “D”
- AWS A5.20: E71T-1M/T-9M
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S.- 3SA,3YSA(H10)
- D.N.V.- III YMS(H10)
- L.R.- 3S,3YS(H10)
- B.V.- SA3YM(HH)
- G.L.- 3YH10S

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Process
- Bridge Construction
- Civil Construction
- Rail Road Car
- Mobile Machinery
- Shipbuilding
- General Fabrication
- Steel Industry
- Automotive

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	76 ksi, 525 MPa
Tensile Strength	86 ksi, 595 MPa
Elongation in 2”	29%
As Welded 90% Ar / 10% CO_2	
Yield Strength	80 ksi, 550 MPa
Tensile Strength	88 ksi, 605 MPa
Elongation in 2”	27%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded 75% Ar / 25% CO_2	
	53 ft-lb, 72 J
As Welded 90% Ar / 10% CO_2	
	68 ft-lb, 92 J
Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	
	40 ft-lb, 54 J
As Welded 90% Ar / 10% CO_2	
	43 ft-lb, 58 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.04%
Mn	1.2%
Si	0.6%
P	0.016%
S	0.012%
90% Ar / 10% CO_2	
C	0.04%
Mn	1.2%
Si	0.7%
P	0.015%
S	0.012%

DUAL SHIELD 70 ULTRA PLUS continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)	Efficiency (%)
.045 (1.2)	150	25.5	200 (508)	C-8	3.9 (8)	84
	200	26.5	300 (762)	C-8	6.0 (2.7)	86
	245	27.5	400 (1016)	C-8	8.1 (3.7)	86
	293	29	500 (1270)	C-8	10.1 (4.6)	87
	335	30.5	600 (1524)	C-8	12.2 (5.5)	87
.052 (1.3)	157	24	150 (381)	C-8	4.0 (1.8)	86
	205	24.5	200 (508)	C-8	5.5 (2.5)	86
	265	26	300 (762)	C-8	8.2 (3.7)	86
	335	27.5	400 (1016)	C-8	11.1 (5.0)	87
	365	29	500 (1270)	C-8	13.8 6.3)	87
	465	31.5	600 (1524)	C-8	16.6 (7.5)	87
1/16 (1.6)	210	24.5	150 (381)	C-8	5.5 (2.5)	86
	315	25.5	250 (635)	C-8	9.2 (4.2)	86
	360	26.5	300 (762)	C-8	10.9 (4.9)	86
	410	27.5	350 (889)	C-8	12.7 (5.7)	86
	432	28.5	400 (1016)	C-8	14.7 (6.7)	87
	545	30	500 (1270)	C-8	18.3 (8.3)	87

DUAL SHIELD 70 ULTRA PLUS continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
200-300	25.5-26.5	150-200	1/2-3/4	150-200	24-24.5	157-205	3/4-1
400-500	27.5-29	245-293	1/2-3/4	300-400	26-27.5	265-335	3/4-1
600	30.5	335	1/2-3/4	500-600	29-31.5	365-465	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
150-250	24.5-25.5	210-315	3/4-1
300-350	26.5-27.5	360-410	3/4-1
400-500	28.5-30	432-545	3/4-1

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245015813	DS 70 ULT PLUS 045X33#AWS	662303020019
245015912	DS 70 ULT PLUS 045X60#CL	662303034801
245015609	DS 70 ULT PLUS 052X33# AWS VP	662303087418
245015896	DS 70 ULT PLUS 052X33#AWS	662303030131
245015920	DS 70 ULT PLUS 052X60#CL	662303034818
245015904	DS 70 ULT PLUS 1/16X33#AWS	662303030148
245018098	DS 70 ULT PLUS 1/16X33#AWS VP	662303076658
245015938	DS 70 ULT PLUS 1/16X60#CL	662303034825

DUAL SHIELD II 70 ULTRA

AWS A5.20: E71T-1M/T-9M/T-12M

FEATURES

Dual Shield II 70 Ultra is an all-position flux cored wire that displays exceptional impact properties when used with 75% Ar/25% CO_2. The improved properties qualify this wire to the Navy's "HY" classification. The "Ultra" series produces smoother arc characteristics and lower welding fumes. Dual Shield II 70 Ultra was developed to join low and medium carbon steel. The Military classification allows Dual Shield II 70 Ultra to be used for attaching steels of less than 81 ksi (560 MPa) yield to HY-80 and HY-100. Commercial applications include construction, shipbuilding, railcar, and heavy equipment industries.

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E71T-1M/T-9M/T-12M
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S.- 3SA,3YSA(H5)
- QPL-24403/1: MIL-71T-1-HYM
- QPL-24403/1: MIL-71T-1M
- D.N.V.- III YMS(H10)
- L.R.- 3S,3YS(H10)
- B.V.- SA3YM(HH)
- G.L.- 3YH10S
- DEUTSCHE BAHN
- TUV
- DB
- CL

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Civil Construction
- Mobile Machinery
- Bridge Construction
- Rail Road Car
- Shipbuilding
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	72 ksi, 490 MPa
Tensile Strength	81 ksi, 560 MPa
Reduction in Area	75%
Elongation in 2"	29%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded 75% Ar / 25% CO_2	
	117 ft-lb, 159 J
Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	
	70 ft-lb, 95 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.04%
Mn	1.0%
Si	0.4%
P	0.008%
S	0.009%

DUAL SHIELD II 70 ULTRa continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shield Gas	Deposition Rate lb/hr (kg/hr)	Efficiency %
.035 (0.9)	110	22	250 (635)	75/25	2.9 (1.32)	84.00
	140	24	400 (1016)	75/25	4.7 (2.13)	85.00
	160	24.5	475 (1206)	75/25	5.6 (2.54)	85.00
	180	25.5	550 (1394)	75/25	6.5 (2.94)	86.00
	215	28	750 (1905)	75/25	9.0 (4.08)	87.00
.045 (1.2)	145	22	200 (508)	75/25	3.94 (1.79)	86.15
	210	23	300 (762)	75/25	5.99 (2.72)	85.51
	247	24.5	400 (1016)	75/25	8.10 (3.68)	87.55
	275	26	500 (1270)	75/25	9.52 (4.33)	82.08
.052 (1.4)	150	21	150 (381)	75/25	4.01 (1.82)	83.25
	192	22	200 (508)	75/25	5.44 (2.48)	84.71
	262	23.5	300 (762)	75/25	8.12 (3.69)	85.48
	308	25	400 (1016)	75/25	10.92 (4.97)	86.31
1/16 (1.6)	203	23	150 (381)	75/25	5.63 (2.56)	87.15
	298	24.5	250 (635)	75/25	9.33 (4.25)	87.56
	340	25.5	300 (762)	75/25	11.10 (5.05)	87.68
	375	26	350 (889)	75/25	13.24 (6.02)	88.35
	408	27.5	400 (1016)	75/25	14.49 (6.59)	85.66

DUAL SHIELD II 70 ULTRA continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .035”				Gas: 75/25 .045”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
250-400	22-24	110-140	5/8	150-260	22-26	130-200	3/8-1/2
400-750	24.5-28	160-215	5/8	260-380	24-27	200-225	1/2-3/4
				380-520	27-29	225-265	3/4-1

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .052”				Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
110-230	22-26	135-250	1/2-5/8	110-200	24-28	185-285	5/8-3/4
230-340	25-29	250-295	5/8-3/4	200-300	27-30	285-340	3/4-1
340-470	27-31	295-355	3/4-1	300-420	28-32	340-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245013750	DS II 70 ULT 035X33#PSP	662303004897
245014709	DS II 70 ULT 045X15#PSP	662303005511
245013313	DS II 70 ULT 045X33#PSP	662303004491
245013453	DS II 70 ULT 045X33#PSP VP	662303004613
245013321	DS II 70 ULT 052X33#PSP	662303004507
245014808	DS II 70 ULT 1/16X15#PSP	662303005597
245013339	DS II 70 ULT 1/16X33#PSP	662303004514
245013354	DS II 70 ULT 1/16X60#CL	662303004521

DUAL SHIELD II 71 ULTRA AWS A5.20: E71T-1CJ/T-9CJ/12CJ

FEATURES

Dual Shield II 71 Ultra is an all-position flux cored wire that displays exceptional impact properties when used with CO_2. The improved properties qualify this wire to the Navy's "HY" classification. The "Ultra" series produces smoother arc characteristics and lower welding fumes. Dual Shield II 71 Ultra was developed to join low and medium carbon steel. The Military classification allows Dual Shield II 71 Ultra to be used for attaching steels of less than 80 ksi (552 MPa) yield to HY-80 and HY-100. Commercial applications include construction, shipbuilding, railcar, and heavy equipment industries. Weld metal analysis is similar to an E7018 low hydrogen electrode.

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E71T-1CJ/T-9CJ/T-12CJ
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S.-3Y400 (H10)
- QPL-24403/1: MIL-71T-1-HYC
- QPL-24403/1: MIL-71T-1C
- DNV-IIIY40MS(H10)
- LR-3Y40S (H10)
- G.L.- 3YH10S

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Shipbuilding
- Civil Construction
- Rail Road Car
- Mobile Machinery
- General Fabrication
- Bridge Construction

TYPICAL MECHANICAL PROPERTIES

Yield Strength	71 ksi, 495 MPa
Tensile Strength	79 ksi, 540 MPa
Reduction in Area	77%
Elongation in 2"	28%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded	96 ft-lb, 130 J
Testing Temperature -20 F (-29 C)	
As Welded CO_2	40 ft-lb 54 J

WELD METAL ANALYSIS

C	0.03%
Mn	1.4%
Si	0.4%
P	0.012%
S	0.010%

DUAL SHIELD II 71 ULTRA continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)	Efficiency %
0.035 (0.9)	110	24.6	250 (635)	CO_2	2.48 (1.13)	72.9
	142	26	400 (1016)	CO_2	4.53 (2.05)	83.5
	158	26.5	475 (1206.5)	CO_2	5.50 (2.49)	84.2
	177	27.5	550 (1397)	CO_2	6.23 (2.82)	83.4
	215	30	750 (1905)	CO_2	8.45 (3.83)	83.5
.045 (1.2)	142	24.5	200 (508)	CO_2	3.66 (1.66)	80.2
	193	26	300 (762)	CO_2	5.63 (2.55)	82.3
	230	27.5	400 (1016)	CO_2	7.52 (3.41)	83.0
	275	29	500 (1270)	CO_2	9.55 (4.33)	83.0
.052 (1.3)	155	23.5	150 (381)	CO_2	3.94 (1.79)	81.2
	185	24.5	200 (508)	CO_2	5.06 (2.29)	80.3
	245	26	300 (762)	CO_2	8.05 (3.65)	83.6
	300	27.5	400 (1016)	CO_2	10.71(4.86)	84.3
	345	29	500 (1270)	CO_2	13.77 (6.24)	86.7
	405	30.5	600 (1524)	CO_2	16.62 (7.54)	86.9
0.062 (1.6)	205	24	150 (381)	CO_2	5.31 (2.41)	81.0
	290	25.5	250 (635)	CO_2	8.77 (3.98)	83.2
	340	26	300 (762)	CO_2	10.53 (4.77)	83.7
	375	27	350 (889)	CO_2	12.35 (5.60)	84.8

DUAL SHIELD II 71 Ultra continued

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 .045”				Gas: CO_2 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	23-26	130-200	3/8-1/2	110-230	23-26	125-235	1/2-5/8
260-380	25-27	200-225	1/2-3/4	230-340	25-29	235-290	5/8-3/4
380-520	26-30	225-265	3/4-1	340-470	29-31	290-350	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: CO_2 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	25-28	165-270	5/8-3/4
200-300	27-30	270-345	3/4-1
300-420	28-32	345-415	1-$1^{1/4}$

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245014576	DS II 71 ULT 045X15#PSP	662303005399
245013875	DS II 71 ULT 045X33#PSP	662303004972
245013917	DS II 71 ULT 045X60#CL	662303005016
245014444	DS II 71 ULT 052X15#PSP	662303005306
245014014	DS II 71 ULT 052X33#AWS	662303080570
245013925	DS II 71 ULT 052X33#PSP	662303005023
245013982	DS II 71 ULT 1/16X33#PSP	662303005085
245013859	DS II 71 ULT 1/16X60#CL	662303004958

DUAL SHIELD II 711X

AWS A5.20: E71T-1CJH8/T-9CJH8/T-9M H8/T-12CJH8
AWS A5.20: E71T-CJH8/T-9CJH8/T-12CJH8

FEATURES

Dual Shield II 711X is an all-position flux cored wire that displays exceptional impact properties in combination with CO_2 shielding gas. This flux cored wire was developed to join low and medium carbon steels where higher impacts and toughness are required. As with all X Series wires, Dual Shield II 711X offers higher top-end current levels for out-of-position welding, broader operating ranges and higher deposition rates in out-of-position applications.

Applications include construction, shipbuilding, rail car, light and heavy equipment, and general fabrication where exceptional impacts are required. Weld metal analysis is similar to Atom Arc 7018 and Atom Arc 7018-1.

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E71T-1CJH8/T-9CJH8/T-9M H8/T-12CJH8
- AWS A5.20: E71T-CJH8/T-9CJH8/T-12CJH8
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- ABS 3SA,3YSA
- DNV IIIY40MS (H10)
- D.N.V.- III YMS(H10)
- L.R. - 3S,3YS

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Rail Road Car
- Civil Construction
- General Fabrication
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

Shielding Gas CO_2	
Yield Strength	78 ksi, 540 MPa
Tensile Strength	86 ksi, 595 MPa
Elongation (In 2”, 51 mm)	29%

CHARPY V-NOTCH PROPERTIES

Shielding Gas CO_2	
Testing Temperature	
0°F (-18°C)	96 ft-lb, 130 J
-20°F (-29°C)	79 ft-lb, 107 J
-40°F (-40°C)	36 ft-lb, 49 J

WELD METAL ANALYSIS

Shielding Gas CO_2	
C	0.04%
Mn	1.4%
Si	0.4%
P	0.012%
S	0.010%
Ni	0.4%

DUAL SHIELD II 711X continued

DEPOSITION TABLE					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)
.045 (1.2)	122	20.2	178 (452)	CO_2	
	134	20.9	205 (521)	CO_2	
	146	21.6	233 (592)	CO_2	
	158	22.3	260 (660)	CO_2	
	170	23.0	288 (732)	CO_2	
	182	23.7	315 (800)	CO_2	
	194	24.4	343 (871)	CO_2	
	206	25.1	370 (940)	CO_2	
	218	25.8	398 (1011)	CO_2	
	230	26.5	425 (1080)	CO_2	7.4 (3.36)
.052 (1.4)	150	20.5	160 (406)	CO_2	
	160	21.1	181 (460)	CO_2	
	170	21.6	201 (511)	CO_2	
	180	22.2	222 (564)	CO_2	
	190	22.7	242 (615)	CO_2	
	200	23.3	263 (668)	CO_2	
	210	23.8	283 (719)	CO_2	
	220	24.4	304 (772)	CO_2	
	230	24.9	324 (823)	CO_2	
	240	25.5	345 (876)	CO_2	
	250	26.0	365 (927)	CO_2	8.7 (3.95)
1/16 (1.6)	156	22.4	136 (345)	CO_2	
	167	22.9	149 (378)	CO_2	
	178	23.3	162 (411)	CO_2	
	189	23.8	175 (445)	CO_2	
	199	24.2	188 (478)	CO_2	
	210	24.7	201 (511)	CO_2	
	221	25.1	214 (544)	CO_2	
	231	25.6	227 (577)	CO_2	
	242	26.0	240 (610)	CO_2	8.8 (3.99)

DUAL SHIELD II 711X continued

VERTICAL UP WELDING PARAMETERS								
Gas: CO_2 .045”			Gas: CO_2 .052”			Gas: CO_2 1/16”		
WFS ipm	Volts	Amps	WFS ipm	Volts	Amps	WFS ipm	Volts	Amps
178	20.2	122	160	20.5	150	136	22.4	156
205	20.9	134	181	21.1	160	149	22.9	167
233	21.6	146	201	21.6	170	162	23.3	178
260	22.3	158	222	22.2	180	175	23.8	189
288	23.0	170	242	22.7	190	188	24.2	199
315	23.7	182	263	23.3	200	201	24.7	210
343	24.4	194	283	23.8	210	214	25.1	221
370	25.1	206	304	24.4	220	227	25.6	231
398	25.8	218	324	24.9	230	240	26.0	242
425	26.5	230	345	25.5	240			
			365	26.0	250			

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 .045”				Gas: CO_2 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
170-290	23-26	135-205	3/8-1/2	130-280	23-26	125-235	1/2-5/8
290-350	25-27	175-230	1/2-3/4	280-400	25-29	215-290	5/8-3/4
350-550	26-30	180-265	3/4-1	400-600	29-31	250-350	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: CO_2 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
135-265	25-28	165-270	5/8-3/4
265-400	27-30	245-345	3/4-1
400-500	28-32	290-415	$1\text{-}1^{1/4}$

DUAL SHIELD II 711X continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245019088	DS II 711X 045X15# PSP	662303086985
245019005	DS II 711X 045X33#AWS	662303082116
245019013	DS II 711X 052X33#AWS	662303082123
245019021	DS II 711X 1/16X33#AWS	662303082130
245019070	DS II 711X 1/16X60# CL	662303085988

DUAL SHIELD II 712X AWS A5.20: E71T-1MJH8/T-9MJH8/T-12MJH8

FEATURES

Dual Shield II 712X is an all-position flux cored wire intended for applications requiring outstanding weld metal toughness. This X Series wire, in combination with 75% Argon/25% CO_2 shielding gas, can produce Charpy V-notch impact results of more than 50 ft-lb (68 J) at -60°F (-51°C) and Crack Tip Opening Displacement (CTOD) results of more than 20 mils (0.5 mm) at -40°F (-40°C). Dual Shield II 712X also provides the smooth arc and low spatter levels characteristic of Dual Shield flux cored wires.

Applications include off-shore oil components, shipbuilding and heavy equipment where exceptional Charpy impact/low temperature toughness is required.

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E71T-1MJH8/T-9MJH8/T-12MJH8
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S. - 3SA, 4YSA
- D.N.V. - IV YS
- L.R. - 4YS,40S

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Heavy Equipment
- Shipbuilding
- Offshore Oil

TYPICAL MECHANICAL PROPERTIES

Shielding Gas 75/25	
Yield Strength	78 ksi, 540 MPa
Tensile Strength	83 ksi, 570 MPa
Elongation (In 2", 51 mm)	28%

CHARPY V-NOTCH PROPERTIES

Shielding Gas 75/25	
Testing Temperature	
0°F (-18°C)	129 ft-lb, 175 J
-40°F (-40°C)	93 ft-lb, 125 J

WELD METAL ANALYSIS

Shielding Gas 75/25	
C	0.05%
Mn	1.1%
Si	0.3%
P	0.009%
S	0.010 %

DUAL SHIELD II 712X continued

DEPOSITION TABLE					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)
.045 (1.2)	129	19.5	160 (406)	75/25	
	141	20.2	190 (483)	75/25	
	153	20.9	219 (556)	75/25	
	165	21.6	249 (632)	75/25	
	177	22.3	278 (706)	75/25	
	189	23.0	308 (782)	75/25	
	200	23.7	337 (856)	75/25	
	212	24.4	367 (932)	75/25	
	224	25.1	396 (1006)	75/25	
	236	25.8	426 (1082)	75/25	
	248	26.5	455 (1156)	75/25	9.3 (4.21)
.052 (1.4)	135	20.0	130 (330)	75/25	
	148	20.6	153 (389)	75/25	
	160	21.1	176 (447)	75/25	
	173	21.7	199 (505)	75/25	
	185	22.2	222 (564)	75/25	
	198	22.8	245 (622)	75/25	
	210	23.3	268 (681)	75/25	
	223	23.9	291 (739)	75/25	
	235	24.4	314 (798)	75/25	
	248	25.0	337 (856)	75/25	
	260	25.5	360 (914)	75/25	9.4 (4.26)
1/16 (1.6)	195	23.8	145 (368)	75/25	
	213	24.0	160 (406)	75/25	
	231	24.3	175 (445)	75/25	
	249	24.5	190 (383)	75/25	
	267	24.8	205 (521)	75/25	
	285	25.0	220 (559)	75/25	
	303	25.3	235 (597)	75/25	
	321	25.5	250 (635)	75/25	9.6 (4.35)

DUAL SHIELD II 712X continued

VERTICAL UP WELDING PARAMETERS								
Gas: 75/25 .045”			Gas: 75/25 .052”			Gas: 75/25 1/16”		
WFS ipm	Volts	Amps	WFS ipm	Volts	Amps	WFS ipm	Volts	Amps
160	19.5	129	130	20.0	135	145	23.8	195
190	20.2	141	153	20.6	148	160	24.0	213
219	20.9	153	176	21.1	160	175	24.3	231
249	21.6	165	199	21.7	173	190	24.5	249
278	22.3	177	222	22.2	185	205	24.8	267
308	23.0	189	245	22.8	198	220	25.0	285
337	23.7	200	268	23.3	210	235	25.3	303
367	24.4	212	291	23.9	223	250	25.5	321
396	25.1	224	314	24.4	235			
426	25.8	236	337	25.0	248			
455	26.5	248	360	25.5	260			

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
140-240	22-26	130-200	3/8-1/2	125-270	24-28	135-250	1/2-5/8
240-305	24-27	165-225	1/2-3/4	270-370	27-30	225-295	5/8-3/4
305-470	27-29	185-265	3/4-1	370-540	28-32	245-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
140-240	24-28	185-285	5/8-3/4
240-320	27-30	250-340	3/4-1
320-460	28-32	285-400	1-1 1/4

DUAL SHIELD II 712X continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245019757	DS II 712X 045X33#AWS	662303082178
245019765	DS II 712X 052X33#AWS	662303082185
245019773	DS II 712X 1/16X33#AWS	662303082192
245019781	DS II 712X 1/16x60#CL	

DUAL SHIELD II 70T-12H4

AWS A5.20: E71T-1MJH4/T-9MJH4/T-12MJH4

FEATURES

Each of the new Dual Shield II H4 wires is an all-position flux cored wire that provides excellent low temperature toughness in both the as welded and/or stress relieved conditions (as applicable) when used with 75% Ar / 25% CO_2. Each can produce diffusible hydrogen levels of <4 mL/100g over a wide range of welding parameters. Dual Shield II 70T-12H4 also provides the smoth arc and low spatter levels characteristic of other Dual Shield II wires. Dual Shield II 70T-12H4 can be used in construction, heavy equipment fabrication, offshore oil components, shipbuilding, and railcar. Weld metal analysis is similar to E7018.

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E71T-1MJH4/T-9MJH4/T-12MJH4
- ASME SFA 5.20
- A.B.S.-3SA,3YSA(H5)
- D.N.V.-IV YMS(H5)
- L.R.-4Y40S(H10)
- G.L.-4YH10S
- Certified by C.W.B.-CSA W48

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- Civil Construction
- Bridge Construction
- Shipbuilding
- Rail Road Car
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	72 ksi, 495 MPa
Tensile Strength	80 ksi, 550 MPa
Reduction in Area	71%
Elongation in 2”	27%
Stress Relieved 2 hrs @ 1150^{0}F (621^{0}C)	
75% Ar / 25% CO_2	
Yield Strength	68 ksi, 460 MPa
Tensile Strength	78 ksi, 540 MPa
Reduction in Area	73%
Elongation in 2”	30%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO2	79 ft-lb, 107 J
Stress Relieved 2 hrs @ 1150^{0}F (620^{0}C)	
75% Ar / 25% CO_2	76 ft-lb, 103 J
Testing Temperature -40^{0}F (-40^{0}C)	
As Welded 75% Ar / 25% CO_2	62 ft-lb, 84 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.027%
Mn	1.08%
Si	0.33%
P	0.016%
S	0.008%

DUAL SHIELD II 70T-12H4 continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shielding Gas	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	145	24.5	200 (508)	C-25	3.8(1.72)	81.5
	195	26	300 (762)	C-25	5.8 (2.63)	81.8
	245	27.5	400 (1016)	C-25	7.9 (3.58)	82.9
	285	29	500 (1270)	C-25	9.9 (4.49)	84.6
.052 (1.3)	155	24	150 (381)	C-25	3.5 (1.58)	72.3
	185	25	200 (508)	C-25	5.4 (2.44)	82.1
	250	26.5	300 (762)	C-25	8.1 (3.67)	83.6
	305	28	400 (1016)	C-25	11.1 (5.03)	85.2
0.062 (1.6)	190	24	150 (381)	C-25	5.3 (2.40)	80.3
	295	25	250 (635)	C-25	8.6 (3.90)	80.8
	335	26	300 (762)	C-25	10.8 (4.89)	85.4
	365	27	350 (889)	C-25	12.9 (5.85)	86.9
	410	28	400 (1016)	C-25	15.0 (6.80)	87.9

DUAL SHIELD II 70T-12H4 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	22-26	130-200	3/8-1/2	110-230	22-26	135-250	1/2-5/8
260-380	24-27	200-225	1/2-3/4	230-340	25-29	250-295	5/8-3/4
380-520	27-29	225-265	3/4-1	340-470	27-31	295-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	24-28	185-285	5/8-3/4
200-300	27-30	285-340	3/4-1
300-420	28-32	340-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245016605	DS II 70T-12H4 045X15#PSP VP	662303083984
245016290	DS II 70T-12H4 045X33#PSP VP	662303058494
245016373	DS II 70T-12H4 052X25#AWS VP	662303058562
245016316	DS II 70T-12H4 1/16X33#PSP VP	662303058517
245016365	DS II 70T-12H4 1/16X60#CL	662303058555

DUAL SHIELD T-75 AWS A5.20: E70T-5CJH4

FEATURES

Dual Shield T-75 is a flux cored wire with a basic slag system designed for multiple pass welding and produces excellent properties in both the as welded and stress relieved conditions. The exceptional impact toughness and low sensitivity to cracking makes it an ideal choice for a variety of low and medium carbon steels. The arc characteristics are globular, but can be improved with argon gas mixtures. The weld metal analysis is similar to an E7018 low hydrogen electrode.

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	73 ksi, 505 MPa
Tensile Strength	86 ksi, 595 MPa
Reduction in Area	66%
Elongation in 2”	29%
As Welded CO_2	
Yield Strength	72 ksi, 495 MPa
Tensile Strength	82 ksi, 565 MPa
Reduction in Area	65%
Elongation in 2”	28%

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E70T-5CJH4
- ASME SFA 5.20
- A.B.S.-3YSA (3/32”, 7/64”)
- QPL-24403/1: MIL-70T-5C (3/32”)
- D.N.V.-III YMS (3/32”, 7/64”)
- L.R.-3S,3YS(H15) (3/32”, 7/64”)

CHARPY V-NOTCH PROPERTIES

Testing Temperature -40°F (-40°C)	
As Welded 75% Ar / 25% CO_2	
	55 ft-lb, 75 J
As Welded CO_2	70 ft-lb, 95 J

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

CO_2	
C	0.04%
Mn	1.5%
Si	0.6%
P	0.006%
S	0.010%
75% Ar / 25% CO_2	
C	0.04%
Mn	1.7%
Si	0.7%
P	0.004%
S	0.011%

INDUSTRIES

- General Fabrication
- Rail Road Car
- Mobile Machinery
- Civil Construction

DUAL SHIELD T-75 continued

DEPOSITION TABLE - CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
3/32 (2.4)	450	32	217 (551)	17.6 (8)	85	1 (25.4)
	475	32	245 (622)	20 (9.1)	87	1 (25.4)
	500	32	270 (686)	22.8 (10.3)	89	1 (25.4)

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
250-350	19-28	140-190	3/4-1	180-250	220-280	29-30	3/4-1
450-550	29-30	240-265	3/4-1	250-400	280-380	31-32	1-1 1/4
650	32	300	3/4-1				

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 3/32”			
WFS ipm	Volts	Amps	Tip to Work in
100-200	30-32	240-370	$1\text{-}1^{1/4}$
200-320	32-33	370-460	$1^{1/4}\text{-}1^{1/2}$

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
243006004	DS T-75 3/32X60#CL	662303002152

DUAL SHIELD T-5 AWS A5.20: E71T-5CJH4/T-5MJH4

FEATURES

Dual Shield T-5 is a basic slag flux cored wire that produces crack resistant, highly ductile weld deposits. The small diameter wires, such as .045 & 1/16" diameters can be used out-of-position. The arc characteristics are globular but can be improved with the use of argon mixes. Dual Shield T-5 is recommended for medium to heavy fabrication of many mild steels where superior toughness and crack resistance are required. It is a good choice for mild steel or when being joined to quenched and tempered low alloy high strength steels. The weld metal analysis is similar to an E7018 or E7018-1 low hydrogen electrode.

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E71T-5CJH4/T-5MJH4
- ASME SFA 5.20
- A.B.S.- 3SA,3YSA(H10)
- D.N.V.- III YMS(H10)
- L.R.- 3S,3YS(H10)
- G.L.- 5YH10S
- B.V.- SA3YM(HH)
- TUV

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Civil Construction
- Rail Road Car
- Mobile Machinery
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	68 ksi, 460 MPa
Tensile Strength	81 ksi, 560 MPa
Reduction in Area	71%
Elongation in 2"	31%
Stress Relieved 2 hrs. @ 1150°F (621°C)	
75% Ar / 25% CO_2	
Yield Strength	52 ksi, 355 MPa
Tensile Strength	74 ksi, 500 MPa
Reduction in Area	76%
Elongation in 2"	34%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded 75% Ar / 25% CO_2	
	96 ft-lb, 130 J
Stress Relieved 2 hrs. @ 1150°F (620°C)	
75% Ar / 25% CO_2	174 ft-lb, 236 J
Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	
	81 ft-lb, 110 J
Stress Relieved 2 hrs. @ 1150°F (620°C)	
75% Ar / 25% CO_2	131 ft-lb, 178 J
Testing Temperature -40°F (-40°C)	
As Welded 75% Ar / 25% CO_2	
	71 ft-lb, 96 J
Stress Relieved 2 hrs. @ 1150°F (620°C)	
75% Ar / 25% CO_2	103 ft-lb, 140 J
Testing Temperature -60°F (-51°C)	
As Welded 75% Ar / 25% CO_2	
	59 ft-lb, 80 J
Stress Relieved 2 hrs. @ 1150°F (620°C)	
75% Ar / 25% CO_2	93 ft-lb, 126 J

DUAL SHIELD T-5 continued

WELD METAL ANALYSIS	
75% Ar / 25% CO_2	
C	0.066%
Mn	1.45%
Si	0.52%
P	0.007%
S	0.013%

DEPOSITION TABLE - 75% Ar / 25% $C0_2$

Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	170	19	285 (724)	7 (3.2)	96	3/4 (191)
	250	30	469 (1191)	10.8 (4.9)	91	1 (25.4)
	300	32	606 (1539)	14.2 (6.44)	92	1 (25.4)
1/16 (1.6)	300	30	226 (574)	9.8 (4.45)	92	1 (25.4)
	400	32	369 (937)	16.1 (7.3)	92	1 (25.4)

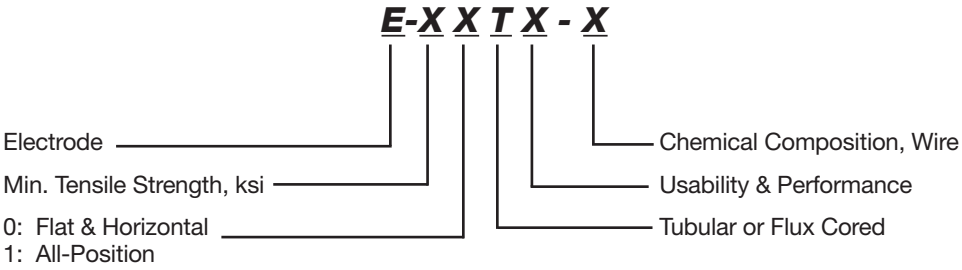
FULL RANGE WELDING PARAMETERS

Gas: 75/25 .045”				Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
250-350	19-28	140-190	3/4-1	180-250	220-280	29-30	3/4-1
450-650	29-32	240-300	3/4-1	250-400	280-380	31-32	1-1 1/4
650	32	300	3/4-1				

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
245021035	DS T-5 045X33#AWS	662303006297
245021043	DS T-5 1/16X60#CL	662303006303

AWS Filler Metal Specification A5.29
Low Alloy Steel Electrodes for Flux Cored Arc Welding



AWS Classification	External Shielding	Current Polarity
EXXT1-X (Multiple-pass)	CO_2	DCEP
EXXT4-X (Multiple-pass)	None	DCEP
EXXT5-X (Multiple-pass)	CO_2	DCEP
EXXT8-X (Multiple-pass)	None	DCEN
EXXTX-G (Multiple-pass)	Not Specified	Not Specified

DUAL SHIELD 7000-A1 AWS A5.29: E81T1-A1C/A1M

FEATURES

Dual Shield 7000-A1 is an all-position flux cored electrode recommended for 0.5% Mo steels. It is used in the fabrication and erection of boilers, pressure piping and tubing and other pressure vessel applications. Shielding gas of 100% CO_2 and 75% Ar, remainder CO_2 may be used. A 75% Ar/25% CO_2 shielding gas mixture is recommended to improve arc characteristics, increase wetting action, decrease penetration, and provide easier arc control for out-of-position welding. The weld metal analysis is similar to an E7018-A1 low hydrogen electrode.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E81T1-A1C/A1M
- ASME SFA 5.29

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- Shipbuilding
- Civil Construction
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	82 ksi, 566 MPa
Tensile Strength	92 ksi, 635 MPa
Elongation% in 2”	22%
Stress Relieved 1 hr @ 1150°F (620°C)	
Yield Strength	82 ksi, 566 MPa
Tensile Strength	93 ksi, 645 MPa
Elongation% in 2”	26%

CHARPY V-NOTCH PROPERTIES

As Welded	
Yield Strength	82 ksi, 566 MPa
Tensile Strength	92 ksi, 635 MPa
Elongation% in 2”	22%
Stress Relieved 1 hr @ 1150°F (620°C)	
Yield Strength	82 ksi, 566 MPa
Tensile Strength	93 ksi, 645 MPa
Elongation% in 2”	26%

WELD METAL ANALYSIS

C	0.05%
Mn	0.9%
Si	0.6%
P	0.01%
S	0.008%
Mo	0.55%

DUAL SHIELD 7000-A1 continued

DEPOSITION TABLE							
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Shield Gas	TTW Dist. in (mm)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	140	24	200 (508)	CO-2	0.625 (15.9)	3.6 (1.7)	77.8
	192	25.5	300 (762)	CO-2	0.625 (15.9)	5.5 (2.5)	79.3
	230	27	400 (1016)	CO-2	0.75 (19)	7.4 (3.3)	81.8
	275	28.5	500 (1270)	CO-2	0.75 (19)	9.6 (4.4)	83.1
.052 (1.4)	150	23.5	150 (381)	CO-2	0.75 (19)	3.6 (1.6)	75.8
	190	24	200 (508)	CO-2	0.75 (19)	4.9 (2.2)	77.8
	250	25.5	300 (762)	CO-2	0.75 (19)	7.7 (3.5)	81.7
	300	27	400 (1016)	CO-2	0.75 (19)	10.3 (4.7)	82.5
	345	28.5	500 (1270)	CO-2	0.75 (19)	13.3 (6.0)	84.7
1/16 (1.6)	195	24	150 (381)	CO_2	0.75 (19)	5.5 (2.5)	85.0
	290	25.5	250 (635)	CO_2	0.75 (19)	9.2 (4.2)	86.5
	325	26.5	300 (762)	CO_2	0.75 (19)	10.9 (4.9)	85.9
	352	27	350 (889)	CO_2	0.75 (19)	13.1 (6.0)	88.1
	382	28.5	400 (1016)	CO_2	0.75 (19)	14.7 (6.7)	86.8

DUAL SHIELD 7000-A1 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
170	19.0	170	3/4	226	30	300	1
250	30.0	250	1	369	32.0	400	1
300	32	300	1	422	32	450	1
350	32	350	1				

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 3/32”			
WFS ipm	Volts	Amps	Tip to Work in
217	32.0	450	1
245	32.0	475	1
270	32	500	1
346	33	550	1

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245012521	DS 7000-A1 045X33#AWS	662303004095

DUAL SHIELD 810X-Ni1 AWS A5.29: E81T1-Ni1CD H8

FEATURES

Dual Shield 810X-Ni1 provides outstanding operator appeal with an easily controlled arc, improved operation at both lower and higher current levels, minimal spatter and easily removed slag. Dual Shield 810X-Ni1 is designed for use with 100% CO_2. It is an excellent choice for welding on COR-TEN® steel in applications where weathering grade wires are not desirable.

CLASSIFICATIONS AND APPROVALS

- Seismic Certified “D”
- AWS A5.29: E81T1-Ni1CD H8
- Certified by C.W.B. - CSA W48

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Rail Road Car
- Barges
- Power Generation
- General Fabrication
- Light Equipment
- Heavy Equipment
- Civil Construction
- Bridge Construction
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

Shielding Gas CO_2	
Yield Strength	86 ksi, 590 MPa
Tensile Strength	92 ksi, 635 MPa
Elongation (In 2”, 51 mm)	29%

CHARPY V-NOTCH PROPERTIES

Shielding Gas CO_2	
Testing Temperature	
-20°F (-29°C)	60 ft-lb, 81 J
-40°F (-40°C)	45 ft-lb, 61 J

WELD METAL ANALYSIS

Shielding Gas CO_2	
C	0.04%
Mn	1.3%
Si	0.6%
P	0.010%
S	0.009%
Ni	1.0%

DUAL SHIELD 810X-Ni1 continued

VERTICAL UP WELDING PARAMETERS								
Gas: CO_2 .045”			Gas: CO_2 .052”			Gas: CO_2 1/16”		
WFS ipm	Volts	Amps	WFS ipm	Volts	Amps	WFS ipm	Volts	Amps
184	21.7	128	160	21.0	124	144	21.9	168
208	22.3	140	169	21.6	137	159	22.5	181
232	23.0	153	178	22.1	149	174	23.1	195
256	23.6	165	187	22.7	162	189	23.7	209
280	24.3	178	196	23.2	174	204	24.3	222
304	24.9	190	205	23.8	187	220	25.0	236
328	25.6	203	214	24.3	200	235	25.6	249
352	26.2	215	223	24.9	212	250	26.2	263
376	26.9	228	232	25.4	225			
400	27.5	240	241	26.0	237			
			250	26.5	250			

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 .045”				Gas: CO_2 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
170-290	23-26	135-205	3/8-1/2	130-280	23-26	125-235	1/2-5/8
290-350	25-27	175-230	1/2-3/4	280-400	25-29	215-290	5/8-3/4
350-550	26-30	180-265	3/4-1	400-600	29-31	250-350	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: CO_2 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
135-265	25-28	165-270	5/8-3/4
265-400	27-30	245-345	3/4-1
400-500	28-32	290-415	1-$1^{1/4}$

DUAL SHIELD 810X-Ni1 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245022074	DS 810X-Ni1 045x33 #AWS	000000000000
245022132	DS 810X-Ni1 052X33# AWS	662303086664
245022082	DS 810X-Ni1 1/16x33 #AWS	000000000000
245022090	DS 810X-Ni1 1/16X60# CL	662303085995
245023023	DS 810X-Ni1 1/16X600# OMP	662303087777

DUAL SHIELD II 80-Ni1H4

AWS A5.20: E81T1-Ni1MJDH4

FEATURES

Dual Shield II 80-Ni1H4 produces diffusible Hydrogen levels of <4mL/100g over a wide range of welding parameters. Applications include petrochemical equipment, bridge fabrication, offshore oil construction, ship fabrication railcar, and heavy machinery.

CLASSIFICATIONS AND APPROVALS

- Seismic D
- AWS A5.29: E81T1-Ni1MJDH4
- ASME SFA 5.29
- CERTIFIED BY C.W.B.- AWS A5.29
- A.B.S.- 3YSA(H5)
- MIL-E-24403/1: MIL-81T1-Ni1M
- D.N.V.- IV YMS(H5)
- L.R.- 4Y40S(H10)
- BV
- TUV

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Rail Road Car
- Mobile Machinery
- General Fabrication
- Civil Construction
- Bridge Construction
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	79 ksi, 545 MPa
Tensile Strength	89 ksi, 615 MPa
Reduction in Area	71%
Elongation in 2”	28%
Stress Relieved 2 hrs. @ 1150°F (620°C)	
75% Ar / 25% CO_2	
Yield Strength	73 ksi, 505 MPa
Tensile Strength	84 ksi, 570 MPa
Reduction in Area	71%
Elongation in 2”	28%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	
	100 ft-lb, 149 J
Stress Relieved 2 hrs. @ 1150°F (620°C)	
75% Ar / 25% CO_2	90 ft-lb, 122 J
Testing Temperature -40°F (-40°C)	
As Welded 75% Ar / 25% CO_2	
	84 ft-lb, 114 J
Stress Relieved 2 hrs. @ 1150°F (620°C)	
75% Ar / 25% CO_2	50 ft-lb, 68 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.05%
Mn	1.20%
Si	0.32%
P	0.014%
S	0.009%
Ni	0.93%

DUAL SHIELD II 80-Ni1H4 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (2.86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
.052 (1.4)	155	25	150, (381)	4.4 (2)	87
	245	28	250, (635)	7.3 (3.31)	86
	310	33	350, (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (635)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
5/64 (2.0)	250	26	112 (284)	6.4 (2.9)	85
	350	28	176 (447)	10.5 (4.76)	85
	450	31	258 (655)	14.8 (6.71)	85

DUAL SHIELD II 80-Ni1H4 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	22-26	130-200	3/8-1/2	110-230	22-26	135-250	1/2-5/8
260-380	24-27	200-225	1/2-3/4	230-340	25-29	250-295	5/8-3/4
380-520	27-29	225-265	3/4-1	340-470	27-31	295-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	24-28	185-285	5/8-3/4
200-300	27-30	285-340	3/4-1
300-420	28-32	340-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245011119	DS II 80-NI1H4 045X33#PSP	662303058913
245011127	DS II 80-NI1H4 052X33#PSP	662303058920
245011135	DS II 80-NI1H4 1/16X33#PSP	662303058937
245011234	DS II 80-NI1H4 1/16X33#PSP VP	662303058951
245011630	DS II 80-NI1H4 1/16X60#CL	662303058890
245011671	DS II 80-NI1H4 1/16X600#OMP	662303082987

DUAL SHIELD 8000-Ni2 AWS A5.29: E81T1-Ni2C/Ni2M

FEATURES

Dual Shield 8000-Ni2 is an all-position flux cored electrode that deposits 2.5% Ni deposit with an 82 ksi (565 MPa) minimum tensile strength. Dual Shield 8000-Ni2 may be used with CO_2 or argon mixtures. The argon-CO_2 mixtures reduce spatter and further improve weldability especially for small vertical-up fillets. Dual Shield 8000-Ni2 produces superior weld metal properties which make it most desirable for such applications as shipbuilding and heavy machinery construction. The weld metal analysis is similar to an E8018-C1 low hydrogen electrode.

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	82 ksi, 565 MPa
Tensile Strength	90 ksi, 620 MPa
Reduction in Area	68%
Elongation in 2”	27%
As Welded CO_2	
Yield Strength	80 ksi, 550 MPa
Tensile Strength	88 ksi, 605 MPa
Reduction in Area	67%
Elongation in 2”	26%

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E81T1-Ni2C/Ni2M
- ASME SFA 5.29
- CERTIFIED BY C.W.B.- AWS A5.29
- A.B.S.- 3YSA
- MIL-E-24403/1: MIL-81T1-Ni2C/Ni2M

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded CO_2	62 ft-lb, 84 J
As Welded 75% Ar / 25% CO_2	63 ft-lb, 69 J
Testing Temperature -20°F (-29°C)	
As Welded CO_2	43 ft-lb, 58 J
As Welded 75% Ar / 25% CO_2	47 ft-lb, 64 J
Testing Temperature -40°F (-40°C)	
As Welded CO_2	39 ft-lb, 53 J
As Welded 75% Ar / 25% CO_2	40 ft-lb, 54 J

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Bridge Construction
- Process

DUAL SHIELD 8000-Ni2 continued

WELD METAL ANALYSIS	
CO_2	
C	0.05%
Mn	0.9%
Si	0.3%
P	0.012%
S	0.010%
Ni	2.2%
75% Ar / 25% CO_2	
C	0.05%
Mn	1.1%
Si	0.4%
P	0.012%
S	0.010%
Ni	2.2%

DEPOSITION TABLE

Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
	330	34	600 (1524)	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87
	500	39	500 (1270)	20.1 (9.11)	87

DUAL SHIELD 8000-Ni2 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245020409	DS 8000-NI2 045X33#AWS	662303006051
242206613	DS 8000-NI2 052X33#PSP	662303025380
245020219	DS 8000-NI2 1/16X33#AWS	662303005931
245020383	DS 8000-NI2 1/16X60#CL	662303006037

DUAL SHIELD 9000-C1 AWS A5.29: E91T1-Ni2C/Ni2M

FEATURES

Dual Shield 9000-C1 is an all-position flux cored electrode which produces a 2.5% Ni deposit. The analysis is very similar to the Dual Shield T-90C1 except that this product has out-of-position capability. Dual Shield 9000-C1 is used for welding of 2-3% Ni steels and castings used in applications requiring good toughness at subzero temperatures. Shielding gas 100% CO_2 and 75% Ar - Remainder CO_2 may be used.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E91T1-Ni2C/Ni2M
- ASME SFA 5.29

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Process
- Offshore

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	89 ksi, 610 MPa
Tensile Strength	98 ksi, 680 MPa
Elongation in 2”	24%
As Welded CO_2	
Yield Strength	85 ksi, 580 MPa
Tensile Strength	96 ksi, 665 MPa
Elongation in 2”	25%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded CO_2	38 ft-lb, 52 J
Testing Temperature -40°F (-40°C)	
As Welded CO_2	30 ft-lb, 41 J
As Welded 75% Ar / 25% CO_2	
	33 ft-lb, 45 J

WELD METAL ANALYSIS

CO_2	
C	0.07%
Mn	1.2%
Si	0.5%
P	0.013%
S	0.010%
Ni	2.5%
75% Ar / 25% CO_2	
C	0.08%
Mn	1.5%
Si	0.7%
P	0.014%
S	0.011%
Ni	2.6%

DUAL SHIELD 9000-C1 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
	330	34	600 (1524)	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87
	500	39	500 (1270)	20.1 (9.11)	87

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245012737	DS 9000-C1 045X33#AWS	662303004200
245012711	DS 9000-C1 1/16X60#CL	662303004187

DUAL SHIELD 8000-B2 AWS A5.29: E81T1-B2C/B2M

FEATURES

Dual Shield 8000-B2 is an all-position flux cored electrode which contains 1.25% Cr - 0.5% Mo. The analysis is very similar to Dual Shield 88 CM, except 8000-B2 is for out-of-position welding. The weld metal analysis is similar to an E8018-B2 low Hydrogen electrode. Dual Shield 8000-B2 wire is used for the welding of such steel as 0.5% Cr - 0.5% Mo, 1% Cr-0.5% Mo, and 1.25% Cr - 0.5% Mo. This wire is designed for single or multiple pass welding. Shielding gases of 100% CO_2 and 75% Ar - Remainder CO_2 may be used.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E81T1-B2C/B2M
- ASME SFA 5.29

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Pipeline
- Petrochemical
- Power Generation

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	97 ksi, 669 MPa
Tensile Strength	109 ksi, 752 MPa
Elongation% in 2”	17%
Stress Relieved 8 hrs @ 1275°F (690°C)	
Yield Strength	83 ksi, 573 MPa
Tensile Strength	95 ksi, 655 MPa
Elongation% in 2”	22%

CHARPY V-NOTCH PROPERTIES

As Welded	
Yield Strength	97 ksi, 669 MPa
Tensile Strength	109 ksi, 752 MPa
Elongation% in 2”	17%
Stress Relieved 8 hrs @ 1275°F (690°C)	
Yield Strength	83 ksi, 573 MPa
Tensile Strength	95 ksi, 655 MPa
Elongation% in 2”	22%

WELD METAL ANALYSIS

C	0.06%
Mn	0.7%
Si	0.6%
P	0.009%
S	0.008%
Cr	1.3%
Mo	0.5%

DUAL SHIELD 8000-B2 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
	330	34	600 (1524)	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87
	500	39	500 (1270)	20.1 (9.11)	87

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245005590	DS 8000-B2 035X33#AWS	662303003876
245005533	DS 8000-B2 045X33#AWS	662303003821
245005582	DS 8000-B2 045X60#CL	662303003869
245020532	DS 8000-B2 1/16X33#AWS	662303006105
245005517	DS 8000-B2 1/16X60#CL	662303003814

DUAL SHIELD 8000-B2L AWS A5.29: E81T1-B2LM

FEATURES

Dual Shield 8000-B2L is an all-position flux cored electrode for low carbon grades of 1.25% Cr - 0.5% Mo steels. It is designed for use with 75% - 90% Argon, remainder CO_2 shielding gases. The weld metal analysis is similar to an E8018-B2L low Hydrogen electrode.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr. @ 1275°F (690°C)	
75% Ar / 25% CO_2	
Yield Strength	76 ksi, 525 MPa
Tensile Strength	87 ksi, 605 MPa
Elongation in 2”	23%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.29
- AWS A5.29: E81T1-B2LM

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.02%
Mn	0.9%
Si	0.4%
P	0.010%
S	0.010%
Cr	1.4%
Mo	0.5%

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Pipeline
- Petrochemical
- Chemical

DUAL SHIELD 8000-B2L continued

DEPOSITION TABLE					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
	330	34	600 (1524)	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87
	500	39	500 (1270)	20.1 (9.11)	87

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245006531	DS 8000-B2L 045X33#PSP VP	662303037147

DUAL SHIELD 9000-B3 AWS A5.29: E91T1-B3C/B3M

FEATURES

Dual Shield 9000-B3 is an all-position flux cored electrode which deposits a 2.25% Cr - 1% Mo weld metal. The analysis is very similar to Dual Shield 98 CM, except 9000-B3 is for out-of-position welding. The weld metal analysis is similar to an E9018-B3 low hydrogen electrode. Dual Shield 9000-B3 is recommended for welding 2.25% Cr - 1% Mo steels. This wire is designed for single or multiple pass welding. Shielding gas of 100% CO_2 and 75% Ar - remainder CO_2 may be used.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 3 hrs @ 1275°F (690°C)	
Yield Strength	84 ksi, 580 MPa
Tensile Strength	97 ksi, 669 MPa
Elongation% in 2”	22%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.29
- AWS A5.29: E91T1-B3C/B3M

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

CO_2	
C	0.06%
Mn	0.6%
Si	0.6%
P	0.01%
S	0.008%
Cr	2.2%
Mo	1.0%

INDUSTRIES

- Power Generation
- Pipeline

DUAL SHIELD 9000-B3 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
	330	34	600 (1524)	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87
	500	39	500 (1270)	20.1 (9.11)	87

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245006523	DS 9000-B3 045X33#AWS	662303003982
245006424	DS 9000-B3 045X33#PSP VP	662303074753
245006416	DS 9000-B3 1/16X33#AWS	662303003913
245006515	DS 9000-B3 1/16X60#CL	662303003975

DUAL SHIELD 9000-B3L AWS A5.29: E91T1-B3LC/B3LM

FEATURES

Dual Shield 9000-B3L is an all-position flux cored electrode for low carbon grades of 2.25% Cr-1% Mo steels. It is designed for use with 75% - 90% Argon, remainder CO_2 shielding gases. The weld metal analysis is similar to an E9018-B3L low hydrogen electrode.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 1 hr. @ 1275°F (691°C)	
75% Ar / 25% CO_2	
Yield Strength	79 ksi, 545 MPa
Tensile Strength	92 ksi, 635 MPa
Elongation in 2”	22%

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E91T1-B3LC/B3LM
- ASME SFA 5.29

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.02%
Mn	0.8%
Si	0.4%
P	0.010%
S	0.010%
Cr	2.2%
Mo	1.1%

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Pipeline
- Chemical
- Petrochemical

DUAL SHIELD 9000-B3L continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (.86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
	330	34	600 (1524)	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87
	500	39	500 (1270)	20.1 (9.11)	87

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245006499-43	DS 9000-B3L 045X33#PSP VP	662303058616

DUAL SHIELD B6 AWS A5.29: E81T1-B6C/B6M

FEATURES

Dual Shield B6 is an all-position flux cored electrode designed for using with 75% Ar / 25% CO_2 or 100% CO_2 shielding gas. Dual Shield B6 is intended for use on pipe and plate steels having a nominal 5% chromium - 0.5% molybdenum composition. These steels are typically used in process piping in the oil, gas, petrochemical, and marine industries.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E81T1-B6C/B6M
- ASME SFA 5.29

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Pipeline
- Petrochemical

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 2 hrs. @ 1375°F (746°C)	
75% Ar / 25% CO_2	
Yield Strength	84 ksi, 580 MPa
Tensile Strength	98 ksi, 675 MPa
Elongation in 2”	20%
Stress Relieved 2 hrs. @ 1375°F (746°C) CO_2	
Yield Strength	84 ksi, 580 MPa
Tensile Strength	98 ksi, 676 MPa
Elongation in 2”	20%

WELD METAL ANALYSIS

CO_2	
C	0.08%
Mn	0.6%
Si	0.7%
P	0.010%
S	0.006%
Cr	4.7%
Mo	0.5%
75% Ar / 25% CO_2	
C	0.05%
Mn	0.5%
Si	0.5%
P	0.006%
S	0.007%
Cr	5.4%
Mo	0.5%

DUAL SHIELD B6 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
	330	34	600 (1524)	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87
	500	39	500 (1270)	20.1 (9.11)	87

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258079045	DS B6 045X33#PSP VP	662303048877

DUAL SHIELD B9 AWS A5.29: E91T1-B9M

FEATURES

Dual Shield B9 is an all-position flux cored electrode designed for the welding of modified 9% chromium creep resisting steels, such as ASTM A335 Grade P91 or ASTM A213 T91. This product is formulated with a combined Mn & Ni <1.20% to meet stringent customer specifications.

Dual Shield B9 is packaged on layer level-wound wire spool baskets to allow the product to be placed in a heated storage oven. In addition, the wire is packaged in a vacuum-sealed foil bag to prevent moisture pick-up until such time the sealed bag has been opened.

TYPICAL MECHANICAL PROPERTIES

Stress Relieved 2 hrs @ 1400°F (760°C)	
Yield Strength	87 ksi, 600 MPa
Tensile Strength	107 ksi, 738 MPa
Elongation% in 2”	21%

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E91T1-B9M
- ASME II SFA 5.29 E91T1-B9M
- ASME IX F No. 6

WELD METAL ANALYSIS

C	0.1%
Mn	0.96%
Si	0.18%
P	0.009%
S	0.008%
Cr	8.9%
Mo	1.0%
X-Factor	< 15

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Power Generation
- Pipeline
- Boiler
- Heat Exchanger

DUAL SHIELD B9 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
	330	34	600 (1524)	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87
	500	39	500 (1270)	20.1 (9.11)	87

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242250025	DS B9 045X10#PSP VP/60CT	662303072636
242250033	DS B9 045X33#BAWS VP	662303075729
242250017	DS B9 045X33#PSP VP	662303040079

DUAL SHIELD II 81-K2 AWS A5.29: E81T1-K2CD-H8/KZMD-H8

FEATURES

The wire produces a smooth stable arc and low spatter levels using a 100% CO_2 shielding gas. Dual Shield II 81-K2 was developed for higher tensile steels such as ASTM A302, A533 Class I and A537. Applications include ship fabrication, offshore oil rigs, and heavy equipment construction. This wire is an excellent choice for welding ASTM steels A302, A533 Class I and A537. Dual Shield II 81-K2 produces a smooth stable arc and low spatter levels using 100% CO_2 shielding gas. Applications include ship building, offshore oilrigs, and heavy equipment construction.

TYPICAL MECHANICAL PROPERTIES

As Welded CO_2	
Tensile Strength	82 ksi, 570 MPa
Yield Strength	74 ksi, 515 MPa
Elongation in 2”	27%
Reduction of Area	73%

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: Seismic Certified “D”
- AWS A5.29: E81T1-K2CD-H8
- AWS A5.29: E81T1-K2MD-H8
- ASME SFA 5.29

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded CO_2	100 ft-lb, 136 J
Testing Temperature -20°F (-29°C)	
As Welded CO_2	89 ft-lb, 121 J
Testing Temperature -60°F (-51°C)	
As Welded CO_2	60 ft-lb, 81 J

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

CO_2	
C	.025%
Mn	1.18%
Si	0.49%
P	0.013%
S	0.009%
Ni	1.44%

INDUSTRIES

- Civil Construction
- Shipbuilding
- Mobile Machinery
- Rail Road Car
- General Fabrication

DUAL SHIELD II 81-K2 continued

DEPOSITION TABLE - CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (2.86)	86
	250	30	400 (1016)	8.5 (3.86)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (635)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 .045”				Gas: CO_2 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	23-26	130-200	3/8-1/2	110-230	23-26	125-235	1/2-5/8
260-380	25-27	200-225	1/2-3/4	230-340	25-29	235-290	5/8-3/4
380-520	26-30	225-265	3/4-1	340-470	29-31	290-350	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: CO_2 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	25-28	165-270	5/8-3/4
200-300	27-30	270-345	3/4-1
300-420	28-32	345-415	1-1 1/4

DUAL SHIELD II 81-K2 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245014865	DS II 81-K2 045X33#PSP VP	662303005658
245014931	DS II 81-K2 1/16X33#PSP VP	662303005726

DUAL SHIELD II 90-K2 AWS A5.29: E91T1-K2M

FEATURES

Dual Shield II 90-K2 is an all-position, high performance flux cored electrode with low diffusible hydrogen levels. This wire provides a smooth stable arc, low spatter, and easy slag removal similar to other Dual Shield II products.

Dual Shield II 90-K2 was developed for use on commercial grades of HY-80, ASTM A710, A514 and A517 and other similar HSLA low alloy steels.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E91T1-K2M
- ASME SFA 5.29

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- Shipbuilding
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	88 ksi, 605 MPa
Tensile Strength	94 ksi, 650 MPa
Elongation in 2”	23%
Stress Relieved 10 hr. @ 1075°F (579°C)	
75% Ar / 25% CO_2	
Yield Strength	76 ksi, 520 MPa
Tensile Strength	87 ksi, 600 MPa
Elongation in 2”	26%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	101 ft-lb, 137 J
Testing Temperature -40°F (-40°C)	
As Welded 75% Ar / 25% CO_2	90 ft-lb, 122 J
Testing Temperature -60°F (-51°C)	
As Welded 75% Ar / 25% CO_2	63 ft-lb, 85 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.06%
Mn	1.42%
Si	0.33%
P	0.014%
S	0.010%
Ni	1.5%

DUAL SHIELD II 90-K2 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87

DUAL SHIELD II 90-K2 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	22-26	130-200	3/8-1/2	110-230	22-26	135-250	1/2-5/8
260-380	24-27	200-225	1/2-3/4	230-340	25-29	250-295	5/8-3/4
380-520	27-29	225-265	3/4-1	340-470	27-31	295-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	24-28	185-285	5/8-3/4
200-300	27-30	285-340	3/4-1
300-420	28-32	340-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245013081	DS II 90-K2 045X33#PSP	662303004385
245013073	DS II 90-K2 1/16X33#PSP	662303004378
245013594	DS II 90-K2 1/16X33#PSP VP	662303004750

DUAL SHIELD II 101H4M AWS A5.29: E91T1-GM-H4

FEATURES

Dual Shield II 101H4M is one of a series of low hydrogen flux cored electrodes introduced by ESAB. Each of the new Dual Shield II H4 wires is an all-position flux cored electrode that provides excellent low temperature toughness in both the as welded and/or stress relieved conditions (as applicable) when used with 75% Ar/25% CO_2. Each can produce diffusible hydrogen levels of < 4mL/100g deposited over a wide range of welding parameters. Dual Shield II 101H4M is especially designed to weld HY-80 and HSLA-100 steels typically used in shipbuilding. Suitable for single or multi-pass welding applications. This wire was developed to meet the stringent requirements of MIL-E-24403/2 and offshore welding, and it is an ideal choice for HSLA steels.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E91T1-GM-H4
- ASME SFA 5.29
- A.B.S. - 4YQ500
- QPL-24403/2: MIL-101TM

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- General Fabrication
- Mobile Machinery
- Pipeline
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded MIL-E-24403/2 Vertical-Up HY-80	
Base Plate 75% Ar / 25% CO_2	
Yield Strength	86 ksi, 598 MPa
Tensile Strength	101 ksi, 680 MPa
Reduction of Area	68%
Elongation in 2”	27%
AWS A5.29 Requirement 75% Ar / 25% CO_2	
Yield Strength	93 ksi, 640 MPa
Tensile Strength	102 ksi, 705 MPa
Reduction of Area	67%
Elongation in 2”	23%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded 75% Ar / 25% CO_2	
	70 ft-lb, 95 J
Testing Temperature -60°F (-50°C)	
As Welded 75% Ar / 25% CO_2	
	50 ft-lb, 66 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.059%
Mn	1.37%
Si	0.36%
P	0.012%
S	0.010%
Ni	2.09%

DUAL SHIELD II 101H4M continued

DEPOSITION TABLE					
Diameter	Amps	Volts	Wire Feed Speed	Deposition Rate	Efficiency
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88

DUAL SHIELD II 101H4M continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	22-26	130-200	3/8-1/2	110-230	22-26	135-250	1/2-5/8
260-380	24-27	200-225	1/2-3/4	230-340	25-29	250-295	5/8-3/4
380-520	27-29	225-265	3/4-1	340-470	27-31	295-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	24-28	185-285	5/8-3/4
200-300	27-30	285-340	3/4-1
300-420	28-32	340-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
2450116464	DS II 101H4M 045X15# PSP VP	662303082963
245016100	DS II 101H4M 045X33#PSP VP	662303044961
245016522	DS II 101H4M 052X15# PSP VP	662303085810
245016118	DS II 101H4M 052X33#PSP VP	662303044978
245016456	DS II 101H4M 1/16X33#AWS VP	662303078454

DUAL SHIELD II 101-TM AWS A5.29: E81T1-K2M

FEATURES

Dual Shield II 101-TM is an all-position flux cored electrode developed to meet the stringent requirements of the military specification. The excellent mechanical properties and low temperature impact toughness makes it an ideal choice for HY80 and HSLA80 steels. The smooth arc characteristics, low spatter levels, and easy post weld clean-up resemble other Dual Shield II products. Dual Shield II 101-TM was specially designed to weld HY-80 and A710 steels typically used in shipbuilding with 75% Ar / 25% CO_2 shielding gas. This product is suitable for single or multipass welding applications.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E81T1-K2M
- ASME SFA 5.29
- QPL-24403/2: MIL-101TM

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- General Fabrication
- Mobile Machinery
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded MIL-E-24403/2 Vertical-Up HY-80 Base Plate 75% Ar / 25% CO_2	
Yield Strength	87 ksi, 605 MPa
Tensile Strength	97 ksi, 670 MPa
Elongation in 2”	24%
Reduction of Area	64%
As Welded MIL-E-24403/2 Vertical-Up A-710 Base Plate 75% Ar / 25% CO_2	
Yield Strength	86 ksi, 595 MPa
Tensile Strength	95 ksi, 655 MPa
Elongation in 2”	23%
Reduction of Area	61%
AWS A5.29 Requirement 75% Ar / 25% CO_2	
Yield Strength	86 ksi, 595 MPa
Tensile Strength	94 ksi, 655 MPa
Elongation in 2”	24%
Reduction of Area	64%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
	70 ft-lb, 95 J
Testing Temperature -60°F (-50°C)	
	42 ft-lb, 57 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.05%
Mn	1.13%
Si	0.30%
P	.013%
S	.010%
Ni	1.72%

DUAL SHIELD II 101-TM continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
	330	34	600 (1524)	12.7 (5.76)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88
	450	33	400 (016)	16 (7.3)	87

DUAL SHIELD II 101-TM continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	22-26	130-200	3/8-1/2	110-230	22-26	135-250	1/2-5/8
260-380	24-27	200-225	1/2-3/4	230-340	25-29	250-295	5/8-3/4
380-520	27-29	225-265	3/4-1	340-470	27-31	295-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	24-28	185-285	5/8-3/4
200-300	27-30	285-340	3/4-1
300-420	28-32	340-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245013834	DS II 101-TM 1/16X33#PSP VP	662303004934

DUAL SHIELD II 101-TC AWS A5.29: E91T1-K2C

FEATURES

Dual Shield II 101-TC is an all-position flux cored electrode developed to meet the U.S. Navy qualification tests for hydrogen levels of less than 0.05 ml/g of deposited weld metal. This unique formulation designed for CO_2 shielding optimizes performance and reduces post-weld cleanup cost. Dual Shield II 101-TC produces exceptional mechanical properties and low temperature impact toughness. It is intended for use on HY-80, ASTM A710, A514, and A517 or other similar HSLA steels.

TYPICAL MECHANICAL PROPERTIES

As Welded MIL-E-24403/2 Vertical-Up HY-80 Base Plate CO_2	
Yield Strength	93 ksi, 640 MPa
Tensile Strength	103 ksi, 710 MPa
Elongation in 2”	23%
AWS A5.29 Requirement Flat Mild Steel Plate CO_2	
Yield Strength	87 ksi, 600 MPa
Tensile Strength	94 ksi, 640 MPa
Elongation in 2”	25%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.29
- QPL-24403/2: MIL-101TC
- D.N.V.- IV YMS(H10)
- AWS A5.29: E91T1-K2C

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded CO_2	77 ft-lb, 104 J
Testing Temperature -60°F (-51°C)	
As Welded CO_2	43 ft-lb, 58 J

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

CO_2	
C	0.03%
Mn	1.32%
Si	0.35%
P	0.014%
S	0.010%
Ni	1.64%

INDUSTRIES

- Shipbuilding
- Mobile Machinery
- General Fabrication

DUAL SHIELD II 101-TC continued

DEPOSITION TABLE - CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88

DUAL SHIELD II 101-TC continued

FULL RANGE WELDING PARAMETERS							
Gas: CO_2 .045”				Gas: CO_2 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	23-26	130-200	3/8-1/2	110-230	23-26	125-235	1/2-5/8
260-380	25-27	200-225	1/2-3/4	230-340	25-29	235-290	5/8-3/4
380-520	26-30	225-265	3/4-1	340-470	29-31	290-350	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: CO_2 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	25-28	165-270	5/8-3/4
200-300	27-30	270-345	3/4-1
300-420	28-32	345-415	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245015995	DS II 101-TC 045X33#PSP VP	662303035525
245016415	DS II 101-TC 052X15#PSP VP	662303071448
245015979	DS II 101-TC 052X33#PSP VP	662303035501
245015987	DS II 101-TC 1/16X33#PSP VP	662303035518

DUAL SHIELD II 100-D1 AWS A5.29: E101T1-GM

FEATURES

Dual Shield II 100-D1 is an all-position flux cored electrode specially formulated to weld quenched and tempered steels that require a postweld heat treatment using 75% Ar / 25% CO_2 shielding gas. Dual Shield II 100-D1 was designed to weld oil field components made of 4130, 8630, API X-80 and similar steels.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E101T1-GM
- ASME SFA 5.29

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Civil Construction

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	94 ksi, 650 MPa
Tensile Strength	102 ksi, 705 MPa
Reduction in Area	58%
Elongation in 2”	23%
Stress Relieved 8 hrs. @ 1175°F (635°C) 75% Ar / 25% CO_2	
Yield Strength	85 ksi, 585 MPa
Tensile Strength	94 ksi, 650 MPa
Reduction in Area	62%
Elongation in 2”	26%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -25°F (-32°C)	
As Welded 75% Ar / 25% CO_2	40 ft-lb, 54 J
Stress Relieved 8 hrs. @ 1175°F (635°C) 75% Ar / 25% CO_2	20 ft-lb, 27 J
Testing Temperature -40°F (-40°C)	
As Welded 75% Ar / 25% CO_2	33 ft-lb, 45 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.06%
Mn	1.60%
Si	0.40%
P	0.009%
S	0.010%
Ni	0.82%
Mo	0.33%

DUAL SHIELD II 100-D1 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88

DUAL SHIELD II 100-D1 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	22-26	130-200	3/8-1/2	110-230	22-26	135-250	1/2-5/8
260-380	24-27	200-225	1/2-3/4	230-340	25-29	250-295	5/8-3/4
380-520	27-29	225-265	3/4-1	340-470	27-31	295-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	24-28	185-285	5/8-3/4
200-300	27-30	285-340	3/4-1
300-420	28-32	340-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245014006	DS II 100-D1 045X33#PSP	662303005108
245014063	DS II 100-D1 045X33#PSP VP	662303005153
245014311	DS II 100-D1 1/16X33#PSP VP	662303048563

DUAL SHIELD II 100 AWS A5.29: E101T1-K3MH4

FEATURES

Dual Shield II 100 is an all-position flux cored electrode that combines a high strength deposit with excellent impact toughness and low diffusible hydrogen levels. The rutile basic slag system produces a smooth spray-like transfer with reduced spatter and low post weld cleanup. Dual Shield II 100 is designed to join high strength steels such as HY-80 and T-1 the as welded or stress relieved condition using a 75% Ar / 25% CO_2 shielding gas. It is especially well suited for high tensile steels that are used in sub-zero temperatures. The weld metal analysis is similar to an E10018-M low hydrogen electrode.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E101T1-K3MH4
- ASME SFA 5.29

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- General Fabrication

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.05%
Mn	1.45%
Si	0.44%
P	0.012%
S	0.010%
Ni	1.70%
Mo	0.40%

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	101 ksi, 700 MPa
Tensile Strength	109 ksi, 755 MPa
Reduction in Area	60%
Elongation in 2”	21%
Stress Relieved 1 hr. @ 1050°F (566°C) 75% Ar / 25% CO_2	
Yield Strength	99 ksi, 685 MPa
Tensile Strength	110 ksi, 760 MPa
Reduction in Area	61%
Elongation in 2”	22%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded 75% Ar / 25% CO_2	48 ft-lb, 65 J
Stress Relieved 1 hr. @ 1050°F (566°C) 75% Ar / 25% CO_2	33 ft-lb, 45 J
Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	40 ft-lb, 54 J
Stress Relieved 1 hr. @ 1050°F (566°C) 75% Ar / 25% CO_2	30 ft-lb, 41 J
Testing Temperature -40°F (-40°C)	
As Welded 75% Ar / 25% CO_2	32 ft-lb, 43 J
Testing Temperature -60°F (-51°C)	
As Welded 75% Ar / 25% CO_2	28 ft-lb, 38 J

DUAL SHIELD II 100 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
	430	37	600 (1524)	17.6 (7.98)	87
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88

DUAL SHIELD II 100 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	22-26	130-200	3/8-1/2	110-230	22-26	135-250	1/2-5/8
260-380	24-27	200-225	1/2-3/4	230-340	25-29	250-295	5/8-3/4
380-520	27-29	225-265	3/4-1	340-470	27-31	295-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	24-28	185-285	5/8-3/4
200-300	27-30	285-340	3/4-1
300-420	28-32	340-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245013636	DS II 10.045 X33#PSP VP	662303004781
245013651	DS II 100 1/16X33#PSP VP	662303004804

DUAL SHIELD II 110 AWS A5.29: E111T1-K3M

FEATURES

Dual Shield II 110 is an all-position flux cored electrode which produces a smooth spray-like transfer, low spatter levels, low diffusible hydrogen levels, easy slag removal and good arc direction. Dual Shield II 110 was designed to join high strength steel such as HY-100 and T-1 (25.4)the as welded or stress relieved condition using 75% Ar / 25% CO_2 shielding gas. It is well suited for joining high tensile steels that will be used in low temperatures. The weld metal analysis is similar to an E11018-M low hydrogen electrode.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E111T1-K3CH4/K3MH4
- ASME SFA 5.29
- A.B.S.- AWS A5.29: E111T1-K3M

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- General Fabrication

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.05%
Mn	1.91%
Si	0.43%
P	0.013%
S	0.010%
Ni	1.74%
Mo	0.39%

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	110 ksi, 760 MPa
Tensile Strength	120 ksi, 830 MPa
Reduction in Area	54%
Elongation in 2”	19%
Stress Relieved 8 hrs. @ 1150°F (621°C) 75% Ar / 25% CO_2	
Yield Strength	108 ksi, 745 MPa
Tensile Strength	116 ksi, 800 MPa
Reduction in Area	56%
Elongation in 2”	19%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 0°F (-18°C)	
As Welded 75% Ar / 25% CO_2	40 ft-lb, 54 J
Stress Relieved 8 hrs. @ 1150°F (621°C) 75% Ar / 25% CO_2	29 ft-lb, 39 J
Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	36 ft-lb, 49 J
Stress Relieved 8 hrs. @ 1150°F (621°C) 75% Ar / 25% CO_2	27 ft-lb, 37 J
Testing Temperature -60°F (-51°C)	
As Welded 75% Ar / 25% CO_2	26 ft-lb, 35 J
Stress Relieved 8 hrs. @ 1150°F (621°C) 75% Ar / 25% CO_2	21 ft-lb, 28 J

DUAL SHIELD II 110 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition Rate lb/hr (kg/hr)	Efficiency %
.045 (1.2)	150	28	200 (508)	4.2 (1.91)	86
	210	29	300 (762)	6.3 (86)	86
	250	30	400 (1016)	8.5 (3.86)	87
	290	33	500 (1270)	10.7 (4.85)	87
.052 (1.4)	155	25	150 (381)	4.4 (2)	87
	245	28	250 (635)	7.3 (3.31)	86
	310	33	350 (889)	10.2 (4.63)	85
	360	36	450 (1143)	13.3 (6.03)	85
1/16 (1.6)	190	27	150 (38)	6.1 (2.77)	87
	300	30	250 (35)	10.2 (4.63)	87
	365	33	300 (762)	12.3 (5.58)	86
	410	33	350 (889)	14 (6.35)	88

DUAL SHIELD II 110 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
150-260	22-26	130-200	3/8-1/2	110-230	22-26	135-250	1/2-5/8
260-380	24-27	200-225	1/2-3/4	230-340	25-29	250-295	5/8-3/4
380-520	27-29	225-265	3/4-1	340-470	27-31	295-355	3/4-1

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
110-200	24-28	185-285	5/8-3/4
200-300	27-30	285-340	3/4-1
300-420	28-32	340-400	1-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245013693	DS II 11.045 X33#PSP VP	662303004835
245013701	DS II 11.052 X33#PSP VP	662303004842
245013719	DS II 110 1/16X33#PSP VP	662303004859

DUAL SHIELD T-115

AWS A5.29: E111T5-K4M (.045, 1/16, .052, 5/65)
AWS A5.29: E110T5-K4C (3/32)

FEATURES

Dual Shield T-115 is a basic slag flux cored electrode designed for applications requiring a high strength weld deposit. Dual Shield T-115 produces weld deposits which are resistant to cracking in heavy sections or under high restraint. It has good usability with a minimum amount of spatter and easy slag removal. It can be used for welding steels such as: T-1, HY-80, HY-90, N-A-XTRA 90, 100 and 110, and the SSS 100 series. The weld metal analysis is similar to an E11018-M low hydrogen electrode. A 100% CO_2 shielding gas is recommended for the 3/32" (2.4) size and a 75% Ar / 25% CO_2 gas for the .045 " (1.2) and 1/16" (1.6) sizes.

CLASSIFICATIONS AND APPROVALS

- AWS A5.29: E111T5-K4M (.045, 1/16, .052)
- AWS A5.29: E110T5-K4M (5/64)
- AWS A5.29: E110T5-K4C (3/32)
- ASME SFA 5.29
- CERTIFIED BY C.W.B.-AWS A5.29: E110T5-K4M-H4

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	110 ksi, 761 MPa
Tensile Strength	118 ksi, 815 MPa
Elongation in 2"	20.0%
Reduction in Area	42.9%
Stress Relieved 1 hr. @ 1050°F (566°C) 75% Ar / 25% CO_2	
Yield Strength	96 ksi, 660 MPa
Tensile Strength	109 ksi, 750 MPa
Elongation in 2"	23%
Reduction in Area	65%
As Welded CO_2	
Tensile Strength	96 ksi, 662 MPa
Yield Strength	117 ksi, 810 MPa
Elongation in 2"	22.0%
Reduction of Area	56.9%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	50 ft-lb, 68 J
Stress Relieved 1 hr. @ 1050°F (566°C) 75% Ar / 25% CO_2	48 ft-lb, 65 J
Testing Temperature -60°F (-51°C)	
As Welded 75% Ar / 25% CO_2	36 ft-lb, 49 J
Stress Relieved 1 hr. @ 1050°F (566°C) 75% Ar / 25% CO_2	32 ft-lb, 43 J

DUAL SHIELD T-115 continued

WELD METAL ANALYSIS	
75% Ar / 25% CO_2	
C	0.06%
Mn	1.20%
Si	0.40%
P	0.012%
S	0.011%
Cr	0.20%
Ni	1.75%
Mo	0.20%
CO_2	
C	0.06%
Mn	1.86%
Si	0.56%
P	0.011%
S	0.012%
Ni	2.11%
Mo	0.44%

DEPOSITION TABLE - 75% Ar / 25% CO_2

Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	170	19	285 (724)	7 (3.2)	96	3/4 (19)
	250	30	469 (1191)	10.8 (4.9)	91	1 (25.4)
	300	32	606 (1539)	14.2 (6.44)	92	1 (25.4)
1/16 (1.6)	300	30	226 (574)	9.8 (4.45)	92	1 (25.4)
	400	32	369 (937)	16.1 (7.3)	92	1 (25.4)
3/32 (2.4)	450	32	217 (551)	17.6 (8)	85	1 (25.4)
	475	32	245 (622)	20 (9.1)	87	1 (25.4)
	500	32	270 (686)	22.8 (10.3)	89	1 (25.4)

DUAL SHIELD T-115 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
250-350	19-28	140-190	3/4-1	180-250	29-30	220-280	3/4-1
450-650	29-32	240-300	3/4-1	250-400	31-32	280-380	1-1 1/4

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 3/32”			
WFS ipm	Volts	Amps	Tip to Work in
100-200	30-32	240-370	1-1 1/4
200-320	32-33	370-460	1 1/4-1 1/2

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
245020474	DS T-115 045X33#AWS	662303006075
243006228	DS T-115 045X60#CL	662303002190
245020482	DS T-115 1/16X33#AWS	662303006082
242200525	DS T-115 1/16X60#CL	662303000073
245020912	DS T-115 3/32X500# POP	662303087845
243006202	DS T-115 3/32X60#CL	662303002183

Additional Products (FCAW)

- Dual Shield 110
- Dual Shield 88-CM
- Dual Shield 88-C3
- Dual Shield T-4130
- Dual Shield T-4130-LN
- Dual Shield II 120M2

For additional information on the above products, please visit us at www.esabna.com

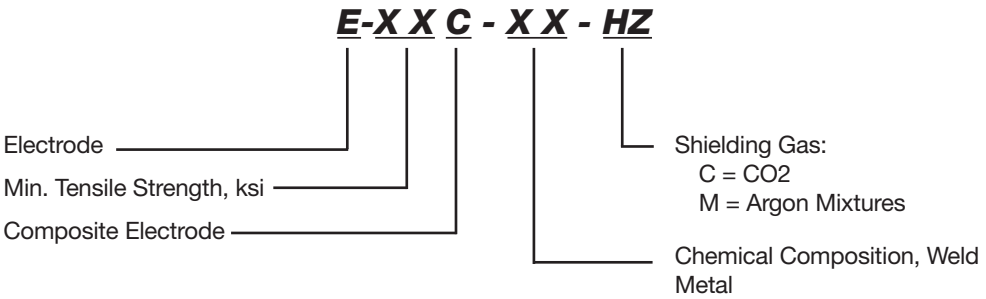
Coreweld wires have metal powders in the core which gives them the high deposition rates of flux cored wires and the high efficiency of solid wires. The only slag produced by these wires are small silicon islands similar to those produced by solid wires.

Argon-CO_2 gas mixtures of 75% - 92% Ar / 25% - 8% CO_2 is the recommended shield gas. Straight CO_2 may be used for some wires.

Coreweld wires are now classified as composite wires and are covered by AWS Specifications A5.18 for the carbon or mild steel types and AWS Specification A5.28 for the low alloy tpes as shown below.

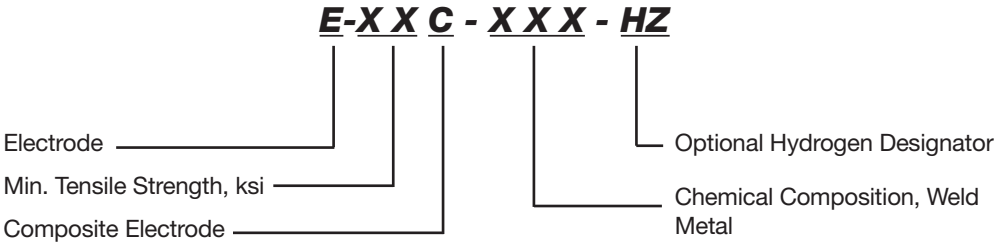
AWS Filler Metal Specification A5.18

Carbon Steel Composite Electrodes for
Gas Metal Arc Welding



AWS Filler Metal Specification A5.28

Low Alloy Composite Electrodes for
Gas Metal Arc Welding



COREWELD 77-HS AWS A5.18: E70C-6M H4

FEATURES

Coreweld 77-HS is a metal-cored wire designed to run at faster travel speeds, higher deposition rates and leave very few silica islands. This metal cored wire is ideal for robotic applications. Optimal performance is achieved with 90% Argon / 10% CO_2 shielding gas.

CLASSIFICATIONS AND APPROVALS

- AWS A5.18: E70C-6M H4
- ASME SFA A5.18
- CWB CSA W48
- D.N.V.- III YMS

WELDING PROCESS

- MCAW (Metal Core)

INDUSTRIES

- Mobile Machinery
- Railcar
- General Fabrication
- Automotive

CHARPY V-NOTCH PROPERTIES

Testing Temperature @ -20°F (-29°C)	
As Welded, 75% Ar / 25% CO_2	38 ft-lbs, 52 J
As Welded, 90% Ar / 10% CO_2	63 ft-lbs, 85 J
Testing Temperature @ -40°F (-40°C)	
As Welded, 75% Ar / 25% CO_2	28 ft-lbs, 38 J
As Welded, 90% Ar / 10% CO_2	40 ft-lbs, 54 J

TYPICAL MECHANICAL PROPERTIES

As Welded	
Shielding Gas - 75% Ar / 25% CO_2	
Yield Strength	61 ksi, 420 MPa
Tensile Strength	75 ksi, 515 MPa
Reduction in Area	60%
Elongation% in 2”	32%
As Welded	
Shielding Gas - 90% Ar / 10% CO_2	
Yield Strength	62 ksi, 425 MPa
Tensile Strength	74 ksi, 510 MPa
Reduction in Area	58%
Elongation% in 2”	33%

WELD METAL ANALYSIS

Shielding Gas, 75% Ar / 25% CO_2	
C	0.04%
Mn	0.9%
Si	0.7%
P	0.01%
S	0.015%
Ni	0.4%
Shielding Gas, 90% Ar / 10% CO_2	
C	0.04%
Mn	1.0%
Si	0.7%
P	0.01%
S	0.015%
Ni	0.4%

COREWELD 77-HS continued

DEPOSITION TABLE - 90% Ar / 10% CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	170	24	200 (510)	5.2 (2.4)	94	5/8 (15.8)
	200	27	250 (640)	6.5 (3.0)	95	
	230	25	300 (760)	7.7 (3.5)	96	
	260	28	350 (890)	9.1 (4.1)	97	
	290	29	400 (1020)	10.2 (4.6)	98	
	330	32	500 (1270)	12.7 (5.8)	99	
	360	33	550 (1400)	13.9 (6.3)	99	
.052 (1.4)	190	26	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	27	250 (640)	7.7 (3.5)	95	
	280	28	300 (760)	9.2 (4.2)	97	
	340	31	400 (1020)	11.2 (5.1)	99	
	410	36	530 (1330)	15.7 (7.1)	99	
1/16 (1.6)	230	26	150 (380)	6.2 (2.81)	91	3/4 (19.1)
	290	27	200 (510)	8.8 (4.0)	95	
	340	29	250 (640)	12.3 (5.6)	98	
	460	32	350 (890)	15.9(7.2)	99	
	510	36	480 (1210)	20.7 (9.4)	99	

COREWELD 77-HS continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
250-550	27-33	200-360	5/8	180-530	27-37	190-410	5/8

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
150-480	26-36	230-510	3/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
243414000	CW 77-HS 045X33#AWS	662303073954
243414067	CW 77 HS 045X60#CL	662303086947
243414042	CW 77-HS 045X600#OMP	662303084240
243414018	CW 77-HS 052X33#AWS	662303073947
243414034	CW 77-HS 052X600#OMP	662303076191
243414026	CW 77-HS 1/16X33#AWS	662303073961
243414109	CW 77-HS 1/16X60#CL	662303087302
243414059	CW 77-HS 1/16X600#OMP	662303085292

COREWELD C6 AWS A5.18: E70C-6M H4

FEATURES

Coreweld C6 was developed and "fine-tuned" especially for hand-held, automatic and robotic welding in the automotive industry, as well as rail car manufacturing, structural welding and other similar applications. Never before has there been such a perfect pairing of filler metal and industry requirements for quality, productivity and profitability.

WELDING PROCESS

- MCAW (Metal Core)

INDUSTRIES

- Mobile Machinery
- Rail Road Car
- General Fabrication
- Bridge Construction
- Civil Construction
- Automotive
- Shipbuilding

CHARPY V-NOTCH PROPERTIES

Testing Temperature @ -20°F (-29°C)	
As Welded, 92% Ar / 8% CO_2	56 ft-lbs, 78 J
As Welded, 75% Ar / 25% CO_2	38 ft-lbs, 52 J
Testing Temperature @ 0°F (-18°C)	
As Welded, 75% Ar / 25% CO_2	55 ft-lbs, 75 J

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: Seismic Certified "D"
- AWS A5.18: E70C-6M H4
- ASME SFA 5.18
- Certified by CWB to CSA W48
- A.B.S. - 3SA, 4YSA

TYPICAL MECHANICAL PROPERTIES

As Welded	
Shielding Gas - Argon 75% CO_2 25%	
Yield Strength	74 ksi, 505 MPa
Tensile Strength	86 ksi, 595 MPa
Elongation% in 2"	27%
Reduction in Area	64%
As Welded	
Shielding Gas - Argon 92% O_2 8%	
Yield Strength	79 ksi, 545 MPa
Tensile Strength	86 ksi, 595 MPa
Elongation% in 2"	25%
Reduction in Area	63%

WELD METAL ANALYSIS

Shielding Gas, 75% Ar / 25% CO_2	
C	0.04%
Mn	1.6%
Si	0.7%
P	0.012%
S	0.016%
Shielding Gas, 92% Ar / 8% CO_2	
C	0.04%
Mn	1.6%
Si	0.8%
P	0.015%
S	0.017%

COREWELD C6 continued

DEPOSITION TABLE - 90% Ar / 10% CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	200	27	250 (640)	6.5 (3.0)	95	5/8 (15.8)
	260	28	350 (890)	9.1 (4.1)	97	
	290	29	400 (1020)	10.2 (4.6)	98	
	330	32	500 (1270)	12.7 (5.8)	99	
	360	33	550 (1400)	13.9 (6.3)	99	
.052 (1.4)	190	26	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	27	250 (640)	7.7 (3.5)	95	
	280	28	300 (760)	9.2 (4.2)	97	
	340	31	400 (1020)	11.2 (5.1)	99	
	410	36	530 (1330)	15.7 (7.1)	99	
1/16 (1.6)	230	26	150 (380)	6.2 (2.81)	91	3/4 (19.1)
	290	27	200 (510)	8.8 (4.0)	95	
	340	29	250 (640)	12.3 (5.6)	98	
	430	32	350 (890)	15.9 (7.2)	99	
	510	36	480 (1210)	20.7 (9.4)	99	

COREWELD C6 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	170	24	200 (510)	5.2 (2.4)	94	5/8 (15.8)
	230	25	300 (760)	7.7 (3.5)	96	
	290	27	400 (1020)	10.2 (4.6)	98	
	330	29	500 (1270)	12.7 (5.8)	99	
	390	32	650 (1650)	16.5 (7.5)	99	
.052 (1.4)	190	24	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	25	250 (640)	7.7 (3.5)	95	
	310	27	350 (890)	10.7 (4.9)	98	
	370	30	450 (1140)	13.6 (6.2)	99	
	420	32	550 (1400)	16.6 (7.5)	99	
1/16 (1.6)	230	24	150 (380)	6.2 (2.81)	91	3/4 (19.1)
	290	26	200 (510)	8.8 (4.0)	95	
	370	28	280 (700)	12.5 (5.7)	96	
	430	29	350 (890)	15.9 (7.2)	99	
	510	33	480 (1210)	20.7 (9.4)	99	

COREWELD C6 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
250-550	27-33	200-360	5/8	180-530	27-36	190-410	5/8

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
150-480	26-36	230-510	3/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
243411204	CW C6 045X33#AWS	662303056346
243411147	CW C6 045X60#CL	662303067663
243411170	CW C6 045X600#OMP	662303.052 6
243411162	CW C6 052X33#AWS	662303068134
243411154	CW C6 052X60#CL	662303068141
243411188	CW C6 052X600#OMP	662303070267
243411220	CW C6 1/16X33#AWS	662303059057
243411022	CW C6 1/16X60#CL	662303054441
243411196	CW C6 1/16X600#OMP	662303070274
243411261	CW C6 1/16X600#RL	662303084943

COREWELD 70 AWS A5.18: E70C-6M

FEATURES

Coreweld 70 is a tubular wire containing ingredients primarily comprised of metal powder along with additional arc stabilizers and alloying elements. The net result is a high efficiency (90 to 98%) wire. Arc characteristics, weld metal transfer, spatter levels are improved, while silica islands are minimized with the use of Argon mixtures up to 92% Argon. Due to the high level of iron powder and low slag components, the only slag formed by this wire are small islands of silica. Coreweld 70 was designed for multipass welding in robotic applications where slag removal between passes is difficult. This metal cored product is intended for use on carbon steels having tensile strengths up to 70 ksi (485 MPa). Coreweld 70 wires from .045 ” up to 1/16” are capable of being welded out-of-position.

INDUSTRIES

- Automotive
- Mobile Machinery
- General Fabrication
- Power Generation
- Bridge Construction
- Civil Construction
- Pipeline
- Shipbuilding
- Rail Road Car

CLASSIFICATIONS AND APPROVALS

- AWS A5.18: E70C-6M
- ASME SFA 5.18
- CERTIFIED BY C.W.B.- CSA W48
- D.N.V.- III YMS(H10)
- L.R.- 3S,3YS(H10)
- B.V.- SA3YM(HH)
- TUV
- DEUTSCHE BAHN
- G.L.- 3YH10S

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Strength	68 ksi, 460 MPa
Tensile Strength	80 ksi, 550 MPa
Elongation in 2”	28%
Reduction in Area	67%
As Welded 92% Ar / 8% CO_2	
Yield Strength	79 ksi, 545 MPa
Tensile Strength	85 ksi, 585 MPa
Elongation in 2”	26%
Reduction in Area	65%

WELDING PROCESS

- MCAW (Metal Cored)

COREWELD 70 continued

CHARPY V-NOTCH PROPERTIES	
Testing Temperature 0°F (-18°C)	
As Welded 75% Ar / 25% CO_2	50 ft-lb, 68 J
As Welded 92% Ar / 8% CO_2	60 ft-lb, 81 J
Testing Temperature -20°F (-29°C)	
As Welded 75% Ar / 25% CO_2	40 ft-lb, 54 J
As Welded 92% Ar / 8% CO_2	50 ft-lb, 68 J
Testing Temperature -40°F (-40°C)	
As Welded 75% Ar / 25% CO_2	30 ft-lb, 41 J
As Welded 92% Ar / 8% CO_2	35 ft-lb, 47 J

WELD METAL ANALYSIS	
75% Ar / 25% CO_2	
C	0.06%
Mn	1.4%
Si	0.6%
P	0.010%
S	0.019%
92% Ar / 8% CO_2	
C	0.06%
Mn	1.5%
Si	0.6%
P	0.009%
S	0.019%

DEPOSITION TABLE

Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %
.035 (0.9)	150	25	320 (813)	4.4 (1.2)	92
	200	27	472 (1199)	6.5 (2.95)	92
	250	29	680 (1727)	9.4 (4.26)	92
.045 (1.2)	250	28	330 (838)	8.0 (3.63)	90
	275	30	430 (1092)	11.1 (5.03)	94
	300	32	464(1179)	11.6 (5.26)	94
	350	32	512 (1300)	12.7 (5.76)	96
.052 (1.4)	275	29	262 (665)	8.0 (3.63)	92
	300	29	312 (792)	9.6 (4.35)	93
	325	30	328 (833)	10.1 (4.58)	93

COREWELD 70 continued

DEPOSITION TABLE					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %
1/16 (1.6)	300	30	181 (460)	8.6 (3.90)	89
	350	30	241 (612)	11.9 (5.40)	94
	400	32	293 (744)	14.6 (6.62)	94
	450	34	333 (846)	16.2 (7.35)	94
5/64 (2.0)	350	27	160 (406)	11.6 (5.26)	94
	400	28	185 (470)	13.2 (5.99)	95
	450	28	210 (533)	15.8 (7.17)	97
	500	29	280 (711)	20.4 (9.25)	97
3/32 (2.4)	400	31	115 (292)	11.5 (5.22)	95
	450	31	138 (350)	14.5 (6.58)	97
	500	32	155 (394)	16.5 (7.48)	97
	550	32	197 (500)	21.0 (9.53)	98

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .035”				Gas: 75/25 .045”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
320-680	23-29	130-260	3/8-3/4	330-572	24-32	150-350	3/8-3/4

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .052”				Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
262-328	26-32	200-400	3/8-3/4	181-333	26-34	300-500	3/8-3/4

COREWELD 70 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 5/64”				Gas: 75/25 3/32”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
160-280	27-33	350-550	3/4-11/4	115-197	28-34	400-580	3/4-1 1/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
243410206	CW 70 .035X33#AWS	662303002374
243410057	CW 70 .045 X33#AWS	662303002275
243410107	CW 70 .045 X60#CL	662303002312
243410131	CW 70 .045 X600#OMP	662303076986
243410073	CW 70 .052 X33#AWS	662303002282
243410180	CW 70 .052 X600#OMP	662303079437
243410032	CW 70 1/16X33#AWS	662303002251
243410024	CW 70 1/16X60#CL	662303002244
243410156	CW 70 1/16X600#OMP	662303076993
243410065	CW 70 5/64X500#POP	662303070953
243410008	CW 70 3/32X60#CL	662303002220

COREWELD 88HS Ni1 AWS A5.28: E80C-Ni1H8

FEATURES

Coreweld 88HS-Ni1 is recommended primarily for robotic or mechanized high speed welding of shet steel. Welding speeds up to 90 ipm are possible when welding vertical down. The low slag level of Coreweld 88HS-Ni1 minimizes post weld clean up. For this reason, Coreweld 88HS-Ni1 gives special advantage in applications where post weld coating or painting is specified.

Coreweld 88HS-Ni1 is a 1% nickel low alloy metal cored wire designed specifically for high speed welding where a clean weld surface is required. Coreweld 88HS-Ni1 deposits have very few silicon islands and almost no slag at the weld toes.

CLASSIFICATIONS AND APPROVALS

- AWS A5.28: E80C-Ni1H8

WELDING PROCESS

- MCAW (Metal Cored)

INDUSTRIES

- General Fabrication
- Rail Car
- Power Poles

TYPICAL MECHANICAL PROPERTIES

Shielding Gas - 75% Ar / 25% CO_2	
Yield Strength	69.6 ksi, 480 MPa
Tensile Strength	83.6 ksi, 576 MPa
Elongation% in 2”	27%
Reduction in Area	60%
Shielding Gas - 90% Ar / 10% CO_2	
Yield Strength	74.3 ksi, 512 MPa
Tensile Strength	86.7 ksi, 598 MPa
Elongation% in 2”	26%
Reduction in Area	58%

CHARPY V-NOTCH PROPERTIES

Absorbed Energy @ -50°F (-46°C)	
As Welded, 75% Ar / 25% CO_2	
	28 ft-lbs, 37 J
As Welded, 90% Ar / 10% CO_2	
	29 ft-lbs, 39 J

WELD METAL ANALYSIS

Shielding Gas, 75% Ar / 25% CO_2	
C	0.053%
Mn	1.23%
Si	0.55%
P	0.010%
S	0.016%
Ni	0.96%
Shielding Gas, 90% Ar / 10% CO_2	
C	0.051%
Mn	1.31%
Si	0.61%
P	0.011%
S	0.017%
Ni	0.96%

COREWELD 88HS Ni1 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %
.045 (1.2)	210	27	250 (635)	5.2 (2.4)	94
	265	28	350 (889)	7.7 (3.5)	96
	295	29	400 (1016)	10.2 (4.6)	98
	330	32	500 (1270)	12.7 (5.8)	99
	375	33	550 (1397)	16.5 (7.5)	99
.052 (1.4)	190	25	175 (445)	5.5 (2.5)	94
	240	27	250 (635)	7.7 (3.5)	95
	255	28	300 (762)	10.7 (4.9)	98
	350	31	400 (1016)	13.6 (6.2)	99
	430	36	525 (1334)	16.6 (7.5)	99
1/16 (1.6)	240	26	150 (381)	6.2 (2.8)	91
	290	27	200 (508)	8.8 (4.0)	95
	340	29	250 (635)	12.5 (5.7)	98
	425	32	350 (889)	15.9 (7.2)	99
	490	36	475 (1207)	20.7 (9.4)	99

COREWELD 88HS Ni1 continued

DEPOSITION TABLE - 90% Ar / 10% CO_2					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %
.045 (1.2)	180	23.5	200 (508)	5.2 (2.4)	94
	250	25	300 (762)	7.7 (3.5)	96
	300	27	400 (1016)	10.2 (4.6)	98
	375	29	500 (1270)	12.7 (5.8)	99
	450	32	650 (1651)	16.5 (7.5)	99
.052 (1.4)	200	24	175 (445)	5.5 (2.5)	94
	260	25	250 (635)	7.7 (3.5)	95
	340	27	350 (889)	10.7 (4.9)	98
	420	30	450 (1143)	13.6 (6.2)	99
	450	32	550 (1397)	16.6 (7.5)	99
1/16 (1.6)	240	24	150 (381)	6.2 (2.8)	91
	310	26	200 (508)	8.8 (4.0)	95
	400	28	275 (699)	12.5 (5.7)	98
	440	29	350 (889)	15.9 (7.2)	99
	515	33	475 (1207)	20.7 (9.4)	99

COREWELD 88HS Ni1 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
250-550	27-33	200-360	5/8	180-530	27-36	190-410	5/8

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
150-480	26-36	230-510	3/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
243412897	CW 88HS NI1 .045x33#AWS	000000000000
243414083	CW 88HS NI1 .045x60#CL	000000000000
243412889	CW 88HS NI1 .052x33#AWS	000000000000
243414091	CW 88HS NI1 .052x60#CL	000000000000
243414075	CW 88HS NI1 1/16x60#CL	000000000000

COREWELD 80C-Ni1 AWS A5.28: E80C-Ni1

FEATURES

Coreweld 80C-Ni1 is a metal cored wire for application where good low temperature impact toughness or weathering characteristics are required. It operates over a broad range of parameters, produces a smooth, spray transfer with minimal fume and spatter and is tolerant of light rust and millscale. The shielding gas used should be Ar 75-92% / 25-8% CO_2.

Coreweld 80C-Ni1 is alloyed wit h1% Ni to provide good low termperature impact toughness. It also meets the requirements in AWS D1.1 and D1.5 for use on unpainted weathering steels. It is suitable for making single or multi-pass welds in the flat or horizontal position using conventional (DCEP or DCEN) or pulsed power.

CLASSIFICATIONS AND APPROVALS

- AWS A5.28: E80C-Ni1
- ASME SFA 5.28

WELDING PROCESS

- MCAW (Metal Cored)

INDUSTRIES

- Bridge Construction
- Mobile Machinery
- General Fabrication
- Process

TYPICAL MECHANICAL PROPERTIES

Shielding Gas - 85% Ar / 15% CO_2	
Yield Strength	70 ksi, 485 MPa
Tensile Strength	82 ksi, 565 MPa
Reduction in Area	66%
Elongation% in 2”	27%

CHARPY V-NOTCH PROPERTIES

Absorbed Energy @ -50°F (-46°C)	
As Welded, 75% Ar / 25% CO_2	
	28 ft-lbs, 37 J
As Welded, 90% Ar / 10% CO_2	
	29 ft-lbs, 39 J

WELD METAL ANALYSIS

Shielding Gas, 85% Ar / 15% CO_2	
C	0.04%
Mn	1.5%
Si	0.3%
P	0.01%
S	0.02%
Ni	0.9%

COREWELD 80C-Ni1 continued

DEPOSITION TABLE -						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	170	24	200 (510)	5.2 (2.4)	94	5/8 (15.8)
	200	27	250 (640)	6.5 (3.0)	95	
	230	25	300 (760)	7.7 (3.5)	96	
	260	28	350 (890)	9.1 (4.1)	97	
	290	29	400 (1020)	10.2 (4.6)	98	
	330	32	500 (1270)	12.7 (5.8)	99	
	360	33	550 (1400)	13.9 (6.3)	99	
	390	32	650 (1650)	16.5 (7.5)	99	
.052 (1.4)	190	26	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	27	250 (635)	7.7 (3.5)	95	
	280	28	300 (760)	9.2 (4.2)	97	
	310	27	350 (890)	10.7 (4.9)	98	
	340	31	400 (1020)	11.2 (5.1)	99	
	370	30	450 (1140)	13.6 (6.2)	99	
	410	36	530 (1330)	15.7 (7.1)	99	
1/16 (1.6)	230	26	150 (380)	6.2 (2.8)	91	3/4 (19.1)
	290	27	200 (510)	8.8 (4.0)	95	
	340	29	250 (640)	12.3 (5.6)	98	
	370	28	280 (700)	12.5 (5.7)	96	
	430	32	350 (890)	15.9 (7.2)	99	
	510	36	480 (1210)	20.7 (9.4)	99	

COREWELD 80C-Ni1 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
250-350	27-28	200-260	5/8	180-300	27-28	190-280	5/8
350-450	28-30	260-310	5/8	300-400	28-31	280-340	5/8
450-550	30-33	310-360	5/8	400-530	31-36	340-410	5/8

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
150-250	26-29	230-340	3/4
250-350	29-32	340-430	3/4
350-480	32-36	430-510	3/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
243417052	CW 80C-NI1 052X600#OMP	662303076344
243417078	CW 80C-NI1 1/16X33# AWS	662303086565
243417029	CW 80C-NI1 1/16X60#CL	662303073596
243417086	CW 80C-NI1 1/16X600# OMP	662303086572

COREWELD W AWS A5.28: E80C-G H4

FEATURES

Coreweld W is a metal cored wire designed for single or multipass welding on weathering grade steels. Coreweld W was designed specifically to meet the demand for weld deposits that color match the low alloy, high strength weathering grade steels, such as A588 and A242.

CLASSIFICATIONS AND APPROVALS

- AWS A5.28: E80C-G H4
- ASME SFA 5.28
- DEUTSCHE BAHN

WELDING PROCESS

- MCAW (Metal Core)

INDUSTRIES

- Shipbuilding
- General Fabrication
- Mobile Machinery
- Rail Road Car
- Civil Construction
- Bridge Construction

TYPICAL MECHANICAL PROPERTIES

Shielding Gas - Argon 75% CO_2 25%	
Yield Strength	81 ksi, 560 MPa
Tensile Strength	90 ksi, 620 MPa
Elongation% in 2”	26%

CHARPY V-NOTCH PROPERTIES

Testing Temperature @ -20°F (-29°C)	
As Welded, 75% Ar / 25% CO_2	38 ft-lbs, 52 J
Testing Temperature @ -60°F (-51°C)	
As Welded, 75% Ar / 25% CO_2	24 ft-lbs, 33 J

WELD METAL ANALYSIS

Shielding Gas, 75% Ar / 25% CO_2	
C	0.04%
Mn	1.3%
Si	0.7%
P	0.008%
S	0.012%
Cr	0.6%
Ni	0.7%
Cu	0.6%

COREWELD W continued

DEPOSITION TABLE - 90% Ar / 10% CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	200	27	250 (640)	6.5 (3.0)	95	5/8 (15.8)
	260	28	350 (890)	9.1 (4.1)	97	
	290	29	400 (1020)	10.2 (4.6)	98	
	330	32	500 (1270)	12.7 (5.8)	99	
	360	33	550 (1400)	13.9 (6.3)	99	
.052 (1.4)	190	26	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	27	250 (640)	7.7 (3.5)	95	
	280	28	300 (760)	9.2 (4.2)	97	
	340	31	400 (1020)	11.2 (5.1)	99	
	410	36	530 (1330)	15.7 (7.1)	99	
1/16 (1.6)	230	26	150 (380)	6.2 (2.81)	91	3/4 (19.1)
	290	27	200 (510)	8.8 (4.0)	95	
	340	29	250 (640)	12.3 (5.6)	98	
	430	32	350 (890)	15.9 (7.2)	99	
	510	36	480 (1210)	20.7 (9.4)	99	

COREWELD W continued

DEPOSITION TABLE - 75% Ar / 25% CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	170	24	200 (510)	5.2 (2.4)	94	5/8 (15.8)
	230	25	300 (760)	7.7 (3.5)	96	
	290	27	400 (1020)	10.2 (4.6)	98	
	330	29	500 (1270)	12.7 (5.8)	99	
	390	32	650 (1650)	16.5 (7.5)	99	
.052 (1.4)	190	24	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	25	250 (640)	7.7 (3.5)	95	
	310	27	350 (890)	10.7 (4.9)	98	
	370	30	450 (1140)	13.6 (6.2)	99	
	420	32	550 (1400)	16.6 (7.5)	99	
1/16 (1.6)	230	24	150 (380)	6.2 (2.81)	91	3/4 (19.1)
	290	26	200 (510)	8.8 (4.0)	95	
	370	28	280 (700)	12.5 (5.7)	96	
	430	29	350 (890)	15.9 (7.2)	99	
	510	33	480 (1210)	20.7 (9.4)	99	

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
330-572	24-32	150-350	3/8-3/4	262-328	26-32	200-400	3/8-3/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
243413515	CW W 045X33# AWS	662303002886
243413523	CW W 045X60#CL	662303002893

COREWELD 80-D2 AWS A5.28: E80C-G H4

FEATURES

Coreweld 80-D2 is a metal cored wire equivalent to ER80S-D2 solid wire. Coreweld 80-D2 produces higher deposition rates, better wetting action, with an absence of copper coating on the wire. Coreweld 80-D2 was developed for HSLA steels. This product is capable of single or multiple pass welding

CLASSIFICATIONS AND APPROVALS

- AWS A5.28: E80C-G H4
- ASME SFA 5.28

WELDING PROCESS

- MCAW (Metal Cored)

INDUSTRIES

- Process
- Mobile Machinery
- General Fabrication
- Automotive

TYPICAL MECHANICAL PROPERTIES

Shielding Gas - Argon 75% CO_2 25%	
Yield Strength	77 ksi, 530 MPa
Tensile Strength	90 ksi, 620 MPa
Reduction in Area	62%
Elongation% in 2”	26%
Stress Relieved 8 hrs. @ 1175°F (635°C)	
Yield Strength	77 ksi, 530 MPa
Tensile Strength	90 ksi, 620 MPa
Elongation% in 2”	26%
Reduction in Area	68%

CHARPY V-NOTCH PROPERTIES

Testing Temperature @ -20°F (-29°C)	
As Welded, 75% Ar / 25% CO_2	34 ft-lbs, 46 J
Stress Relieved 8 hrs. @ 1175°F (635°C)	25 ft-lbs, 34 J
Testing Temperature @ -40°F (-40°C)	
As Welded, 75% Ar / 25% CO_2	23 ft-lbs, 31 J

WELD METAL ANALYSIS

Shielding Gas, 75% Ar / 25% CO_2	
C	0.09%
Mn	1.6%
Si	0.5%
P	0.01%
S	0.01%
Mo	0.5%

COREWELD 80-D2 continued

DEPOSITION TABLE - 90% Ar / 10% CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	200	27	250 (640)	6.5 (3.0)	95	5/8 (15.8)
	260	28	350 (890)	9.1 (4.1)	97	
	290	29	400 (1020)	10.2 (4.6)	98	
	330	32	500 (1270)	12.7 (5.8)	99	
	360	33	550 (1400)	13.9 (6.3)	99	
.052 (1.4)	190	26	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	27	250 (640)	7.7 (3.5)	95	
	280	28	300 (760)	9.2 (4.2)	97	
	340	31	400 (1020)	11.2 (5.1)	99	
	410	36	530 (1330)	15.7 (7.1)	99	
1/16 (1.6)	230	26	150 (380)	6.2 (2.81)	91	3/4 (19.1)
	290	27	200 (510)	8.8 (4.0)	95	
	340	29	250 (640)	12.3 (5.6)	98	
	430	32	350 (890)	15.9 (7.2)	99	
	510	36	480 (1210)	20.7 (9.4)	99	

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .035”				Gas: 75/25 .045”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
320-680	23-29	130-260	3/8-3/4	330-572	24-32	150-350	3/8-3/4

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .052”				Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
262-328	26-32	200-400	3/8-3/4	181-333	26-34	300-500	3/8-3/4

COREWELD 80-D2 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	170	24	200 (510)	5.2 (2.4)	94	5/8 (15.8)
	230	25	300 (760)	7.7 (3.5)	96	
	290	27	400 (1020)	10.2 (4.6)	98	
	330	29	500 (1270)	12.7 (5.8)	99	
	390	32	650 (1650)	16.5 (7.5)	99	
.052 (1.4)	190	24	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	25	250 (640)	7.7 (3.5)	95	
	310	27	350 (890)	10.7 (4.9)	98	
	370	30	450 (1140)	13.6 (6.2)	99	
	420	32	550 (1400)	16.6 (7.5)	99	
1/16 (1.6)	230	24	150 (380)	6.2 (2.81)	91	3/4 (19.1)
	290	26	200 (510)	8.8 (4.0)	95	
	370	28	280 (700)	12.5 (5.7)	96	
	430	29	350 (890)	15.9 (7.2)	99	
	510	33	480 (1210)	20.7 (9.4)	99	

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
243415205	CW 80-D2 045X33#AWS	662303003029
243415221	CW 80-D2 045X60#CL	662303047061
243415304	CW 80-D2 045X600#OMP	662303079413
243415262	CW 80-D2 1/16X60#CL	662303019174
243415296	CW 80-D2 1/16X600#OMP	662303079420

COREWELD 110 AWS A5.28: E110C-G

FEATURES

Coreweld 110 is a metal cored electrode designed for single and multipass welding of high strength low alloy steels, such as T-1, HY-80, and HY-100. The arc is smooth with virtually no spatter. Coreweld 110 is recommended for welding quenched and tempered high strength steels. Because of the metallic core, the wire offers both the high deposition rates of a flux cored electrode and the high efficiencies of a solid wire.

CLASSIFICATIONS AND APPROVALS

- AWS A5.28: E110C-G
- ASME SFA 5.28

WELDING PROCESS

- MCAW (Metal Core)

INDUSTRIES

- Bridge Construction
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

Shielding Gas - Argon 92% CO_2 8%	
Yield Strength	113 ksi, 770 MPa
Tensile Strength	121 ksi, 835 MPa
Elongation% in 2”	20%

CHARPY V-NOTCH PROPERTIES

Testing Temperature @ 0°F (-18°C)	
As Welded, 92% Ar / 8% CO_2	35 ft-lbs, 47 J
Testing Temperature @ -60°F (-51°C)	
As Welded, 92% Ar / 8% CO_2	30 ft-lbs, 41 J

WELD METAL ANALYSIS

Shielding Gas, 92% Ar / 8% CO_2	
C	0.05%
Mn	1.5%
Si	0.3%
P	0.01%
S	0.01%
Mo	0.6%
Ni	2.5%

COREWELD 110 continued

DEPOSITION TABLE - 90% Ar / 10% CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	200	27	250 (640)	6.5 (3.0)	95	5/8 (15.8)
	260	28	350 (890)	9.1 (4.1)	97	
	290	29	400 (1020)	10.2 (4.6)	98	
	330	32	500 (1270)	12.7 (5.8)	99	
	360	33	550 (1400)	13.9 (6.3)	99	
.052 (1.4)	190	26	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	27	250 (640)	7.7 (3.5)	95	
	280	28	300 (760)	9.2 (4.2)	97	
	340	31	400 (1020)	11.2 (5.1)	99	
	410	36	530 (1330)	15.7 (7.1)	99	
1/16 (1.6)	230	26	150 (380)	6.2 (2.81)	91	3/4 (19.1)
	290	27	200 (510)	8.8 (4.0)	95	
	340	29	250 (640)	12.3 (5.6)	98	
	430	32	350 (890)	15.9 (7.2)	99	
	510	36	480 (1210)	20.7 (9.4)	99	

COREWELD 110 continued

DEPOSITION TABLE - 75% Ar / 25% CO_2						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	170	24	200 (510)	5.2 (2.4)	94	5/8 (15.8)
	230	25	300 (760)	7.7 (3.5)	96	
	290	27	400 (1020)	10.2 (4.6)	98	
	330	29	500 (1270)	12.7 (5.8)	99	
	390	32	650 (1650)	16.5 (7.5)	99	
.052 (1.4)	190	24	180 (440)	5.5 (2.5)	94	5/8 (15.8)
	240	25	250 (640)	7.7 (3.5)	95	
	310	27	350 (890)	10.7 (4.9)	98	
	370	30	450 (1140)	13.6 (6.2)	99	
	420	32	550 (1400)	16.6 (7.5)	99	
1/16 (1.6)	230	24	150 (380)	6.2 (2.81)	91	3/4 (19.1)
	290	26	200 (510)	8.8 (4.0)	95	
	370	28	280 (700)	12.5 (5.7)	96	
	430	29	350 (890)	15.9 (7.2)	99	

COREWELD 110 continued

FULL RANGE WELDING PARAMETERS							
Gas: 75/25 .045”				Gas: 75/25 .052”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
330-572	24-32	150-350	3/8-3/4	262-328	26-32	200-400	3/8-3/4

FULL RANGE WELDING PARAMETERS			
Gas: 75/25 1/16”			
WFS ipm	Volts	Amps	Tip to Work in
181-333	26-34	300-500	3/8-3/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
243415882	CW 11.045 X33#AWS	662303003326
243416138	CW 11.052 X60#CL	662303084042
243416146	CW 11.052 X600#OMP	662303084325
243416120	CW 110 1/16X60#CL	662303026196
243416179	CW 110 1/16X600#OMP	66230386138

CORESHIELD 40 AWS A5.20: E70T-4

FEATURES

Coreshield 40 is a self-shielded flux cored wire primarily designed for multiple pass, horizontal and flat position welding of low and medium carbon steels when toughness is not a requirement. The larger sizes achieve very high deposit rates for very low joining costs. The low penetration, convex fillet bead shape and ability for the slag to desulfurize the deposit make it an ideal choice when crack resistance is a primary consideration. The flat position deposits are smooth and uniform with good wetting into the side walls. The core ingredients are carefully balanced to stabilize the droplet transfer, enhance the ability to handle mill scale and easily detach the slag for quick cleaning. Coreshield 40 is designed to operate on DCEP (electrode positive) with longer electrical stickout. The longer extension increases the deposit potential by preheating the wire.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	62 ksi, 430 MPa
Tensile Strength	86 ksi, 595 MPa
Elongation in 2”	29%

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.20: E70T-4

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

C	0.2%
Mn	0.3%
Si	0.3%
P	0.012%
S	0.007%
Al	1.3%

INDUSTRIES

- Rail Road Car
- General Fabrication
- Civil Construction

CORESHIELD 40 continued

DEPOSITION TABLE -						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
5/64 (2.0)	220	27	120 (305)	6 (2.7)	77	1.75 (44.5)
	300	28	178 (452)	9.4 (4.26)	85	1.75 (44.5)
	400	29	230 (584)	11.6 (5.26)	84	1.75 (44.5)
3/32 (2.4)	350	28	196 (498)	13.8 (6.26)	82	2.5 (63.5)
	375	29	212 (539)	15.1 (6.85)	84	2.5 (63.5)
	400	30	229 (582)	116.1 (7.3)	84	2.5 (63.5)

FULL RANGE WELDING PARAMETERS							
1/16”				5/64”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
165	27.0	200	1 3/4	120	27.0	220	1 3/4
207	28.0	250	1 3/4	178	28.0	300	1 3/4
263	29.0	300	1 3/4	230	29.0	400	1 3/4

FULL RANGE WELDING PARAMETERS							
3/32”				.120”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
196	28.0	350	2 1/2	101	29.0	450	2 3/4
212	29.0	375	2 1/2	113	30.0	500	2 3/4
229	30.0	400	2 1/2	123	33.0	550	2 3/4

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242201085	CS 40 5/64X50#CL	662303000332
242201002	CS 40 3/32X50#CL	662303000271

CORESHIELD 7 AWS A5.20: E70T-7

FEATURES

Coreshield 7 flux cored wire is a self-shielded wire designed for single or multiple pass welding of mild steel when impact toughness is not a requirement. The high deposition rate can be successfully translated into fast travel speeds. The DCEN (electrode negative) operation is characterized by a spray-like transfer and a wetting slag which make it ideal for lap and step-up fillet welds. The crumbly slag is easily removed with light scraping; the weld bead is slightly convex. The smaller diameters can be applied vertically down on 10 gauge (3.5 mm) and thicker steels. Coreshield 7 is ideally suited for structural steel applications where no seismic requirements are specified.

INDUSTRIES

- Mobile Machinery
- Civil Construction
- Bridge Construction

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	67 ksi, 460 MPa
Tensile Strength	90 ksi, 625 MPa
Elongation in 2”	26%

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.20: E70T-7

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

C	0.26%
Mn	0.5%
Si	0.14%
P	0.012%
S	0.007%
Al	1.6%

DEPOSITION TABLE -

Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
1/16 (1.6)	225	25	180 (457)	6.6 (2.97)	81	1 (25.4)
	320	28	300 (762)	10.8 (4.88)	80	1 (25.4)
	375	30	370 (940)	12.8 (5.79)	80	1 (25.4)
5/64 (2.0)	275	26	145(368)	7.2 (3.26)	80	1 (25.4)
	325	27	172 (437)	8.8 (3.96)	82	1 (25.4)
	375	28	220 (558)	11.2 (5.08)	84	1 (25.4)
3/32 (2.4)	325	27	135 (343)	8.8 (3.99)	83	1.25 (31.8)
	350	29	175 (445)	10.7(4.84)	84	1.25 (31.8)
	400	29	200 (508)	12.6 (5.7)	85	1.25 (31.8)

CORESHIELD 7 continued

FULL RANGE WELDING PARAMETERS							
1/16”				5/64”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
180	25.0	225	1	145	26.0	275	1
300	28.0	320	1	172	27.0	325	1
370	30.0	375	1	220	28.0	375	1

FULL RANGE WELDING PARAMETERS							
3/32”				7/64”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
135	27.0	325	1 1/4	120	29.0	400	1 1/2
175	29.0	350	1 1/4	150	30.0	430	1 1/2
200	29.0	400	1 1/4	175	31.0	490	1 1/2

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242202711	CS 7 3/32X50#CL	662303001223
242202760	CS 7 3/32X600#WR	662303001261

CORESHIELD 8 AWS A5.20: E71T-8

FEATURES

Coreshield 8 is a self-shielded flux cored wire designed to weld critical structural applications while maintaining excellent arc characteristics and high welder appeal. Coreshield 8 is tested and certified to meet the new AWS D designation requirements, making this self-shielded wire an excellent choice for demand critical welds when the AWS D1.8 Seismic Supplement is utilized.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	67 ksi, 465 MPa
Tensile Strength	82 ksi, 565 MPa
Elongation in 2”	24%

CLASSIFICATIONS AND APPROVALS

- Seismic Certified “D”
- AWS A5.20: E71T-8
- ASME SFA 5.20
- CERTIFIED BY C.W.B.- CSA W48
- A.B.S.- 3SA,3YSA(H10)
- D.N.V.- III YMS(H10)
- L.R.- 3S,3YS(H10)
- B.V.- S3YM(HH)
- TUV
- GL
- DEUTSCHE BAHN

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
	30 ft-lb, 41 J
Testing Temperature 40°F (4°C)	
	65 ft-lb, 85 J

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

C	0.17%
Mn	0.5%
Si	0.1%
P	0.010%
S	0.003%
Al	0.5%

INDUSTRIES

- Mobile Machinery
- Bridge Construction
- Civil Construction
- Shipbuilding
- General Fabrication

CORESHIELD 8 continued

DEPOSITION TABLE -						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
1/16 (1.6)	155	21	150 (381)	4.16 (1.9)	78.6	1/2 (12.7)
	180	22	185 (470)	5.14 (2.3)	79.6	1/2 (12.7)
	205	24	240 (610)	6.60 (3.0)	78.2	1/2 (12.7)
	220	25	275 (698)	7.53 (3.4)	78.9	1/2 (12.7)
0.072 (1.8)	200	21	160 (406)	6.13 (2.8)	79.4	1/2 (12.7)
	225	21	190 (483)	7.32 (3.3)	80.3	1/2 (12.7)
5/64 (2.0)	150	21	90 (229)	3.96 (1.8)	80.6	3/4 (19)
	175	22	110 (279)	4.83 (2.2)	80.9	3/4 (19)
	200	23	135 (343)	5.93 (2.7)	80.4	3/4 (19)

FULL RANGE WELDING PARAMETERS							
1/16”				.072”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
125	18.0	160	1/2-3/4	100	18.0	160	3/4-1
150	19.0	180	1/2-3/4	130	19.0	205	3/4-1
185	19.0	200	1/2-3/4	160	20.0	230	3/4-1
240	20.0	230	1/2-3/4	190	21.0	260	3/4-1
275	22.0	250	1/2-3/4	220	22.0	275	3/4-1

CORESHIELD 8 continued

FULL RANGE WELDING PARAMETERS			
5/64”			
WFS	Volts	Amps	Tip to Work
90	18.0	170	3/4-1
110	19.0	190	3/4-1
135	20.0	220	3/4-1
150	21.0	250	3/4-1
175	22.0	275	3/4-1
200	23.0	285	3/4-1

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242206126	CS 8 1/16X20#AWS	662303081539
242206357	CS 8 1/16X25#AWS	662303053420
242206399	CS 8 1/16X25#AWS VP	662303070106
242206258	CS 8 1/16X50#CL	662303042707
242206134	CS 8 072X20#AWS	662303081546
242206365	CS 8 072X25#AWS	662303053437
242206423	CS 8 072X25#AWS VP	662303070120
242206266	CS 8 072X50#CL	662303053215
242206142	CS 8 5/64X20#AWS	662303081553
242206373	CS 8 5/64X25#AWS	662303053444
242206415	CS 8 5/64X25#AWS VP	662303070113
242206274	CS 8 5/64X50#CL	662303053222

CORESHIELD 8-Ni1 H5 AWS A5.29: E71T-8Ni1J

FEATURES

Coreshield 8-Ni1 H5 is a self-shielded flux cored wire designed to produce welds with low diffusible hydrogen and robust mechanical properties. It is welder friendly and has excellent all-position welding operability. Using DCEN polarity, it produces nice weld beads by either up-hill or down-hill welding to suit for a wider range of WPS requirements. Coreshield 8-Ni1 H5 is especially suited for making root passes or handling poor fit-up, and it features a diffusible hydrogen content lower than 5.0 ml/100g.

Coreshield 8-Ni1 H5 can be ideally used in critical steel applications, such as offshore TKY joints, pipe structures, bridges, storage tanks and other applications where cold-cracking resistance is preferred.

CLASSIFICATIONS AND APPROVALS

- AWS E71T-8Ni1J
- ASME SFA 5.29
- EN ISO 17632-A-T4241NiYN1H5

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Offshore Oil
- Bridge Construction
- Mobile Machinery
- Civil Construction
- General Fabrication
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

Yield Strength	65 ksi, 447 MPa
Tensile Strength	78 ksi, 536 MPa
Elongation% in 2”	30%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
	110 ft-lbs, 150 J
Testing Temperature -40°F (-40°C)	
	108 ft-lbs, 146 J

WELD METAL ANALYSIS

C	0.03%
Mn	1.4%
Si	0.30%
P	0.01%
S	0.01%
Ni	1.00%
Al	0.80%

CORESHIELD 8-Ni1 H5 continued

DEPOSITION TABLE				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)
1/16 (1.6)	120	19	75 (190.5)	1.82 (0.82)
	150	20	100 (254)	2.81(1.27)
	175	21	125 (317.5)	3.49 (1.58)
	200	22	150 (381)	4.09 (1.86)
	220	23	175 (444.5)	4.79 (2.17)
	245	24	215 (546.1)	5.88 (2.67)
5/64 (2.0)	120	20	50 (127)	1.83 (0.83)
	170	21	75 (190.5)	3.04 (1.38)
	210	23	100 (254)	4.24 (1.92)
	250	24	125 (317.5)	5.19 (2.35)
	280	25	150 (381)	6.23 (2.83)

FULL RANGE WELDING PARAMETERS							
1/16”				5/64”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
75-215	19-24	120-245	3/4-1	50-150	20-25	120-280	3/4-1

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242203107	CS 8-Ni1 H5 1/16X33#AWS VP	662303086114
242203099	CS 8-Ni1 H5 5/64X25#AWS VP	662303085827

CORESHIELD 11 AWS A5.20: E71T-11

FEATURES

Coreshield 11 is an all-position self-shielded flux cored welding wire meeting all requirements for the E71T-11 classification.Coreshield 11 is excellent for use on single or multiple pass lap, fillet and butt welds on mild steels in all welding positions. Limitations do exist for multipass welds in excess of 3/8" (9.5 mm). It produces smooth arc action, full slag coverage, easy slag removal, and low spatter. This product should find excellent acceptance in general purpose mild steel fabrication. In structural fabrication, the product can be used where no seismic requirements are present. Coreshield 11 is run DCEN.

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	63 ksi, 435 MPa
Tensile Strength	90 ksi, 620 MPa
Elongation in 2"	22%

CLASSIFICATIONS AND APPROVALS

- AWS A5.20: E71T-11
- ASME SFA 5.20
- Certified by CWB to CSA W48
- A.B.S.- AWS A5.20: E71T-11

WELD METAL ANALYSIS

C	0.25%
Mn	0.7%
Si	0.4%
P	0.01%
S	0.01%
Al	1.6%

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Civil Construction
- General Fabrication
- Automotive

CORESHIELD 11 continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	80	15	81 (206)	.9 (.41)	75	3/8 (9.5)
	120	17	155 (394)	1.7 (.77)	77	3/8 (9.5)
	200	17	392 (995)	4.5 (2.04)	81	3/8 (9.5)
.045 (1.2)	95	15	54 (137)	.9 (.41)	74	1/2 (12.5)
	150	17	118 (300)	2.1 (.95)	79	1/2 (12.5)
	225	18	140 (356)	2.6 (1.18)	82	1/2 (12.5)
1/16 (1.6)	160	17	56 (142)	2.1 (.95)	78	5/8 (16)
	200	18	76 (193)	2.9 (1.32)	80	5/8 (16)
	275	19	132 (335)	5.2 (2.35)	81	5/8 (16)
5/64 (2.0)	185	19	50 (127)	2.4 (1.09)	77	1 (25)
	250	20	91(231)	4.5 (2.04)	79	1 (25)
	300	21	135 (343)	6.6 (2.99)	81	1 (25)

FULL RANGE WELDING PARAMETERS							
.030”				.035”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
69	15.0	40	3/8	81	15.0	80	3/8
175	16.0	100	3/8	155	17.0	120	3/8
440	16.0	160	3/8	392	17.0	200	3/8

FULL RANGE WELDING PARAMETERS							
.045”				1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
54	15.0	95	1/2	56	17.0	160	5/8
118	17.0	150	1/2	76	18.0	200	5/8
140	18.0	225	1/2	132	19.0	275	5/8

CORESHIELD 11 continued

FULL RANGE WELDING PARAMETERS			
5/64”			
WFS	Volts	Amps	Tip to Work in
50	19.0	185	1
91	20.0	250	1
135	21.0	300	1

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242203511	CS 11 035X10#PSP	662303001421
242203503	CS 11 035X33#PSP	662303001414
242201440	CS 11 045X10#PSP	662303000431
242201408	CS 11 045X33#AWS	662303000400
242201465	CS 11 1/16X10#PSP	662303000448
242201424	CS 11 1/16X33#AWS	662303000424
242201416	CS 11 5/64X25#AWS	662303000417

CORESHIELD 15 AWS A5.20: E71T-14

FEATURES

Coreshield 15 is an all-position self-shielded flux cored welding wire for single pass applications. Coreshield 15 produces smooth arc action, full slag coverage, easy slag removal, and low spatter. The use of DCEN (electrode negative) current minimizes the risk of burn-through. Coreshield 15 is excellent for use on lap and fillet welds on thin gauge galvanized and mild steels in all welding positions. The availability of .030" (0.8 mm) diameter makes it possible to use this product on materials as thin as 18 gauge (1.2 mm). The wire is particularly suitable for thin gauge materials 0.030 - 3/16" (0.8-5.0 in.) in galvanised, zinc-aluminum carbon, or aluminised carbon steels. In structural fabrications, the product can be used where no seismic requirements are present.

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.20: E71T-14

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Civil Construction
- Automotive
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded	
Transverse Tensile Strength	
	89 ksi, 615 MPa
Longitudinal Guided Bend Test	
	Satisfactory

WELD METAL ANALYSIS

C	0.23%
Mn	0.7%
Si	0.4%
P	0.007%
S	0.01%
Al	2%

CORESHIELD 15 continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	80	15	81 (206)	.9 (.41)	75	3/8 (9.5)
	120	17	155 (394)	1.7 (.77)	77	3/8 (9.5)
	200	17	392 (995)	4.5 (2.04)	81	3/8 (9.5)
.045 (1.2)	95	15	54 (137)	.9 (.41)	74	1/2 (12.5)
	150	17	118 (300)	2.1 (.95)	79	1/2 (12.5)
	225	18	140 (356)	2.6 (1.18)	82	1/2 (12.5)
1/16 (1.6)	160	17	56 (142)	2.1 (.95)	78	5/8 (16)
	200	18	76 (193)	2.9 (1.32)	80	5/8 (16)
	275	19	132 (335)	5.2 (2.35)	81	5/8 (16)

FULL RANGE WELDING PARAMETERS							
0.30”				0.35”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
69	15.0	40	3/8	81	15.0	80	3/8
175	16.0	100	3/8	155	17.0	120	3/8
440	16.0	160	3/8	392	17.0	200	3/8

FULL RANGE WELDING PARAMETERS							
0.45”				1/16”			
WFS ipm	Volts	Amps	Tip to Work in	WFS ipm	Volts	Amps	Tip to Work in
54	15.0	95	1/2	56	17.0	160	5/8
118	17.0	150	1/2	76	18.0	200	5/8
140	18.0	225	1/2	132	19.0	275	5/8

CORESHIELD 15 continued

FULL RANGE WELDING PARAMETERS			
5/64”			
WFS ipm	Volts	Amps	Tip to Work in
50	19.0	185	1
91	20.0	250	1
135	21.0	300	1

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242201812	CS 15 030X10#PSP	662303000745
242201648	CS 15 035X10#PSP	662303000592
242201606	CS 15 035X33#AWS	662303000554
242201655	CS 15 045X10#PSP	662303000608
242201614	CS 15 045X33#AWS	662303000561
242203644	CS 15 045X600#OMP	662303079338
242203651	CS 15 052X600#OMP	662303079345
242201630	CS 15 1/16X33#AWS	662303000585
242203669	CS 15 1/16X600#OMP	662303079352

CORESHIELD 6 AWS A5.20: E70T-6

FEATURES

Coreshield 6 is a high productivity, high deposition gasless flux cored wire. This self-shielded wire is ideal for single or multiple pass weld applications in addition to providing high deposition rates, low spatter, and good penetration. Because of its stiffer weld puddle, Coreshield 6 offers exceptional multi-pass weld stacking characteristics, produces excellent bead appearance and X-ray quality weld deposits.

Coreshield 6 is run DCEP (electrode positive).

CLASSIFICATIONS AND APPROVALS

- Seismic Certified “D”
- SFA/AWS A5.20: E70T-6

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Shipbuilding
- Bridge Construction

TYPICAL MECHANICAL PROPERTIES

As Welded	
Yield Strength	67 ksi, 465 MPa
Tensile Strength	85 ksi, 590 MPa
Elongation in 2”	26%

CHARPY V-NOTCH PROPERTIES

Testing Temperature -20°F (-29°C)	
	31 ft-lb, 42 J

WELD METAL ANALYSIS

C	0.12%
Mn	0.8%
Si	0.2%
P	0.005%
S	0.008%
Ni	0.4%
Al	0.7%

CORESHIELD 6 continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
5/64 (2.0)	275	22	150 (381)	6.4 (2.9)	78.1	1 (25.4)
	325	23	200 (508)	8.5 (3.8)	79.6	1 (25.4)
	390	24	300 (762)	12.2 (5.5)	80.2	1 (25.4)
	475	27	400 (1016)	16.3 (7.3)	80.3	1 (25.4)
	535	29	500 (1270)	20.7 (9.3)	81.2	1 (25.4)
	600	31	600 (1524)	25.7 (11.5)	81.7	1 (25.4)
3/32 (2.4)	265	22	100 (254)	6.1 (2.9)	78.7	1 (25.4)
	365	23	150 (381)	9.3 (4.2)	79.8	1 (25.4)
	415	23	200 (508)	12.5 (5.6)	80.9	1 (25.4)
	530	26	300 (762)	19.0 (8.5)	81.8	1 (25.4)
	615	29	400 (1016)	25.8 (11.6)	81.8	1 (25.4)

FULL RANGE WELDING PARAMETERS			
3/32”			
WFS ipm	Volts	Amps	Tip to Work in
100-400	21-29	235-530	1 1/2

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
242207504	CS 6 5/64X25#AWS	662303067670
242207512	CS 6 5/64X50#CL	662303067687
242207538	CS 6 3/32X25#AWS	662303070205
242207520	CS 6 3/32X50#CL	662303067694

SHIELD-BRIGHT 308L AWS A5.22:E308LT1-1/T1-4

FEATURES

Shield-Bright 308L was developed for welding type 304L stainless steel and can also be used for welding types 301, 302, and 304 steels. It may also be used for welding types 321 and 347 if the service conditions do not exceed an approximate of 750°F (399°C).

Shield-Bright 308L was designed for welding in all position and performs particularly well in the vertical position with excellent slag removal.

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 6
- MIL-STD-1689 APPLICATIONS-NAVY
- ASME II SFA 5.22: E308LT1-1/T1-4
- TUV
- CERTIFIED by CWB - AWS A5.22
- ABS - AWS A5.22: E308LT1-1

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Shipbuilding
- Process
- Pipeline

TYPICAL MECHANICAL PROPERTIES

As Welded using 75% Ar - 25% CO_2	
Tensile Strength	85 ksi, 580 MPa
Yield Strength	60 ksi, 410 MPa
Elongation in 2”	44%

WELD METAL ANALYSIS

100% CO_2	
C	0.03%
Mn	1.2%
Si	0.8%
Cr	19%
Ni	10%
Mo	0.1%
Cu	0.15%
Ferrite	7 FN
75% Ar / 25% CO_2	
C	0.03%
Mn	1.2%
Si	0.9%
Cr	19%
Ni	10%
Mo	0.1%
Cu	0.15%
Ferrite	7 FN

SHIELD-BRIGHT 308L continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9	1/2 - 1 (12.5 - 25.4)
	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84	1/2 - 1 (12.5 - 25.4)
	165	26	341 (8.7)	6.14 (2.8)	83	1/2 - 1 (12.5 - 25.4)
	190	28	445 (11.3)	8.08 (3.7)	84	1/2 - 1 (12.5 - 25.4)
	220	30	567 (14.4)	10.24 (4.6)	84	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83	1/2 - 1 (12.5 - 25.4)
	210	27	193 (4.9)	6.89 (3.1)	82.5	1/2 - 1 (12.5 - 25.4)
	250	28	243 (6.2)	8.57 (3.9)	83	1/2 - 1 (12.5 - 25.4)
	300	29	321 (8.2)	11.43 (5.2)	83	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201801	SB 308L 035X15#PSP VP/60CT	662303082215
252200423	SB 308L 035X33#PSP VP	662303007720
252200100	SB 308L 045X15#PSP VP/60CT	662303044473
252200027	SB 308L 045X33# BAWS VP	662303087005
252200050	SB 308L 045X33#PSP VP	662303007515
252200019	SB 308L 1/16X33# BAWS VP	662303087012
252200043	SB 308L 1/16X33#PSP VP	662303007508

CRYO-SHIELD 308L AWS A5.22: E308LT1-1/T1-4

FEATURES

Cryo-Shield 308L is an all-position wire adaptable to a variety of shop and field erection applications. The use of argon/CO_2 gas shielding is recommended for maximum toughness. Designed for cryogenic applications where good weld metal toughness is required. Applications include cryogenic vessel fabrication and process piping repair. Cyro-Shield 308L is guaranteed to produce a minimum of 15mils lateral expansion at -320°F.

Cryo-Shield 308L was developed for the welding of types 304 & 304L stainless steels for the low temperature service, even down to liquid helium temperatures. This is done by controlling the composition and the ferrite content to give good toughness at temperatures of -320°F (-196°C) and lower.

Cryo-Shield 308L was developed for welding in all positions and performs particularly well in the vertical position with excellent slag removal.

TYPICAL MECHANICAL PROPERTIES

As Welded using 75% Ar - 25% CO_2	
Tensile Strength	80 ksi, 550 MPa
Yield Strength	65 ksi, 450 MPa
Elongation in 2”	45%

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.03%
Mn	1.3%
Si	0.8%
Cr	19%
Ni	10.7%
Mo	0.1%
Cu	0.15%
Ferrite	4% FN

CLASSIFICATIONS AND APPROVALS

- AWS A5.22: E308LT1-1/T1-4
- ASME II SFA 5.22 E308LT1-1/T1-4
- ASME IX F No. 6

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Petrochemical
- Process
- General Fabrication
- Pipeline

CRYO-SHIELD 308L continued

DEPOSITION TABLE					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9
	120	23	315 (8)	3.4 (1.5)	81.4
	140	25	405 (10.3)	4.6 (2.1)	82.6
	170	26	530 (13.5)	5.7 (2.6)	81.8
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84.0
	165	26	341 (8.7)	6.14 (2.8)	83.0
	190	28	445 (11.3)	8.08 (3.7)	84.0
	220	30	567 (14.4)	10.24 (4.6)	84.0
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83.0
	210	27	193 (4.9)	6.89 (3.1)	82.5
	250	28	243 (6.2)	8.57 (3.9)	83.0
	300	29	321 (8.2)	11.43 (5.2)	83.0

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252210026	CRYO-SH 308L 035X33#PSP VP	662303036140
252210000	CRYO-SH 308L 045X33#PSP VP	662303034832

SHIELD-BRIGHT 308H AWS A5.22: E308HT1-1/T1-4

FEATURES

Shield-Bright 308H was developed for welding Type 304H stainless steel and can also be used for welding Type 301, 302, and 304 steels. It contains a higher carbon level than 308L filler metals to give greater high temperature strength. The ferrite content is also lower for high temperature service. It has greater ductility than 347 types at high temperatures and for that reason it is sometimes used to weld Types 321 and 347 for service above 750°F(399°C) coupled with high stress.

Shield-Bright 308H was designed for welding in all positions and performs particularly well in the vertical position with excellent slag removal.

TYPICAL MECHANICAL PROPERTIES

As Welded using 75% Ar - 25% CO_2	
Tensile Strength	87 ksi, 600 MPa
Yield Strength	62 ksi, 430 MPa
Elongation in 2”	42%

CLASSIFICATIONS AND APPROVALS

- AWS A5.22: E308HT1-1/T1-4
- ASME II SFA 5.22 E308HT1-1/T1-4
- ASME IX F No. 6

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Power Generation
- Petrochemical
- General Fabrication

WELD METAL ANALYSIS

100% CO_2	
C	0.06%
Mn	1.1%
Si	0.7%
Cr	19.5%
Ni	9.7%
Mo	0.1%
Cu	0.15%
Ferrite	5 FN
75% Ar / 25% CO_2	
C	0.06%
Mn	1.1%
Si	0.8%
Cr	19.5%
Ni	9.8%
Mo	0.1%
Cu	0.15%
Ferrite	5 FN

SHIELD-BRIGHT 308H continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9	1/2 - 1 (12.5 - 25.4)
	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84	1/2 - 1 (12.5 - 25.4)
	165	26	341 (8.7)	6.14 (2.8)	83	1/2 - 1 (12.5 - 25.4)
	190	28	445 (11.3)	8.08 (3.7)	84	1/2 - 1 (12.5 - 25.4)
	220	30	567 (14.4)	10.24 (4.6)	84	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83	1/2 - 1 (12.5 - 25.4)
	210	27	193 (4.9)	6.89 (3.1)	82.5	1/2 - 1 (12.5 - 25.4)
	250	28	243 (6.2)	8.57 (3.9)	83	1/2 - 1 (12.5 - 25.4)
	300	29	321 (8.2)	11.43 (5.2)	83	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201058	SB 308H 045X33#PSP VP	662303008192
252201066	SB 308H 1/16X33#PSP VP	662303008208

SHIELD-BRIGHT 309L AWS A5.22:E309T1-1/T1-4

FEATURES

Shield-Bright 309L was developed for welding stainless steel to carbon or low alloy steels and for the first layer cladding of carbon and low alloy steels. It was designed for welding in all positions and performs particularly well in the vertical position with excellent slag removal.

For joining thick sections, it is perferred the non-stainless steel be buttered with a layer of Shield-Bright 309L and the joint completed with Shield-Bright 316L or 308L. The service temperature should not exceed approximately 750°F (399°C).

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Tensile Strength	87 ksi, 600 MPa
Yield Strength	70 ksi, 480 MPa
Elongation in 2”	35%

CLASSIFICATIONS AND APPROVALS

- ASME II SFA 5.22 E309LT1-1/T1-4
- ASME IX F No. 6
- G.L.- AWS A5.22: E309LT1-4
- MIL-STD-1689 APPLICATIONS-NAVY
- TUV
- CERTIFIED BY C.W.B.- AWS A5.22
- ABS-AWS A5.22: E309LT1-1
- AWS A5.22: E309LT1-1/T1-4

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Process
- Mobile Machinery
- General Fabrication
- Shipbuilding

WELD METAL ANALYSIS

CO_2	
C	0.03%
Mn	1.2%
Si	0.9%
Cr	23.5%
Ni	12.5%
Mo	0.1%
Cu	0.1%
Ferrite	16 FN
75% Ar / 25% CO_2	
C	0.03%
Mn	1.3%
Si	0.9%
Cr	24%
Ni	12.5%
Mo	0.1%
Cu	0.1%
Ferrite	18 FN

SHIELD-BRIGHT 309L continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9	1/2 - 1 (12.5 - 25.4)
	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84	1/2 - 1 (12.5 - 25.4)
	165	26	341 (8.7)	6.14 (2.8)	83	1/2 - 1 (12.5 - 25.4)
	190	28	445 (11.3)	8.08 (3.7)	84	1/2 - 1 (12.5 - 25.4)
	220	30	567 (14.4)	10.24 (4.6)	84	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83	1/2 - 1 (12.5 - 25.4)
	210	27	193 (4.9)	6.89 (3.1)	82.5	1/2 - 1 (12.5 - 25.4)
	250	28	243 (6.2)	8.57 (3.9)	83	1/2 - 1 (12.5 - 25.4)
	300	29	321 (8.2)	11.43 (5.2)	83	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201819	SB 309L 035X15#PSP VP/60CT	662303082222
252200415	SB 309L 035X33#PSP VP	662303007713
252200258	SB 309L 045X15#PSP VP/60CT	662303007638
252200068	SB 309L 045X33#PSP VP	662303007522
252200076	SB 309L 1/16X33#PSP VP	662303007539
252200126	SB 309L 1/16X50#CL	662303007560

SHIELD-BRIGHT 309LMo AWS A5.22: E309LMoT1-1/T1-4

FEATURES

Shield-Bright 309LMo was designed for welding type 316 clad steels on the first pass in cladding steels or for welding dissimilar metals such as molybdenum-containing austenitic stainless steels to carbon steels. It is used in paper mills and in power plants to give greater corrosion resistance. This wire performs best when used out-of-position shielded with either Argon/C0[2] or 100% C0[2].

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Tensile Strength	90 ksi, 620 MPa
Yield Strength	70 ksi, 480 MPa
Elongation in 2”	30%

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 6
- AWS A5.22: E309LMoT1-1/T1-4
- ASME II SFA 5.22: E309LMoT1-1/T1-4

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- General Fabrication
- Pulp and Paper
- Process

WELD METAL ANALYSIS

CO_2	
C	0.03%
Mn	1.0%
Si	0.6%
Cr	23%
Ni	13.5%
Mo	2.5%
Cu	0.1%
Ferrite	19 FN
75% Ar / 25% CO_2	
C	0.03%
Mn	1.2%
Si	0.75%
Cr	23.5%
Ni	13.5%
Mo	2.5%
Cu	0.1%
Ferrite	21 FN

SHIELD-BRIGHT 309LMo continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9	1/2 - 1 (12.5 - 25.4)
	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84	1/2 - 1 (12.5 - 25.4)
	165	26	341 (8.7)	6.14 (2.8)	83	1/2 - 1 (12.5 - 25.4)
	190	28	445 (11.3)	8.08 (3.7)	84	1/2 - 1 (12.5 - 25.4)
	220	30	567 (14.4)	10.24 (4.6)	84	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83	1/2 - 1 (12.5 - 25.4)
	210	27	193 (4.9)	6.89 (3.1)	82.5	1/2 - 1 (12.5 - 25.4)
	250	28	243 (6.2)	8.57 (3.9)	83	1/2 - 1 (12.5 - 25.4)
	300	29	321 (8.2)	11.43 (5.2)	83	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252200613	SB 309LMO 035X33#PSP VP	662303007874
252200332	SB 309LMO 045X33#PSP VP	662303007669

SHIELD-BRIGHT 316L AWS A5.22: E316LT-1/T1-4

FEATURES

Shield-Bright 316L was developed for the welding of Type 316L stainless steel but can be used for other stainless steels including Types 316 and 304L. In a few cases, e.g. nitric acid service, Shield-Bright 316L should not be used to weld 304L. It contains molybdenum which resists pitting corrosion induced by sulphuric and sulphurous acids, chlorides and cellulose solutions. Used widely in the rayon, dye and paper making industries.

Shield-Bright 316L was developed for welding in all positions and performs particularly well in the vertical position with excellent slag removal.

CLASSIFICATIONS AND APPROVALS

- ASME II SFA 5.22 E316LT1-1/T1-4
- AWS A5.22: E316LT-1/T14
- ABS - A5.22: E316LT1-1
- ASME IX F No. 6
- MIL-STD-1689 APPLICATIONS-NAVY
- TUV
- CERTIFIED BY C.W.B.- AWS A5.22

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Pipeline
- General Fabrication
- Mobile Machinery
- Shipbuilding
- Process

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Tensile Strength	85 ksi, 580 MPa
Yield Strength	65 ksi, 450 MPa
Elongation in 2”	40%

WELD METAL ANALYSIS

CO_2	
C	0.03%
Mn	1.2%
Si	0.8%
Cr	18.5%
Ni	12%
Mo	2.7%
Cu	0.15%
Ferrite	8 FN
75% Ar / 25% CO_2	
C	0.03%
Mn	1.2%
Si	0.9%
Cr	18.5%
Ni	12%
Mo	2.7%
Cu	0.15%
Ferrite	8 FN

SHIELD-BRIGHT 316L continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9	1/2 - 1 (12.5 - 25.4)
	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84	1/2 - 1 (12.5 - 25.4)
	165	26	341 (8.7)	6.14 (2.8)	83	1/2 - 1 (12.5 - 25.4)
	190	28	445 (11.3)	8.08 (3.7)	84	1/2 - 1 (12.5 - 25.4)
	220	30	567 (14.4)	10.24 (4.6)	84	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83	1/2 - 1 (12.5 - 25.4)
	210	27	193 (4.9)	6.89 (3.1)	82.5	1/2 - 1 (12.5 - 25.4)
	250	28	243 (6.2)	8.57 (3.9)	83	1/2 - 1 (12.5 - 25.4)
	300	29	321 (8.2)	11.43 (5.2)	83	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201827	SB 316L 035X15#PSP VP/60CT	662303082239
252200456	SB 316L 035X33#PSP VP	662303007751
252201108	SB 316L 045X15#PSP VP/60CT	662303008239
252200092	SB 316L 045X33#PSP VP	662303007553
252200084	SB 316L 1/16X33#PSP VP	662303007546

SHIELD-BRIGHT 317L AWS A5.22: E317LT1-1/T1-4

FEATURES

Shield-Bright 317L is recommended for welding Type 317 and 317L stainless steel. It can also be used for Type 316L where additonal weld metal corrosion resistance, including pitting resistance, is required.This is used in industries where there is severe corrosion applications involving sulfuric and sulfurous acids and their salts.

Shield-Bright 317L was developed for welding in all position.

TYPICAL MECHANICAL PROPERTIES

As Welded using 75% Ar - 25% CO_2	
Tensile Strength	70 ksi, 480 MPa
Yield Strength	90 ksi, 620 MPa
Elongation in 2”	35%

CLASSIFICATIONS AND APPROVALS

- AWS A5.22: E317LT1-1/T1-4
- ASME II SFA 5.22 E317LT1-1/LT1-4
- ASME IX F No. 6

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.03%
Mn	1.2%
Si	0.85%
Cr	19.5%
Ni	13%
Mo	3.5%
Cu	0.15%
Ferrite	9 FN

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Pulp and Paper
- Shipbuilding
- Process
- General Fabrication

SHIELD-BRIGHT 317L continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9	1/2 - 1 (12.5 - 25.4)
	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84	1/2 - 1 (12.5 - 25.4)
	165	26	341 (8.7)	6.14 (2.8)	83	1/2 - 1 (12.5 - 25.4)
	190	28	445 (11.3)	8.08 (3.7)	84	1/2 - 1 (12.5 - 25.4)
	220	30	567 (14.4)	10.24 (4.6)	84	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83	1/2 - 1 (12.5 - 25.4)
	210	27	193 (4.9)	6.89 (3.1)	82.5	1/2 - 1 (12.5 - 25.4)
	250	28	243 (6.2)	8.57 (3.9)	83	1/2 - 1 (12.5 - 25.4)
	300	29	321 (8.2)	11.43 (5.2)	83	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252200159	SB 317L 045X33#PSP VP	662303007584

SHIELD-BRIGHT 347 AWS A5.22: E347T1-1/T1-4

FEATURES

Shield-Bright 347 was developed for the welding of stainless steel Types 321 and 347. As with all 347 weld metals, for service at temperatures greater than 1000°F (540°C) it can be used in circumstances of lower stress and not under creep conditions. Shield-Bright 347 can also be used for the welding of Types 302, 304 and sometimes 304L stainless steels. Shield-Bright 347 was developed for welding in all positions and performs particularly well in the vertical position with excellent slag removal.

CLASSIFICATIONS AND APPROVALS

- AWS A5.22: E347T1-1/T1-4
- ASME II SFA 5.22 E347T1-1/T1-4
- ASME IX F No. 6

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Process
- Shipbuilding
- Petrochemical
- General Fabrication
- Pipeline

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Tensile Strength	95 ksi, 650 MPa
Yield Strength	75 ksi, 520 MPa
Elongation in 2”	35%

WELD METAL ANALYSIS

CO_2	
C	0.03%
Mn	1.2%
Si	0.8%
Cr	19%
Ni	10%
Mo	0.1%
Cu	0.1%
Nb	0.45%
Ferrite	6 FN
75% Ar / 25% CO_2	
C	0.03%
Mn	1.2%
Si	0.9%
Cr	19.5%
Ni	10%
Mo	0.1%
Cu	0.1%
Nb	0.45%
Ferrite	7 FN

SHIELD-BRIGHT 347 continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9	1/2 - 1 (12.5 - 25.4)
	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84	1/2 - 1 (12.5 - 25.4)
	165	26	341 (8.7)	6.14 (2.8)	83	1/2 - 1 (12.5 - 25.4)
	190	28	445 (11.3)	8.08 (3.7)	84	1/2 - 1 (12.5 - 25.4)
	220	30	567 (14.4)	10.24 (4.6)	84	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83	1/2 - 1 (12.5 - 25.4)
	210	27	193 (4.9)	6.89 (3.1)	82.5	1/2 - 1 (12.5 - 25.4)
	250	28	243 (6.2)	8.57 (3.9)	83	1/2 - 1 (12.5 - 25.4)
	300	29	321 (8.2)	11.43 (5.2)	83	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201264	SB 347 035X10#PSP VP/60CT	662303031701
252201074	SB 347 035X33#PSP VP	662303008215
252201272	SB 347 045X10#PSP VP/60CT	662303034535
252200514	SB 347 045X33#PSP VP	662303007782
252200811	SB 347 1/16X33#PSP VP	662303008048

Shield-Bright 410 NiMo AWS A5.22: E410NiMoT1-1/T1-4

FEATURES

Shield-Bright 410NiMo is an all-positional gas shielded flux cored wire for fabrication and repair of hydroelectric turbine “runners” and other similar applications. Its spray-like transfer enhances the arc characteristics while minimizing post-weld clean up and rework.

The ease of use and “user-friendly” characteristics minimize training while producing consistent quality welds. The self-peeling slag removal and easy post-weld clean up minimize the cost to deposit while improving performance efficiency. This electrode is designed for use with Argon/CO_2 shielding gas (75 to 80% Argon, balance CO_2).

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Tensile Strength	134 ksi, 927 MPa
Yield Strength	111 ksi, 767 MPa
Elongation in 2”	17%

CLASSIFICATIONS AND APPROVALS

- AWS A5.22: E410NiMoT1-1/T1-4
- ASME SFA A5.22 E410NiMoT1-1/T1-4

WELDING PROCESS

- FCAW (Flux Core)

WELD METAL ANALYSIS

C	0.027%
Mn	0.5%
Si	0.7%
P	0.007%
S	0.013%
Cr	11.3%
Ni	4.1%
Mo	0.5%
Cu	0.03%

INDUSTRIES

- Power Generation

Shield-Bright 410 NiMo continued

DEPOSITION TABLE				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Electrical Stickout in (mm)
.045 (1.2)	140-315	23-30	180-600 (5-15)	5/8 (10)
1/16 (1.6)	175-440	23-31	125-500 (3-13)	5/8 (10)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252203211	SB 410NIMO 045X33#AWS VP	662303083083
252203229	SB 410NIMO 1/16X33#AWS VP	662303083090

SHIELD-BRIGHT 2209 AWS A5.22: E2209T1-4

FEATURES

Shield-Bright 2209 was developed for the welding of '2205' duplex stainless steels e.g. UNS S31803, S32205, and J92205. It can also be used for the welding of leaner grades of duplex stainless steels. It has been approved with a 25°C critical pitting temperature and impact toughness at -40°F (-40°C). Shield-Bright 2209 was developed for welding in all positions and performs particularly well in the vertical position with excellent slag removal.

CLASSIFICATIONS AND APPROVALS

- AWS A5.22: E2209T1-4
- ASME II SFA 5.22 E2209T1-4
- ASME IX F No. 6
- D.N.V.- For Duplex S/S
- L.R.- S 31803 S
- A.B.S.- AWS A5.22: E2209T1-4
- TUV

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Pipeline
- Process
- Pulp and Paper
- Petrochemical

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Stress	95 ksi, 650 MPa
Tensile Strength	120 ksi, 820 MPa
Elongation in 2"	25%

CHARPY V-NOTCH PROPERTIES

As Welded 75% Ar / 25% CO_2
Absorbed Energy @ -4°F (-20°C)
45 ft-lb, 61 J
Absorbed Energy @ -40°F (-40°C)
40 ft-lb, 54 J
Absorbed Energy @ -60°F (-51°C)
35 ft-lb, 47 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.03%
Mn	0.9%
Si	0.35%
Cr	22.5%
Ni	9.2%
Mo	3%
Cu	0.1%
N	0.16%
Ferrite	35 FN

SHIELD-BRIGHT 2209 continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9	1/2 - 1 (12.5 - 25.4)
	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84	1/2 - 1 (12.5 - 25.4)
	165	26	341 (8.7)	6.14 (2.8)	83	1/2 - 1 (12.5 - 25.4)
	190	28	445 (11.3)	8.08 (3.7)	84	1/2 - 1 (12.5 - 25.4)
	220	30	567 (14.4)	10.24 (4.6)	84	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83	1/2 - 1 (12.5 - 25.4)
	210	27	193 (4.9)	6.89 (3.1)	82.5	1/2 - 1 (12.5 - 25.4)
	250	28	243 (6.2)	8.57 (3.9)	83	1/2 - 1 (12.5 - 25.4)
	300	29	321 (8.2)	11.43 (5.2)	83	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201512	SB 2209 035X33#PSP VP	662303037888
252201884	SB 2209 045X15# PSP VP/60CT	662303086961
252201504	SB 2209 045X33#PSP VP	662303037871
252201496	SB 2209 1/16X33#PSP VP	662303037864

SHIELD-BRIGHT 2594 AWS A5.22: E2594T1-4

FEATURES

Shield-Bright 2594, a “super duplex” stainless cored wire, was developed with a nominal composition of 25% Cr, 9% Ni, 4% Mo, and 0.25% N. Shield-Bright 2594 is usable for UNS S32750 (SAF 2507 and URN47N+2), S32760 (Zeron 100 & FAC100) and J9338380 (cast Zeron 100) and similar compositions. It is also suitable for the welding of Ferralium® UNS S32550 and CD-4MCu except for applications where sulfuric or sulfurous acids are present, such as scrubbers for power plants.

Shield-Bright 2594 was developed for welding in all positions and performs particularly well in the vertical position with excellent slag removal.

CLASSIFICATIONS AND APPROVALS

- AWS A5.22: E2594T1-4
- ASME IX F No. 6

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Chemical Processing
- Offshore Oil
- Petrochemical
- Process
- Pipeline
- Pulp and Paper

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Yield Stress	100 ksi, 690 MPa
Tensile Strength	130 ksi, 900 MPa
Elongation in 2”	28%

CHARPY V-NOTCH PROPERTIES

As Welded 75% Ar / 25% CO_2
Absorbed Energy @ -40°F (-40°C)
27 ft-lb, 37 J
Absorbed Energy @ -20°F (-29°C)
32 ft-lb, 43 J

WELD METAL ANALYSIS

75% Ar / 25% CO_2	
C	0.03%
Mn	0.9%
Si	0.6%
Cr	25%
Ni	9.7%
Mo	4%
Cu	0.1%
N	0.25%
Ferrite	45 FN

SHIELD-BRIGHT 2594 continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	100	23	265 (6.7)	2.9 (1.3)	83.9	1/2 - 1 (12.5 - 25.4)
	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	130	25	227 (5.8)	4.25 (1.9)	84	1/2 - 1 (12.5 - 25.4)
	165	26	341 (8.7)	6.14 (2.8)	83	1/2 - 1 (12.5 - 25.4)
	190	28	445 (11.3)	8.08 (3.7)	84	1/2 - 1 (12.5 - 25.4)
	220	30	567 (14.4)	10.24 (4.6)	84	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	170	25	154 (3.9)	5.34 (2.4)	83	1/2 - 1 (12.5 - 25.4)
	210	27	193 (4.9)	6.89 (3.1)	82.5	1/2 - 1 (12.5 - 25.4)
	250	28	243 (6.2)	8.57 (3.9)	83	1/2 - 1 (12.5 - 25.4)
	300	29	321 (8.2)	11.43 (5.2)	83	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201512	SB 2594 045X33# BAWS FP	662303072063

SHIELD-BRIGHT 308L X-tra AWS A5.22: E308LTO-1/T0-4

FEATURES

Shield-Bright 308L X-tra was designed for welding type 304L stainless steel but can be used for types 301, 302,and 304 steels. It may also be used successfully for welding of types 321 and 347 stainless steel. Service conditions should not exceed an approximate of 750°F (399°C).

Shield-Bright 308L X-tra was designed for welding in the flat position and for horizontal fillet welds with flat to concave beads with excellent slag removal.

TYPICAL MECHANICAL PROPERTIES

As Welded using 75% Ar - 25% CO_2	
Tensile Strength	85 ksi, 580 MPa
Yield Strength	60 ksi, 410 MPa
Elongation in 2”	40%

CLASSIFICATIONS AND APPROVALS

- ABS - AWS A5.22: E308LTO-1/T0-4
- ASME II SFA 5.22 E308LT0-1/T0-4
- ASME IX F No. 6
- Certified by CWB to AWS
- MIL-STD-1689 APPLICATIONS-NAVY
- TUV

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Shipbuilding
- General Fabrication
- Mobile Machinery
- Process
- Pipeline

WELD METAL ANALYSIS

100% CO_2	
C	0.025%
Mn	1.3%
Si	0.9%
Cr	19.5%
Ni	9.8%
Mo	0.1%
Cu	0.15%
Ferrite	8 FN
75% Ar / 25% CO_2	
C	0.022%
Mn	1.4%
Si	0.9%
Cr	19.6%
Ni	9.9%
Mo	0.1%
Cu	0.15%
Ferrite	8 FN

SHIELD-BRIGHT 308L X-tra continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	150	25	259 (6.6)	5 (2.3)	83.9	1/2 - 1 (12.5 - 25.4)
	200	29	410 (10.4)	7.7 (3.5)	84.2	1/2 - 1 (12.5 - 25.4)
	300	33	860 (21.9)	16.9 (7.7)	87	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	200	25	172 (4.4)	6.7 (3.1)	83.6	1/2 - 1 (12.5 - 25.4)
	240	28	225 (5.7)	8.1 (3.7)	83.6	1/2 - 1 (12.5 - 25.4)
	400	33	495 (12.58)	18.9 (8.6)	85.5	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201587	SBX 308 045X33# PSP VP	6623052010
252201629	SBX 308L 045X33#PSP VP	6623052850
252201637	SBX 308L 1/16X33#PSP VP	6623052867

SHIELD-BRIGHT 309L X-tra AWS A5.22: E309LT0-1/T0-4

FEATURES

Shield-Bright 309L X-tra was developed for the welding of stainless steels to carbon or low alloy steels and for the first layer cladding of carbon and low alloy steels. Shield-Bright 309L X-tra was developed for welding in the flat position and for horizontal fillet welds with flat to concave beads with excellent slag removal.

For joining thick sections, it is preferred the non-stainless steel be buttered with a layer of Shield-Bright 309L X-tra and the joint completed with Shield-Bright 316L X-tra or 308L X-tra. The service temperature should not exceed approximately 750°F (399°C).

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Tensile Strength	87 ksi, 600 MPa
Yield Strength	70 ksi, 480 MPa
Elongation in 2”	35%

CLASSIFICATIONS AND APPROVALS

- ABS - AWS A5.22: E309LT0-1
- AWS A5.22: E309LT0-1/T0-4
- ASME II SFA 5.22 E309LT0-1/T0-4
- ASME IX F No. 6
- MIL-STD-1689 APPLICATIONS-NAVY
- TUV
- CERTIFIED BY C.W.B.- AWS A5.22
- D.N.V.- 309L MS

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Shipbuilding
- Process

WELD METAL ANALYSIS

CO_2	
C	0.03%
Mn	1.3%
Si	0.7%
Cr	24%
Ni	12.5%
Mo	0.1%
Cu	0.1%
Ferrite	16 FN
75% Ar / 25% CO_2	
C	0.03%
Mn	1.4%
Si	0.8%
Cr	24.5%
Ni	12.5%
Mo	0.1%
Cu	0.1%
Ferrite	18 FN

SHIELD-BRIGHT 309L X-tra continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	150	25	259 (6.6)	5 (2.3)	83.9	1/2 - 1 (12.5 - 25.4)
	200	29	410 (10.4)	7.7 (3.5)	84.2	1/2 - 1 (12.5 - 25.4)
	300	33	860 (21.9)	16.9 (7.7)	87	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	200	25	172 (4.4)	6.7 (3.1)	83.6	1/2 - 1 (12.5 - 25.4)
	240	28	225 (5.7)	8.1 (3.7)	83.6	1/2 - 1 (12.5 - 25.4)
	400	33	495 (12.58)	18.9 (8.6)	85.5	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201645	SBX 309L 045X33#PSP VP	662303052874
252201652	SBX 309L 1/16X33#PSP VP	662303052881

SHIELD-BRIGHT 309LMo X-tra AWS A5.22: E309LMoT0-1/T0-4

FEATURES

Shield-Bright 309LMo X-tra was developed for the welding of stainless steels to carbon or low alloy steels. For thick sections it is often preferable that the non-stainless steel should be buttered with a layer of Shield-Bright 309L X-tra and the joint made with Shield-Bright 316L X-tra or 308L X-tra. It was also developed for the first layer cladding of carbon and low alloy steels prior to subsequent layers from Shield-Bright 316L X-tra or 317L X-tra.

The service temperature of all the resulting weldments should not exceed about 700°F (370°C). Multiple layer cladding with Shield-Bright 309LMo X-tra can be used for additional corrosion resistance in some applications in the pulp and paper industry. Shield-Bright 309LMo X-tra was developed for welding in the flat position and for horizontal fillet welds with flat to concave beads with excellent slag removal. It can be used with either 75% Ar / 25% CO_2 or 100% CO_2 gases.

* This item is subject to Industry Alloy Surcharges

CLASSIFICATIONS AND APPROVALS

- AWS A5.22: E309LMoT0-1/T0-4
- ASME IX F No. 6
- ASME II SFA 5.22 E309LMoT0-1/T0-4
- AWS A5.22: E309LMoT0-1/T0-4

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Process
- General Fabrication
- Pulp and Paper

TYPICAL MECHANICAL PROPERTIES

As Welded 75% Ar / 25% CO_2	
Tensile Strength	100 ksi, 690 MPa
Yield Strength	80 ksi, 550 MPa
Elongation in 2”	30%

WELD METAL ANALYSIS

CO_2	
C	0.03%
Mn	1.5%
Si	0.5%
Cr	23.5%
Ni	13.5%
Mo	2.5%
Cu	0.1%
Ferrite	19 FN
75% Ar / 25% CO_2	
C	0.03%
Mn	1.6%
Si	0.6%
Cr	23.5%
Ni	13.5%
Mo	2.5%
Cu	0.1%
Ferrite	20 FN

SHIELD-BRIGHT 309LMo X-tra continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	150	25	259 (6.6)	5 (2.3)	83.9	1/2 - 1 (12.5 - 25.4)
	200	29	410 (10.4)	7.7 (3.5)	84.2	1/2 - 1 (12.5 - 25.4)
	300	33	860 (21.9)	16.9 (7.7)	87	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	200	25	172 (4.4)	6.7 (3.1)	83.6	1/2 - 1 (12.5 - 25.4)
	240	28	225 (5.7)	8.1 (3.7)	83.6	1/2 - 1 (12.5 - 25.4)
	400	33	495 (12.58)	18.9 (8.6)	85.5	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252200969	SBX 309LMO 045X33#PSP VP	662303008123

SHIELD-BRIGHT 316L X-tra AWS A5.22: E316LT0-1/T0-4

FEATURES

Shield-Bright 316L X-tra was developed for the welding Type 316L stainless steel and also can be used for the other stainless steels including Types 316 and 304L. In a few cases, e.g. nitric acid service, Shield-Bright 316L X-tra should not be used to weld 304L. It was designed specifically for applications where the service environment can produce pitting corrosion.

Shield-Bright 316L X-tra was developed for welding in the flat position and for horizontal fillet welds with flat to concave beads with excellent slag removal.

CLASSIFICATIONS AND APPROVALS

- ASME II SFA 5.22 E316LT0-1
- AWS A5.22: E316LT0-1/T0-4
- Certified by CWB to AWS
- DEUTSCHE BAHN
- MIL-STD-1689 APPLICATIONS-NAVY
- TUV
- ABS - AWS A5.22: E316LT0-1
- ASME IX F No. 6

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Pulp and Paper
- General Fabrication
- Process
- Shipbuilding

TYPICAL MECHANICAL PROPERTIES

As Welded using 75% Ar - 25% CO_2	
Tensile Strength	65 ksi, 450 MPa
Yield Strength	85 ksi, 580 MPa
Elongation in 2”	36%

WELD METAL ANALYSIS

100% CO_2	
C	0.03%
Mn	1.2%
Si	0.6%
Cr	18.5%
Ni	12%
Mo	2.7%
Cu	0.15%
Ferrite	7 FN
75% Ar / 25% CO_2	
C	0.03%
Mn	1.3%
Si	0.6%
Cr	19%
Ni	12%
Mo	2.7%
Cu	0.15%
Ferrite	8 FN

SHIELD-BRIGHT 316L X-tra continued

DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.035 (0.9)	120	23	315 (8)	3.4 (1.5)	81.4	1/2 - 1 (12.5 - 25.4)
	140	25	405 (10.3)	4.6 (2.1)	82.6	1/2 - 1 (12.5 - 25.4)
	170	26	530 (13.5)	5.7 (2.6)	81.8	1/2 - 1 (12.5 - 25.4)
.045 (1.2)	150	25	259 (6.6)	5 (2.3)	83.9	1/2 - 1 (12.5 - 25.4)
	200	29	410 (10.4)	7.7 (3.5)	84.2	1/2 - 1 (12.5 - 25.4)
	300	33	860 (21.9)	16.9 (7.7)	87	1/2 - 1 (12.5 - 25.4)
1/16 (1.6)	200	25	172 (4.4)	6.7 (3.1)	83.6	1/2 - 1 (12.5 - 25.4)
	240	28	225 (5.7)	8.1 (3.7)	83.6	1/2 - 1 (12.5 - 25.4)
	400	33	495 (12.58)	18.9 (8.6)	85.5	1/2 - 1 (12.5 - 25.4)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
252201660	SBX 316L 045X33#PSP VP	6623.052 898
252201678	SBX 316L 1/16X33#PSP VP	6623.052 904
252201611	SBX 316L 1/16X50#CL	6623.052 102

CORE-BRIGHT 308L AWS A5.22: E308LT0-3

FEATURES

Welds types 301, 302, 304, 304L, 321, and 347 stainless steels and austenitic steels. Used extensively for welding chemical plant equipment.

TYPICAL MECHANICAL PROPERTIES

Yield Strength	62 ksi, 430 MPa
Tensile Strength	90 ksi, 620 MPa
Elongation in 2”	40%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.22
- CERTIFIED BY C.W.B.- AWS A5.22
- AWS A5.22: E308LTO-3

WELD METAL ANALYSIS

C	0.025%
Mn	1.5%
Si	0.6%
Cr	19.9%
Ni	9.9%
Ferrite	9 FN

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Rail Road Car
- Mobile Machinery
- Power Generation
- Petrochemical
- Process
- General Fabrication

CORE-BRIGHT 308L continued

SPRAY TRANSFER DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	110	26	300 (762)	5.8 (2.6)	86	3/4 (19)
	150	27	400 (1016)	8.1 (3.67)	86	3/4 (19)
	180	27	500 (1270)	9.8 (4.45)	87	3/4 (19)
1/16 (1.6)	150	27	200 (508)	6.8 (3.08)	87	3/4 (19)
	210	28	300 (762)	10.3 (4.67)	87	3/4 (19)
	270	29	400 (1016)	13.5 (6.12)	85	3/4 (19)
5/64 (2.0)	210	24	137 (348)	7.1 (3.2)	86	3/4 (19)
	250	26	181 (460)	9.5 (4.3)	87	3/4 (19)
	300	27	236 (599)	12.0 (5.4)	85	3/4 (19)
3/32 (2.4)	250	26	112 (284)	8.4 (3.8)	85	1 (25.4)
	300	28	136 (345)	10.2 (4.6)	85	1 (25.4)
	350	29	184 (467)	13.9 (6.3)	88	1 (25.4)
	400	30	221 (561)	16.2 (7.3)	85	1 (25.4)
	450	30	273 (693)	20.6 (9.3)	85	1 (25.4)
	250	26	133 (338)	10.0 (4.5)	89	1-1/2 (38)
	300	28	178 (402)	13.5 (6.1)	89	1-1/2 (38)
	350	29	227 (577)	17.1 (7.8)	87	1-1/2 (38)
	400	30	302 (767)	22.7 (10.3)	87	1-1/2 (38)
	450	30	343 (871)	25.9 (11.7)	87	1-1/2 (38)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258077155	CB 308L 045X33#PSP VP	662303043391
258077148	CB 308L 1/16X33#PSP VP	662303043384
258076488	CB 308L 5/64X50#CL	662303008710
251923306	CB 308L 3/32X50#CL	662303007454

CORE-BRIGHT 309L AWS A5.22: E309LTO-3

FEATURES

Designed primarily for overlay applications on carbon steel. May also be used for welding 309 stainless and joining dissimilar metals.

TYPICAL MECHANICAL PROPERTIES

Yield Strength	64 ksi, 440 MPa
Tensile Strength	91 ksi, 630 MPa
Elongation in 2”	34%

CLASSIFICATIONS AND APPROVALS

- AWS A5.22: E309LTO-3
- ASME SFA 5.22
- CERTIFIED BY C.W.B.- AWS A5.22

WELD METAL ANALYSIS

C	0.023%
Mn	1.3%
Si	0.6%
Cr	24.0%
Ni	12.8%
Ferrite	13 FN

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Power Generation
- Process
- Mobile Machinery
- General Fabrication
- Rail Road Car

CORE-BRIGHT 309L continued

SPRAY TRANSFER DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	110	26	300 (762)	5.8 (2.6)	86	3/4 (19)
	150	27	400 (1016)	8.1 (3.67)	86	3/4 (19)
	180	27	500 (1270)	9.8 (4.45)	87	3/4 (19)
1/16 (1.6)	150	27	200 (508)	6.8 (3.08)	87	3/4 (19)
	210	28	300 (762)	10.3 (4.67)	87	3/4 (19)
	270	29	400 (1016)	13.5 (6.12)	85	3/4 (19)
5/64 (2.0)	210	24	137 (348)	7.1 (3.2)	86	3/4 (19)
	250	26	181 (460)	9.5 (4.3)	87	3/4 (19)
	300	27	236 (599)	12.0 (5.4)	85	3/4 (19)
3/32 (2.4)	250	26	112 (284)	8.4 (3.8)	85	1 (25.4)
	300	28	136 (345)	10.2 (4.6)	85	1 (25.4)
	350	29	184 (467)	13.9 (6.3)	88	1 (25.4)
	400	30	221 (561)	16.2 (7.3)	85	1 (25.4)
	450	30	273 (693)	20.6 (9.3)	85	1 (25.4)
	250	26	133 (338)	10.0 (4.5)	89	1-1/2 (38)
	300	28	178 (402)	13.5 (6.1)	89	1-1/2 (38)
	350	29	227 (577)	17.1 (7.8)	87	1-1/2 (38)
	400	30	302 (767)	22.7 (10.3)	87	1-1/2 (38)
	450	30	343 (871)	25.9 (11.7)	87	1-1/2 (38)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258077163	CB 309L 045X33#PSP VP	662303054465
258077171	CB 309L 1/16X33#PSP VP	662303054472
258076496	CB 309L 5/64X50#CL	662303008727
251943304	CB 309L 3/32X50#CL	662303007478

CORE-BRIGHT 316L AWS A5.22: E316LT0-3

FEATURES

Welds types 316, 316L and 318 steels. Contain 2-2.5% molybdenum to increase the corrosion resistance to pitting induced by sulfuric and sulfurous acids, sulphites, chloride, and cellulose solutions. Used extensively in the rayon, dye, and paper industries.

TYPICAL MECHANICAL PROPERTIES

Yield Strength	62 ksi, 430 MPa
Tensile Strength	87 ksi, 600 MPa
Elongation in 2”	42%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.22
- CERTIFIED BY C.W.B.- AWS A5.22
- AWS A5.22: E316LTO-3

WELD METAL ANALYSIS

C	0.025%
Mn	1.3%
Si	0.7%
Cr	19.7%
Ni	12.5%
Mo	2.2%
Ferrite	7 FN

WELDING PROCESS

- FCAW (Flux Core)

INDUSTRIES

- Rail Road Car
- Process
- Shipbuilding
- Power Generation
- General Fabrication
- Mobile Machinery

CORE-BRIGHT 316L continued

SPRAY TRANSFER DEPOSITION TABLE						
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %	Electrical Stickout in (mm)
.045 (1.2)	110	26	300 (762)	5.8 (2.6)	86	3/4 (19)
	150	27	400 (1016)	8.1 (3.67)	86	3/4 (19)
	180	27	500 (1270)	9.8 (4.45)	87	3/4 (19)
5/64 (2.0)	210	24	137 (348)	7.1 (3.2)	86	3/4 (19)
	250	26	181 (460)	9.5 (4.3)	87	3/4 (19)
	300	27	236 (599)	12.0 (5.4)	85	3/4 (19)
3/32 (2.4)	250	26	112 (284)	8.4 (3.8)	85	1 (25.4)
	300	28	136 (345)	10.2 (4.6)	85	1 (25.4)
	350	29	184 (467)	13.9 (6.3)	88	1 (25.4)
	400	30	221 (561)	16.2 (7.3)	85	1 (25.4)
	450	30	273 (693)	20.6 (9.3)	85	1 (25.4)
	250	26	133 (338)	10.0 (4.5)	89	1-1/2 (38)
	300	28	178 (402)	13.5 (6.1)	89	1-1/2 (38)
	350	29	227 (577)	17.1 (7.8)	87	1-1/2 (38)
	400	30	302 (767)	22.7 (10.3)	87	1-1/2 (38)
	450	30	343 (871)	25.9 (11.7)	87	1-1/2 (38)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258077189	CB 316L 045X33#PSP VP	662303054489
251933305	CB 316L 3/32X50#CL	662303007461

Additional Products (SS-FCAW)

- Shield-Bright 309H
- Shield-Bright 316H
- Shield-Bright 347H
- Shield-Bright X-Tra 317L
- Shield-Bright X-Tra 347L

For additional information on the above products, please visit us at www.esabna.com

ARCALOY MC308L AWS A5.9: EC308L/EC308

FEATURES

Arcaloy MC308L is a composite metal cored stainless steel wire which has a stainless steel sheath. Arcaloy MC308L is used for welding types 301, 302, 304, and 304L. This may be used for welding types 321 and 347 if service temperatures do not exceed 500°F(260°C). Its higher deposition rate and less penetration compared to solid wire makes it very suitable for making butt, fillet and lap welds on gauge material. Higher speeds are also possible compared to solid wire. The low spatter and slag-free welds make this electrode ideal for automatic and robotic welding. The pushing technique can be used to further minimize the penetration and oxide film formed on the surface of the weld. Typical applications include automobile catalytic converters, manifolds, mufflers, exhaust systems. For welding in the spray mode of metal transfer, the shielding gas should be argon with 1 or 2% oxygen or carbon dioxide. Pulse welding can also be used to further minimize penetration in thin gauge steels. This metal cored wire can also be used in submerged arc welding in combination with 10.93 Flux.

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.9 EC308L/EC308
- AWS A5.9: EC308L/EC308
- ASME IX F No. 6
- CERTIFIED BY C.W.B.- AWS A5.9

WELD METAL ANALYSIS

As Welded 98% Ar / 2% CO_2	
C	0.025%
Mn	1.5%
Si	0.55%
Cr	20%
Ni	10%
Mo	0.1%
Cu	0.1%
Ferrite	10 FN

WELDING PROCESS

- GMAW (MIG)
- SAW (Sub Arc)
- MCAW (Metal Cored)

INDUSTRIES

- Mobile Machinery
- Pipeline
- Shipbuilding
- General Fabrication
- Process
- Automotive

ARCALOY MC308L continued

DEPOSITION TABLE					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %
.045 (1.2)	144	16	160 (406)	4.2 (1.9)	99.3
	245	25	265 (673)	7.1 (3.2)	99.3
	321	26	370 (939)	10 (4.5)	99.4
	390	28	475 (1206)	13 (5.9)	98.5
	441	30	580 (1473)	16 (7.2)	99.2
1/16 (1.6)	212	23	145 (368)	6.9 (3.1)	99.2
	285	23	225 (571)	10.8 (4.9)	98.8
	332	26	300 (762)	13.7 (6.2)	98.1
	420	28	380 (965)	18.3 (8.3)	99.5
	500	31	460 (1168)	22.5 (10.22)	98.9

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258078419	ARC MC308L 045X33#PSP VP	662393013205
258078435	ARC MC308L 045X250#SPOP	662303076184
258078427	ARC MC308L 1/16X33#PSP VP	662303052560

ARCALOY MC309L AWS A5.9: EC309L/EC309

FEATURES

Arcaloy MC309L is a composite metal cored stainless steel wire which has a stainless steel sheath. Arcaloy MC 309L is designed for welding type 309 wrought or for welding type 304 to mild carbon steel. It is also recommended for cladding 304 when welded to carbon steel.

As a small diameter cored wire, it can be used for welding thin gauge 304L where increased corrosion resistance over Arcaloy MC308L is needed. It is also used for dissimilar welding between the 300 and 400 series stainless steels and mild and low alloys steels. Its higher deposition rate and less penetration compared to solid wire make it very suitable for making butt, fillet and lap welds on gauge material.

Higher speeds are also possible compared to solid wire. The low spatter and slag-free welds make this electrode ideal for automatic and robotic welding. The pushing technique can be used to further minimize the penetration and oxide film formed on the surface of the weld.

Typical applications include automobile catalytic converters, manifolds, mufflers, exhaust systems.

For welding in the spray mode of metal transfer, the shielding gas should be argon with 1 or 2% oxygen or carbon dioxide. Pulse welding can also be used to further minimize penetration in thin gauge steels. This metal cored wire can also be used in submerged arc welding in combination with 10.93 Flux.

INDUSTRIES

- Shipbuilding
- Pipeline
- Process
- Mobile Machinery
- General Fabrication
- Automotive

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.9 EC309L/EC309
- AWS A5.9: EC309L/EC309
- ASME IX F No. 6
- CERTIFIED BY C.W.B.- AWS A5.9

WELDING PROCESS

- SAW (Sub Arc)
- GMAW (MIG)
- MCAW (Metal Core)

WELD METAL ANALYSIS

As Welded 98% Ar / 2% CO_2	
C	0.025%
Mn	1.5%
Si	0.55%
Cr	24%
Ni	12.5%
Mo	0.1%
Cu	0.1%
Ferrite	18 FN

ARCALOY MC309L continued

DEPOSITION TABLE					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %
.045 (1.2)	144	16	160 (406)	4.2 (1.9)	99.3
	245	25	265 (673)	7.1 (3.2)	99.3
	321	26	370 (939)	10 (4.5)	99.4
	390	28	475 (1206)	13 (5.9)	98.5
	441	30	580 (1473)	16 (7.2)	99.2
1/16 (1.6)	212	23	145 (368)	6.9 (3.1)	99.2
	285	23	225 (571)	10.8 (4.9)	98.8
	332	26	300 (762)	13.7 (6.2)	98.1
	420	28	380 (965)	18.3 (8.3)	99.5
	500	31	460 (1168)	22.5 (10.22)	98.9

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258078211	ARC MC309L 045X33#PSP VP	662393013199
258078245	ARC MC309L 045X250#SPOP	662303076177

ARCALOY MC316L AWS A5.9: EC316L/EC316

FEATURES

Arcaloy MC316L is a composite metal cored stainless steel wire which has a stainless steel sheath. The addition of molybdenum helps reduce pitting corrosion. As a small diameter cored wire it can be used for the welding of thin gauge 316, 316L and sometimes 304 and 304L stainless steels. Its higher deposition rate and less penetration compared to solid wire makes it very suitable for making butt, fillet and lap welds on gauge material. Higher speeds are also possible compared to solid wire. The low spatter and slag-free welds make this electrode ideal for automatic and robotic welding. The pushing technique can be used to further minimize the penetration and oxide film formed on the surface of the weld. Typical applications include automobile catalytic converters, manifolds, mufflers, exhaust systems. For welding in the spray mode of metal transfer, the shielding gas should be argon with 1 or 2% oxygen or carbon dioxide. Pulse welding can also be used to further minimize penetration in thin gauge steels. This metal cored wire can also be used in submerged arc welding. It can be used with ESAB OK 10.93 flux.

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.9 EC316L/EC316
- Certified by CWB - AWS A5.9
- AWS A5.9 EC316L/EC316
- ASME IX F No. 6

WELD METAL ANALYSIS

As Welded 98% Ar / 2% CO_2	
C	0.022%
Mn	1.4%
Si	0.5%
Cr	18.5%
Ni	12%
Mo	2.7%
Cu	0.1%
Ferrite	7 FN

WELDING PROCESS

- GMAW (MIG)
- SAW (Sub Arc)
- MCAW (Metal Core)

INDUSTRIES

- Mobile Machinery
- Automotive
- Pipeline
- Process
- Shipbuilding
- General Fabrication

ARCALOY MC316L continued

DEPOSITION TABLE					
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Deposition lb/hr (kg/hr)	Efficiency %
.045 (1.2)	144	16	160 (406)	4.2 (1.9)	99.3
	245	25	265 (673)	7.1 (3.2)	99.3
	321	26	370 (939)	10 (4.5)	99.4
	390	28	475 (1206)	13 (5.9)	98.5
	441	30	580 (1473)	16 (7.2)	99.2
1/16 (1.6)	212	23	145 (368)	6.9 (3.1)	99.2
	285	23	225 (571)	10.8 (4.9)	98.8
	332	26	300 (762)	13.7 (6.2)	98.1
	420	28	380 (965)	18.3 (8.3)	99.5
	500	31	460 (1168)	22.5 (10.22)	98.9

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258078310	ARC MC316L 045X33#PSP VP	662393013182
258078328	ARC MC316L 1/16X33#PSP VP	662303052584

ARCALOY MC409Ti AWS A5.9: EC409

FEATURES

Arcaloy MC409Ti is a 12% Cr alloy metal cored electrode stabilized with Titanium (Ti) for arc stability and to improve corrosion resistance, increase strength at high temperatures, and promote the ferritic microstructure. Arcaloy MC409Ti produces a smooth spray-type metal transfer with very minimal spatter. It is particularly suited for welding parts with poor fit up. It was designed for welding stainless steel catalytic converters, manifolds, mufflers, and exhaust systems.

WELD METAL ANALYSIS

98% Ar / 2% O_2	
C	0.015%
Mn	0.72%
Si	0.27%
P	0.007%
S	0.007%
Cr	11.9%
Ti	1.0%

CLASSIFICATIONS AND APPROVALS

- AWS A5.9: EC409

WELDING PROCESS

- GMAW (Mig)
- SAW (Sub Arc)
- MCAW (Metal Cored)

INDUSTRIES

- Automotive

ARCALOY MC409Ti continued

DEPOSITION TABLE				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Electrical Stickout in (mm)
.045 (1.2)	200	20	210 (533)	0.5 (12.7)
	215	21	230 (584)	0.5 (12.7)
	234	22	250 (635)	0.5 (12.7)
	290	24	300 (762)	0.5 (12.7)
	323	24	350 (889)	0.5 (12.7)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258076264	ARC MC409TI 045X33#PSP	662303085711
258076249	ARC MC409TI 045X250#OMP 8/PLT	662303085513
258076256	ARC MC409TI 045X600#OMP	662303085520
258076298	ARC MC409TI 045X600# OMP 1/PLT	662303087043
258090299	ARC MC409TI 045X700 # OMP ED	662303086930

ARCALOY MC439Ti AWS A5.9: EC439

FEATURES

Arcaloy MC439Ti is an 16-17% Cr alloy metal cored electrode stabilized with Titanium (Ti). The high level of chromium provides additional oxidation and corrosion resistance when welding stainless steel catalytic converters, manifolds, mufflers, and exhaust systems. It is also suited for welding parts with poor fit up. Arcaloy MC439Ti produces a spray - type metal transfer with minimal spatter.

WELD METAL ANALYSIS

98% Ar / 2% O_2	
C	0.016%
Mn	0.76%
Si	0.27%
P	0.007%
S	0.008%
Cr	17.9%
Ti	0.68%

CLASSIFICATIONS AND APPROVALS

- ASME SFA 5.9
- AWS A5.9: EC439

WELDING PROCESS

- GMAW (Mig)
- SAW (Sub Arc)
- MCAW (Metal Cored)

INDUSTRIES

- Automotive

ARCALOY MC439Ti continued

DEPOSITION TABLE				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Electrical Stickout in (mm)
.045 (1.2)	200	20	210 (533)	0.5 (12.7)
	215	21	230 (584)	0.5 (12.7)
	234	22	250 (635)	0.5 (12.7)
	290	24	300 (762)	0.5 (12.7)
	323	24	350 (889)	0.5 (12.7)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258090232	ARC MC439TI 045X600#OMP	662303083779
258090240	ARC MC439TI 045X250#OMP 8/PLT	662303084141
258045590	ARC 439TI 052X250#OMP 8/PLT	662303080129
258090281	ARC MC439TI 045X700# OMP ED	662303086923
258090265	ARC MC439TI 045X600#OMP 1/PLT	662303084301
258090273	ARC MC439TI 045X33#AWS	662303084639

ARCALOY MC18CrCb AWS A5.9: EC439Nb

FEATURES

Arcaloy MC18CrCb is an 18% Cr alloy metal cored electrode stabilized with Titanium (Ti) and Niobium (Nb). It is designed for welding Armco 18Cr-Cb HP-10TM stainless steels used in catalytic converters, manifolds, mufflers, and exhaust systems. It is also suited for welding parts with poor fit up. Arcaloy MC18CrCb produces a smooth spray-type metal transfer with very minimal spatter.

WELD METAL ANALYSIS

98% Ar / 2% O_2	
C	0.021%
Mn	0.7%
Si	0.51%
P	0.010%
S	0.021%
Cr	18.6%
Ti	0.25%
Nb	0.5%

CLASSIFICATIONS AND APPROVALS

- AWS A5.9: EC439Nb

WELDING PROCESS

- GMAW (Mig)
- SAW (Sub Arc)
- MCAW (Metal Core)

INDUSTRIES

- Automotive

ARCALOY MC18CrCb continued

DEPOSITION TABLE				
Diameter in (mm)	Amps	Volts	Wire Feed Speed ipm (cm/min)	Electrical Stickout in (mm)
.045 (1.2)	200	20	210 (533)	0.5 (12.7)
	215	21	230 (584)	0.5 (12.7)
	234	22	250 (635)	0.5 (12.7)
	290	24	300 (762)	0.5 (12.7)
	323	24	350 (889)	0.5 (12.7)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258076850	ARC MC18CRCB 045X33#PSP	662303086978
258076835	ARC MC18CRCB 045X600#OMP	662303069810

NICORE 55

FEATURES

Nicore 55 is a composite metal cored wire for repair and joining of cast iron materials. The deposit, which is approximately 53% iron and 45% nickel, provides an excellent match for the coefficient of expansion exhibited by cast irons. Cracking is minimized because thermal stresses caused by the heat of welding are minimized. The light slag is easily removed enhancing visual weld inspection. The fact that this is a continuous electrode will improve the operating factor and minimize unnecessary stops and starts. This electrode can replace covered electrodes such as AWS ENiFe-CI or ENiFe-CI-A. It may be used for repair welds or for joining various types of cast irons. Cast irons may be welded to steel and other ferrous and non-ferrous materials with this product. The machinability of the weld deposit is comparable to the matching covered electrode.

Substantial savings in weld metal deposition costs will be realized when replacing 55% nickel coated electrodes with Nicore 55. The deposition rate of this wire is more than twice that of a comparable coated electrode. The efficiency (approximately 97%) compared to that of coated electrodes (56% assuming 3" stub loss) is substantially greater. These two factors result in substantial savings in weld metal deposition costs. Because of the high deposition rate, the travel rate is very fast, resulting in lower heat input which is advantageous in welding cast irons.

TYPICAL MECHANICAL PROPERTIES

Ultimate Tensile Strength	72 ksi, 500 MPa
Elongation in 2"	12%
Brinell Hardness	187 BHN

WELD METAL ANALYSIS

C	1.05%
Mn	0.22%
Si	0.61%
P	0.009%
S	0.005%
Ni	Balance%
Fe	53.0%

WELDING PROCESS

- MCAW (Metal Core)

NICORE 55 continued

DEPOSITION TABLE			
Diameter in (mm)	Amps	Volts	Electrical Stickout in (mm)
0.035 (0.9)	160	27	1/2 (12.7)
.045 (1.2)	230	28	1/2 (12.7)
1/16 (1.6)	300	28	5/8 (14.7)
3/32 (2.4)	250	20	5/8 -3/4 (14.7-19)

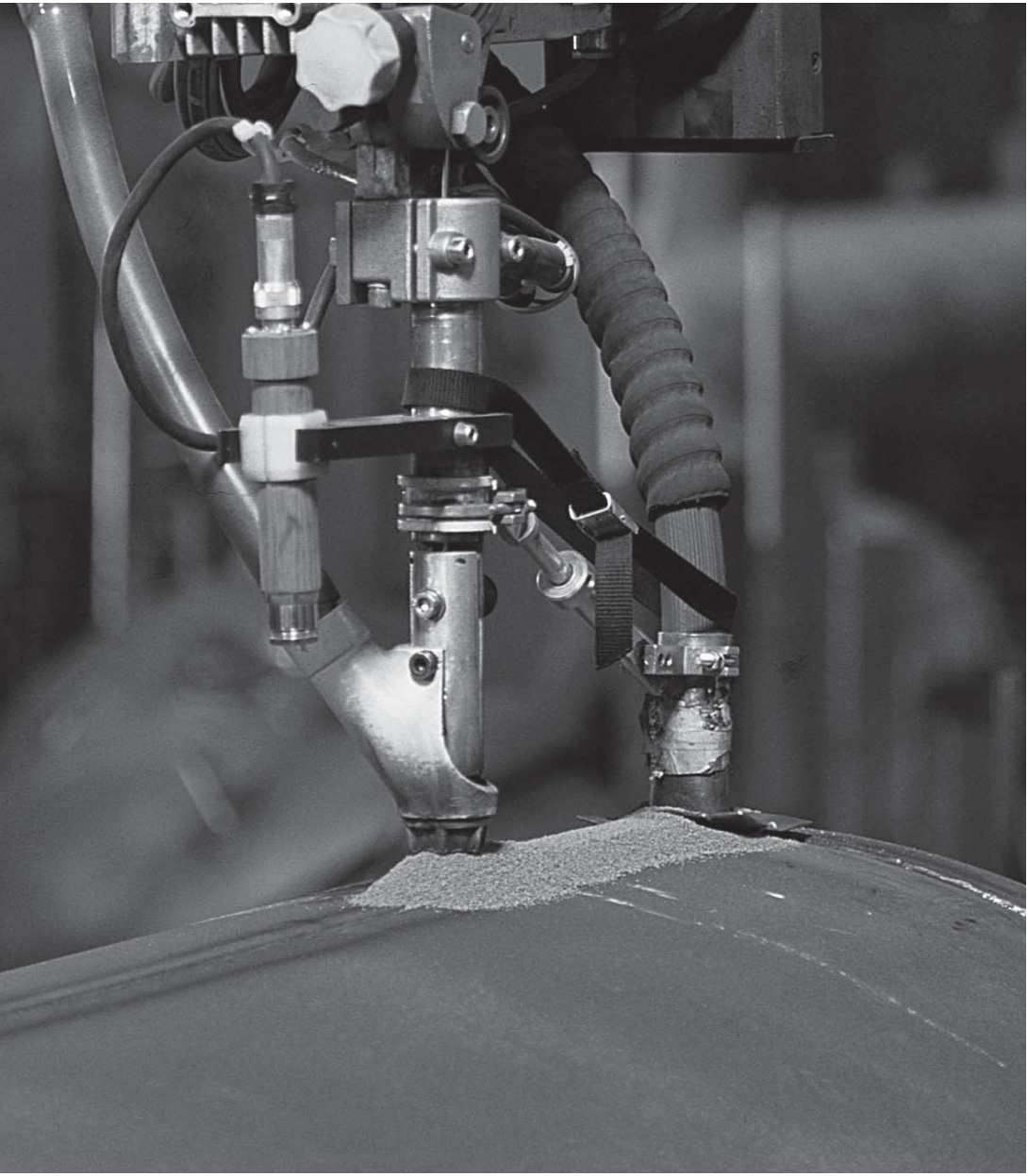
PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
258070416	NC 55 035X15#PSP/60#CT	662303082307
258070515	NC 55 035X33#PSP	662303008567
258070598	NC 55 035X500#RL	662303008628
258070408	NC 55 045X15#PSP/60#CT	662303082291
258070507	NC 55 045X33#PSP	662303008550
258070606	NC 55 1/16X200#RL	662303008635
258070549	NC 55 1/16X33#PSP	662303008598
258070556	NC 55 3/32X60#CL	662303008604

Additional Products (SS-MCAW)

- Arcaloy 309LMo
- Arcaloy MC410
- ArcaloyMC410NiMo
- Arcaloy MC409Nb
- Arcaloy MC430LNb

For additional information on the above products, please visit us at www.esabna.com

Submerged Arc Wire & Fluxes (SAW)



Submerged Arc Wire & Fluxes (SAW) - Section Four

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SPOOLARC 81 AWS A5.17: EM12K

FEATURES

Medium manganese and silicon wire - nominal rust and mill scale tolerance.

Developed for general purpose welding on low and medium carbon steels.

Applications include structural steels, medium strength pressure vessels, ship, barge and offshore oil rig fabrication.

Use with OK Flux 429, 231, 350, 10.71, 10.72, and 10.62.

TYPICAL WIRE CHEMISTRY

C	0.11%
Mn	0.95%
Si	0.26%
P	0.006%
S	0.008%

CLASSIFICATIONS AND APPROVALS

- Certified by CWB to CSA W48
- ABS/AWS A5.17: EM12K
- AWS/ASME SFA 5.17: EM12K

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Windtower - Medium Strength
- Pressure Vessel - Bases
- Ship - Barge
- Offshore Oil Rig Fabrications
- Structural Steel Fabrication

SPOOLARC 81 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/16 (1.6)	400	13 (5.9)	99
	500	17 (7.7)	99
5/64 (2.0)	300	10.8 (4.9)	99
	400	14.5 (6.6)	99
	500	18.2 (8.3)	99
3/32 (2.4)	400	13.2 (6)	99
	500	17 (7.7)	99
	600	22 (10)	99
1/8 (3.2)	400	11 (5)	99
	500	14.5 (6.6)	99
	600	18 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16 (7.3)	99
	700	19.5 (8.8)	99
	800	23 (10.4)	99
	900	26 (11.8)	99
3/16 (4.8)	600	13.9 (6.3)	99
	700	17.5 (7.9)	99
	800	21 (9.5)	99
	900	25 (11.3)	99
	1000	29.2 (13.2)	99
	1100	34 (15.4)	99

SPOOLARC 81 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1204F28	81 1/16X65#CL	662303503727
120UF48	81 1/16X900#OMP 2/PLT	662303668860
1204F29	81 5/64X65#CL	662303503734
1206F89	81 5/64X1000#DR	662303669461
1204F30	81 3/32X65#CL	662303503741
1205F30	81 3/32X200#CL	662303522780
1208F70	81 3/32X700#RL	662303503987
1206F90	81 3/32X1000#DR	662303669775
1204F32	81 1/8X65#CL	662303503758
1206F52	81 1/8X700#DR	662303503895
1208F72	81 1/8X700#RL	662303503994
1206F92	81 1/8X1000#DR	662303669478
1205F52	81 1/8X2200#EC	662303671761
1204F14	81 5/32X45#CL	662303670825
1204F34	81 5/32X65#CL	662303503765
1205F34	81 5/32X200#CL	662303517588
1206F34	81 5/32X300#DR	662303503857
1208F94	81 5/32X300#RL	662303668518
1206F94	81 5/32X1000#DR	662303669485
1205F54	81 5/32X2200#EC	662303671778
1204F35	81 3/16X65#CL	662303503772
120HF35	81 3/16X800#DR 4/PLT	662303669430
1206F95	81 3/16X10003DR	662303669782
1205F55	81 3/16X2200#EC	662303671785

SPOOLARC 29S AWS A5.17: EM13K

FEATURES

Spoolarc 29S is a general purpose copper-coated solid wire suitable for many carbon steel welding applications using either the MIG/Gas Metal Arc Welding (GMAW) or the Submerged Arc Welding (SAW) processes. Spoolarc 29S contains moderate amounts of manganese and silicon to provide sufficient deoxidation over light mill scale. Shielding gas choices for Spoolarc 29S in the GMAW mode are 100% carbon dioxide, argon/carbon dioxide mixtures, argon/oxygen mixtures, and other argon based mixed gas blends. In the SAW mode, Spoolarc 29S can be combined with a variety of active and neutral bonded fluxes to achieve better welding performance over Spoolarc 81 wire. Spoolarc 29S is used in a wide variety of applications including heavy equipment, automotive parts, railcars, agricultural equipment, and sheet metal welding.

TYPICAL WIRE CHEMISTRY

C	0.08%
Mn	1.2%
Si	0.6%
P	0.007%
S	0.008%
Cu	0.02%

CLASSIFICATIONS AND APPROVALS

- AWS.ASME SFA5.17: EM13K
- AWS/ASME SFA5.18: ER70S-3
- ABS 3SA, 3YSA
- Certified by CWB to CSA W48
- CAN/CSA-ISO14341,B-G 49A 2C G3 (ER49S-3)

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Mobile Machinery
- General Fabrication
- Civil Construction
- Automotive

SPOOLARC 29S continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/16 (1.6)	400	13.0 (5.9)	99
	500	17.0 (7.7)	99
5/64 (2.0)	300	10.8 (4.9)	99
	400	14.5 (6.6)	99
	500	18.2 (8.3)	99
3/32 (2.4)	400	13.2 (6)	99
	500	17.0 (7.7)	99
	600	22.0 (10)	99
1/8 (3.2)	400	11.0 (5)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23 (10.4)	99
	900	26 (11.8)	99
3/16 (4.8)	600	13.9 (6.3)	99
	700	17.5 (7.9)	99
	800	21.0 (9.5)	99
	900	25.0 (11.3)	99
	1000	29.2 (13.2)	99
	1100	34.0 (15.4)	99

SPOOLARC 29S continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1314F28	29S 1/16X65#CL	662303506674
131LF48	29S 1/16X400#SOMP 8/PLT	662303668020
131UF48	29S 1/16X900#OMP 2/PLT	662303522209
1315F68	29S 1/16X1000#WFRL 80-100 5A	662303520588
1314F30	29S 3/32X65#CL	662303506698
1316F90	29S 3/32X1000#DR	662303669966
1315F54	29S 5/32X2200#EC	662303506698
1316F92	29S 1/8X1000#DR	662303669973
1315F52	29S 1/8X2200#EC	662303670689

SPOOLARC 53 AWS A5.17: EH12K

FEATURES

Designed for single or multipass welding on carbon and low alloy steels. Provides higher strength deposits with moderate rust and mill scale tolerance. Produces good impact toughness. Applications include pressure vessel fabrication and offshore oil rig structures.

TYPICAL WIRE CHEMISTRY

C	0.11%
Mn	0.95%
Si	0.26%
P	0.006%
S	0.008%

CLASSIFICATIONS AND APPROVALS

- AWS A5.17: EH12K

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Automotive
- Agricultural Equipment
- Mobile Machinery
- General Fabrication

SPOOLARC 53 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/8 (3.2)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1584F34	53 5/32X65#CL	662303509613
1586F90	53 3/32X1000#DR	662303670023
1586F94	53 5/32X1000#DR	662303670061
1584F32	53 1/8X65#CL	662303509606
1586F92	53 1/8X1000#DR	662303670030

SPOOLARC 71 AWS A5.17: EM14K

FEATURES

ESAB's Spoolarc 71 is a medium manganese and silicon subarc wire that has been microalloyed with titanium. Used with 429, OK 10.62, and OK 10.71 fluxes Spoolarc 71 will produce weld deposits with a minimum 70,000 psi tensile strength in the as welded condition or after eight-hours of stress relief. When used with OK 10.62 weld deposits meet ASME A No. 1 chemistry requirements. Spoolarc 71 is used for welding pressure vessles and can be used for other applications requiring good mechanical properties after stress relieving.

TYPICAL WIRE CHEMISTRY

C	0.10%
Mn	1.22%
Si	0.55%
P	0.008%
S	0.005%
Ti	0.07%

CLASSIFICATIONS AND APPROVALS

- AWS A5.17: EM14K

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Pressure Vessels
- Mechanical Piping

SPOOLARC 71 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/16 (1.6)	400	13.0 (5.9)	99
	500	17.0 (7.7)	99
5/64 (2.0)	300	10.8 (4.9)	99
	400	14.5 (6.6)	99
	500	18.2 (8.3)	99
3/32 (2.4)	400	13.2 (6)	99
	500	17.0 (7.7)	99
	600	22.0 (10)	99
1/8 (3.2)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99
3/16 (4.8)	600	13.9 (6.3)	99
	700	17.5 (7.9)	99
	800	21.0 (9.5)	99
	900	25.0 (11.3)	99
	1000	29.2 (13.2)	99
	1100	34.0 (15.4)	99

SPOOLARC 71 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
13L4F29	71 5/64X65#CL	662303521806
13L4F30	71 3/32X65#CL	662303520991
13L6F90	71 3/32X1000#DR	662303670009
13L4F32	71 1/8X65#CL	662303521813
13L7F32	71 1/8X250#DR	662303669898
13L6F32	71 1/8X300#DR	662303669584
13L6F92	71 1/8X1000#DR	662303670788
13L4F34	71 5/32X65#CL	662303520984
13L6F94	71 5/32X1000#DR	662303670016
13L4F35	71 3/16X65#CL	662303669003

ALLOY SHIELD 70S AWS SFA 5.17: EC1

FEATURES

Alloy Shield 70S is a metal-cored wire used for submerged arc welding applications. It is designed for similar applications as solid wire classification EM12K, including structural steel, shipbuilding, tank fabrication, wheel fabrication, heavy equipment, offshore fabrication, and transmission poles. It can be used to weld over light mill scale and rust while still producing quality welds.

TYPICAL WIRE CHEMISTRY

C	0.54%
Mn	1.61%
Si	0.54%
Cu	.08%
S	.013%
P	.014%

CLASSIFICATIONS AND APPROVALS

- With OK FLUX 10.71: F7P5-EC1-H8
- With OK FLUX 10.71: F7A5-EC1-H8
- ASME SFA 5.17
- AWS SFA 5.17: EC1

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Structural Steel Fabrication
- Shipbuilding
- Tank Fabrication
- Transmission Poles
- Heavy Equipment
- Offshore Fabrications
- Wheel Fabrications

ALLOY SHIELD 70S continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
3/32 (2.4)	400	12.5 (5.7)	98
	430	14.5 (5.8)	97
	510	19 (8.6)	99
	530	20.8 (9.4)	97
1/8 (3.2)	400	10.8 (4.9)	94
	520	15.4 (6.9)	95
	630	20.5 (9.3)	95
	720	26.3 (11.9)	98
	820	32.2 (14.6)	98
	870	36.7 (16.4)	95
5/32 (4.0)	370	10 (4.5)	89
	650	20.7 (9.4)	97
	800	27.4 12.4)	96
	920	34.7 (15.7)	98
	1000	39.7 (18)	100

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
244007001	AS 70S 5/64X60#CL	662303086886
244007019	AS 70S 3/32X60#CL	662303086282
244007118	AS 70S 3/32X500#POP	662303086305
244007027	AS 70S 1/8X60#CL	662303086299
244007126	AS 70S 1/8X500#POP	662303086312
244007035	AS 70S 5/32X60#CL	662303086275
244007134	AS 70S 5/32X500#POP	662303086329

SPOOLARC ENi4 AWS A5.23: ENi4

FEATURES

Designed for single or multipass welding on high strength steels. Produces good low temperature toughness on a variety of base materials. Weld metal tensile strengths are in excess of 90 ksi (620 MPa) in both the as welded and stress relieved conditions. Applications include pressure vessels, offshore oil rigs, bridges, and other structural steel fabrication.

TYPICAL WIRE CHEMISTRY

C	0.17%
Mn	0.73%
Si	0.19%
P	0.003%
S	0.004%
Ni	1.74%
Mo	0.17%
Cu	0.06%

CLASSIFICATIONS AND APPROVALS

- ABS/AWS A5.23: ENi4
- AWS/ASME SFA5.23: ENi4

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Pressure Vessel
- Offshore Oil Rigs
- Bridge Fabrication
- Structural Steel

SPOOLARC ENi4 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
5/64 (2.0)	300	10.8 (4.9)	99
	400	14.5 (6.6)	99
	500	18.2 (8.3)	99
3/32 (2.4)	400	13.2 (6)	99
	500	17.0 (7.7)	99
	600	22.0 (10)	99
1/8 (3.2)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (40)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
2214F29	ENI-4 5/64X65#CL	662303510725
2214F30	ENI-4 3/32X65#CL	662303510732
2216F90	ENI-4 3/32X1000# DR	662303670832
2214F32	ENI-4 1/8X65#CL	662303510749
2214F34	ENI-4 5/32X65#CL	662303510756

SPOOLARC 75 AWS A5.23: ENi1K and AWS 5.28: ER80S-Ni1

FEATURES

Spoolarc 75 is a copper-coated 1% nickel solid wire for carbon steel and low alloy welding applications using either the MIG/Gas Metal Arc Welding (GMAW) or Submerged Arc Welding (SAW) processes. Spoolarc 75 produces a deposit that meets the weathering requirements of AWS D1.1 and D1.5 and is designed to weld weathering steels and/or where improved low temperature impact toughness is specified. Shielding gas choices for Spoolarc 75 are Ar/CO2 mixtures containing a minimum of 75% Ar or the 98% Ar/2% O2. In the SAW mode, Spoolarc 75 is typically used with a neutral flux such as ESAB OK Flux 429, 10.71, and 10.62. Spoolarc 75 is used for bridge and structural welding.

TYPICAL WIRE CHEMISTRY

C	0.08%
Mn	0.89%
Si	0.46%
P	0.004%
S	0.008%
Cr	0.02%
Ni	0.90%
Mo	0.01%
Cu	0.07%

CLASSIFICATIONS AND APPROVALS

- AWS/ASME SFA 5.23: ENi1K
- AWS/ASME SFA 5.28: ER80S-Ni1

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Mobile Machinery
- Shipbuilding
- General Fabrication
- Bridge Construction

SPOOLARC 75 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
3/32 (2.4)	400	13.2 (6)	99
	500	17.0 (7.7)	99
	600	22.0 (10)	99
1/8 (3.2)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
13P4F29	75 5/64X65#CL	662303521530
13P4F30	75 3/32X65#CL	662303521448
13P5F30	75 3/32X200#CL	662303670443
13P6F90	75 3/32X1000#DR	662303670801
13P4F32	75 1/8X65#CL	662303521455
13P6F92	75 1/8X1000#DR	662303670184
13P4F34	75 5/32X65#CL	662303521646
13P6F94	75 5/32X1000#DR	662303670191

SPOOLARC 44 AWS /ASME SFA5.23 EF2

FEATURES

Designed for single or multipass welding where high strength and impact toughness is required. Weld metal tensile strengths of 80 ksi (552 MPa) are maintainable after long term stress relieving (50 hrs or more). The presence of Ni in the wire chemistry helps increase low temperature impact toughness. Applications include pressure vessels, structural supports, and some heat treatable valves and fittings.

TYPICAL WIRE CHEMISTRY

C	0.13%
Mn	2.05%
Si	0.05%
P	0.010%
S	0.010%
Ni	0.65%
Mo	0.50%

CLASSIFICATIONS AND APPROVALS

- AWS/ASME SFA5.23 EF2

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Pressure vessels
- Structural Supports
- Heat Treatable Valves & Fittings

SPOOLARC 44 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
3/32 (2.4)	400	13.2 (6)	99
	500	17.0 (7.7)	99
	600	22.0 (10)	99
1/8 (3.2)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (40)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1154F30	44 3/32X65#CL	662303502805
1154F32	44 1/8X65#CL	662303502812
1156F92	44 1/8X1000#DR	662303670092
1154F34	44 5/32X65#CL	662303502829
2154F34	44 BARE 5/32X65#CL	662303671105
1156F94	44 5/32X1000#DR	662303670771

SPOOLARC U515 AWS A5.23: EB2R

FEATURES

Designed for use on low alloy steels up to 1.25% Cr - 0.5% Mo. Applications include process piping, heat exchangers and pressure vessel fabrication.

TYPICAL WIRE CHEMISTRY

C	0.10%
Mn	0.70%
Si	0.020%
P	0.01%
S	0.01%
Cr	1.50%
Mo	0.50%

CLASSIFICATIONS AND APPROVALS

- AWS A5.23: EB2R

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Process Piping
- Heat Exchanger
- Pressure Vessel Fabrication

SPOOLARC U515 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/16 (1.6)	400	13.0 (5.9)	99
	500	17.0 (7.7)	99
3/32 (2.4)	400	13.2 (6)	99
	500	17.0 (7.7)	99
1/8 (3.2)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
218AF68	U515 CU 1/16X60#SP	662303510671
2184F30	U515 CU 3/32X65#CL	662303510497
2186F90	U515 CU 3/32X1000# DR	662303670221
2184F32	U515 CU 1/8X65#CL	662303510503
2186F92	U515 CU 1/8X1000# DR	662303670214
2186F94	U515 CU 5/32X1000# DR	662303670238
218EFLS	U515 CU 1/4X600#DR	662303510688

OK AUTROD 13.20SC AWS /ASME SFA5.23: EB3R

FEATURES

ESAB's OK Autrod 13.20SC is a copper-coated low alloy submerged arc wire designed for the welding of creep-resistant steel of the (2.5% Cr) (1% Mo) type. When combined with OK Flux 10.63, OK Autrod 13.20SC produces a metalurgically clean weld which is capable of meeting X-factor of less than 15. This combination fulfills the stringent requirements for toughness after step cooling treatment of the weld metal. OK Autrod 13.20SC can also be combined with OK Flux 10.62 for applications not requiring step cooling treatment.

OK Autrod 13.20SC is used for welding process piping, heat exchangers, and pressure vessel fabrication.

TYPICAL WIRE CHEMISTRY

C	0.10%
Mn	0.63%
Si	0.16%
P	0.006%
S	0.004%
Cr	2.30%
Mo	1.00%

CLASSIFICATIONS AND APPROVALS

- AWS/ASME SFA5.23: EB3R

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Process Piping
- Heat Exchangers
- Pressure Vessel Fabrication

OK AUTROD 13.20SC continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/8 (3.18)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
2554F28	OK AUTROD 13.20SC 1/16X65#CL	662303081911
2554F30	OK AUTROD 13.20SC 3/32X65#CL	662303081768
2554F32	OK AUTROD 13.20SC 1/8X65#CL	662303081775
2556F94	OK AUTROD 13.20SC 5/32X1000# DR	662303670290

OK AUTROD 12.24 AWS A5.23: EA2

FEATURES

ESAB Welding & Cutting Products introduces OK Autrod 12.24, a molybdenum- alloyed, copper-coated wire for submerged arc welding of non-alloyed and low-alloyed steels. Designed for creep resistant steels (0.5% Mo), this wire is ideal for use with structural steels, ship building steels, pressure vessel steels and pipeline steels. This wire meets SFA/AWS 5.23: EA2 classification, providing superior mechanical properties to those achieved with EA1 wire. OK Autrod 12.24 in the new 2,200 lb EcoCoil™ package will provide pipe mills with high productivity, high-quality product they require. Additionally, this alloy is well-suited to the fabrication of pressure vessels that require post-weld heat treatment.

TYPICAL WIRE CHEMISTRY

C	0.10%
Mn	1.06%
Si	0.15%
P	0.013%
S	0.014%
Cr	0.04%
Ni	0.02%
Mo	0.50%

CLASSIFICATIONS AND APPROVALS

- AWS A5.23: EA2

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- Shipbuilding
- Civil Construction
- Bridge Construction
- Steel Industry
- Pipeline
- Pressure Vessel

OK AUTROD 12.24 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/8 (3.2)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
122424120N	OK AUTROD 12.24 3/32X65# CL	662303670849
122424338A	OK AUTROD 12.24 3/32X2200# EC	662303670511
122424130N	OK AUTROD 12.24 3/32X1000# DR	662303670856
122432120N	OK AUTROD 12.24 1/8X65# CL	662303670863
122432338A	OK AUTROD 12.24 1/8X2200# EC	662303670528
122432130N	OK AUTROD 12.24 1/8X1000# DR	662303670870
122440120N	OK AUTROD 12.24 5/32X65# CL	662303670887
122440130N	OK AUTROD 12.24 5/32X1000# DR	662303670894
122440338A	OK AUTROD 12.24 5/32X2200# EC	662303670535
122448120N	OK AUTROD 12.24 3/16X65# CL	662303670900
122448338A	OK AUTROD 12.24 3/16X2200# EC	662303670542
122448130N	OK AUTROD 12.24 3/16X1000# DR	662303670917

SPOOLARC 70 AWS A5.23: EA1

FEATURES

Designed for creep resistant steels (0.5% Mo) and where impact properties are required, this wire is ideal for use with structural steels, ship building steels, pressure vessel steels and pipeline steels. Spoolarc 70 is the benchmark for quality and customer appeal.

TYPICAL WIRE CHEMISTRY

C	0.09%
Mn	0.94%
Si	0.11%
P	0.009%
S	0.04%
Mo	0.49%
Cu	0.11%
Total other elements	<0.50%

CLASSIFICATIONS AND APPROVALS

- EN 756-52Mo
- EN ISO 24598-A-S Mo
- AWS 5.23: EA1
- AWS/ASME SFA 5.23: EA1
- TUV/HS, DB 52.039.06/HS
- ABS, BV, DNV, GL, LR

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- Structural Fabrication
- Shipbuilding
- Pressure Vessel
- Pipeline Steel

SPOOLARC 70 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/16 (1.6)	400	13.0 (5.9)	99
	500	17.0 (7.7)	99
5/64 (2.0)	300	10.8 (4.9)	99
	400	14.5 (6.6)	99
	500	18.2 (8.3)	99
3/32 (2.4)	400	13.2 (6)	99
	500	17.0 (7.7)	99
	600	22.0 (10)	99
1/8 (3.2)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99
3/16 (4.8)	600	13.9 (6.3)	99
	700	17.5 (7.9)	99
	800	21.0 (9.5)	99
	900	25.0 (11.3)	99
	1000	29.2 (13.2)	99
	1100	34.0 (15.4)	99

SPOOLARC 70 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1114F29	SPOOLARC 70 5/64X65#CL	662303670986
1114F30	SPOOLARC 70 3/32X65#CL	662303502577
1116F90	SPOOLARC 70 3/32X1000#DR	662303670948
1114F32	SPOOLARC 70 1/8X65#CL	662303502584
1116F92	SPOOLARC 70 1/8X1000#DR	662303670955
1114F34	SPOOLARC 70 5/32X65#CL	662303502591
1116F94	SPOOLARC 70 5/32X1000#DR	662303670962
1114F35	SPOOLARC 70 3/16X65#CL	662303502607
1116F15	SPOOLARC 70 3/16X800#DR	662303670979

SPOOLARC 95 AWS A5.23:EM2 and A5.28: ER-100S-1

FEATURES

Spoolarc 95 is Military grade, high strength wire used for HY-80 steel. Applications for Spoolarc 95 include military tanks, ships and submarines.

TYPICAL WIRE CHEMISTRY

C	0.007%
Mn	1.40%
Si	0.35%
P	0.008%
S	0.007%
Cr	0.70%
Ni	1.80%
Mo	0.35%

CLASSIFICATIONS AND APPROVALS

- AWS/ASME SFA 5.23: EM2
- AWS/ASME SFA 5.28: ER100S-1

WELDING PROCESS

- SAW (Subarc)
- GMAW (Mig)

INDUSTRIES

- Military Tanks
- Naval Vessels
- Submarines
- Mining

SPOOLARC 95 continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Deposition Rate lb/hr (kg/hr)	Efficiency%
1/16 (1.6)	400	13.0 (5.9)	99
	500	17.0 (7.7)	99
5/64 (2.0)	300	10.8 (4.9)	99
	400	14.5 (6.6)	99
	500	18.2 (8.3)	99
3/32 (2.4)	400	13.2 (6)	99
	500	17.0 (7.7)	99
	600	22.0 (10)	99
1/8 (3.2)	400	11.0 (5.0)	99
	500	14.5 (6.6)	99
	600	18.0 (8.2)	99
	700	21.2 (9.6)	99
5/32 (4.0)	500	12.5 (5.7)	99
	600	16.0 (7.3)	99
	700	19.5 (8.8)	99
	800	23.0 (10.4)	99
	900	26.0 (11.8)	99
3/16 (4.8)	600	13.9 (6.3)	99
	700	17.5 (7.9)	99
	800	21.0 (9.5)	99
	900	25.0 (11.3)	99
	1000	29.2 (13.2)	99
	1100	34.0 (15.4)	99

SPOOLARC 95 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
2294F30	95 CU 3/32X65#CL	662303510978
2314F32	95 BARE 1/8X65#CL	662303511357
2294F32	95 CU 1/8X65#CL	662303510985
2314F34	95 BARE 5/32X65#CL	662303511364
2294F34	95 CU 5/32X65#CL	662303510992
2298F74	95 CU 5/32X700#RL	662303670931
2296F94	95 CU 5/32X1000#DR	662303670269

OK FLUX 231 AWS A5.17 / ASME SFA 5.17: F7A2-EM12K

FEATURES

OK Flux 231 is an active, bonded flux designed for fillet and butt welding of carbon steel plate. It provides excellent tolerance of rust and mill scale so joint preparation can be minimized. This flux will produce horizontal fillets up to 3/8" (9.5 mm) leg size without undercut or rollover. The slag peeling is excellent. OK Flux 231 can be used for multipass welding, but because Mn and Si buildup is possible, welding voltage should be kept to a minimum and plate thickness should be limited to 1" (25 mm). OK Flux 231 is suitable for DC single and parallel wire welding at currents up to 1000 A. It is used for welding rail cars, water heater tanks, ship plates, and structural steel.

TYPICAL MECHANICAL PROPERTIES

Spoolarc 81	
Tensile Strength	81 ksi, 560 MPa
Yield Strength	67 ksi, 460 MPa
Elongation in 2"	27%
CVN	28 ft-lb, 38 J
Temperature	-20°F, -29°C
Spoolarc 80	
Tensile Strength	74 ksi, 510 MPa
Yield Strength	65 ksi, 450 MPa
Elongation in 2"	28%
CVN	20 ft-lb, 27 J
Temperature	0°F, -18°C

CLASSIFICATIONS AND APPROVALS

- AWS A5.17 / ASME SFA 5.17: F7A2-EM12K
- AWS A5.17 / ASME SFA 5.17: F7AZ-EL12

TYPICAL WIRE CHEMISTRY

Spoolarc 81	
C	0.08%
Mn	1.40%
Si	0.30%
P	0.018%
S	0.010%
Spoolarc 80	
C	0.07%
Mn	1.00%
Si	0.30%
P	0.020%
S	0.010%

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- Rail car
- Tank Fabrication
- Shipbuilding
- Structural

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
833AF09	OK FLUX 231 14X65 2200#BG	662303086480
8334F09	OK FLUX 231 14X65 55#BG	662303055745

OK FLUX 281 AWS A5.17: F7AO-EM12K, AWS A5.17: F7AO-EM13K

FEATURES

OK Flux 281 is intended for welding gauge thickness and thin steel plate(up to 3/8 in. thick) for butt, lap and fillet welds. Due to the excellent operating characteristics, quality welds with self-peeling slag and free from undercut may be achieved with welding speeds ranging from 50 to 100 inches per minute.

Single pass application only. Any mechanical property and undiluted weld chemistry listed are for information only.

CLASSIFICATIONS AND APPROVALS

- AWS A5.17: F7AO-EM12K
- AWS A5.17: F7AO-EM13K

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- Metal Beam Fabrication
- Spiral Pipe
- Storage Tanks
- Rail Cars

TYPICAL MECHANICAL PROPERTIES

Spoolarc 81	
Tensile Strength	92 ksi, 635 MPa
Yield Strength	78 ksi, 540 MPa
Elongation in 2”	25%
CVN	28 ft-lb, 20 J
Temperature	0°F, -18°C
Spoolarc 29S	
Tensile Strength	99 ksi, 680 MPa
Yield Strength	89 ksi, 615 MPa
Elongation in 2”	22%
CVN	23 ft-lb, 31 J
Temperature	0°F, -18°C

TYPICAL WIRE CHEMISTRY

Spoolarc 81	
C	0.07%
Mn	1.80%
Si	0.90%
P	0.025%
S	0.013%
Spoolarc 29S	
C	0.07%
Mn	1.80%
Si	1.00%
P	0.023%
S	0.014%

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
8504F09	OK FLUX 281 14X65 55#BG	66230366789

OK FLUX 282 AWS A5.17: F7AZ-EM12K, AWS A5.17: F7AZ-EM13K

FEATURES

OK Flux 282 is an active, bonded flux designed for high speed, single pass welding of carbon steel sheet. Butt, lap, and fillet welds are well washed and free from undercut even at speeds up to 120 IPM (305 cm/min). It is primarily used with DC single and parallel wire systems at currents up to 1300 amps. OK Flux 282 is recommended for making high speed welds in metallic building beams, spiral pipe, storage tanks, and rail cars.

Single pass application only. Any mechanical property and undiluted weld chemistry listed are for information only.

TYPICAL MECHANICAL PROPERTIES

Spoolarc 81	
Tensile Strength	95 ksi, 655 MPa
Yield Strength	85 ksi, 585 MPa
Elongation in 2”	23%
CVN	18 ft-lb, 24 J
Temperature	0°F, -18°C
Spoolarc 29S	
Tensile Strength	100 ksi, 690 MPa
Yield Strength	88 ksi, 605 MPa
Elongation in 2”	22%
CVN	14 ft-lb, 19 J
Temperature	0°F, -18°C

CLASSIFICATIONS AND APPROVALS

- AWS A5.17: F7AZ-EM12K
- AWS A5.17: F7AZ-EM13K

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- Metal Beam Fabrication
- Spiral Pipe
- Storage Tanks
- Rail Cars

TYPICAL WIRE CHEMISTRY

Spoolarc 81	
C	0.09%
Mn	1.24%
Si	0.80%
P	0.030%
S	0.020%
Spoolarc 29S	
C	0.09%
Mn	1.15%
Si	1.00%
P	0.028%
S	0.014%

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
8514F09	OK FLUX 282 55#BG	662303078102

OK FLUX 350 AWS A5.17: F7A2-EM12K, AWS A5.17: F7A2-EL12

FEATURES

OK Flux 350 is an active bonded flux for making butt and fillet welds in carbon steel plate up to 1" (25 mm) thick. It produces a smooth weld surface with uniform edges. The slag is generally free peeling. Its performance is very good even when the plate surface is covered with rust and mill scale. OK Flux 350 is suitable for use with AC or DC power in single or multiwire applications. It is recommended for butt welding of thin wall pressure vessels, rail cars, and structural steel plate. It is used for fillet welding in shipbuilding, pressure vessel, and structural applications. OK Flux 350 also is widely used as a backing flux in one sided welding. It provides good performance at currents up to 1100 amps.

CLASSIFICATIONS AND APPROVALS

- AWS A5.17 / ASME SFA 5.17: F7A2-EM12K
- AWS A5.17 / ASME SFA 5.17: F7A2-EL12
- AWS A5.17 / ASME SFA 5.17: F7A2-EM13K

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- Pressure Vessels
- Shipbuilding
- Structural Applications

TYPICAL MECHANICAL PROPERTIES

Spoolarc 81	
Tensile Strength	80 ksi, 550 MPa
Yield Strength	66 ksi, 455 MPa
Elongation in 2"	26%
CVN	31 ft-lb, 42 J
Temperature	-20°F, -29°C
Spoolarc 80	
Tensile Strength	76 ksi, 525 MPa
Yield Strength	62 ksi, 425 MPa
Elongation in 2"	30%
CVN	36 ft-lb, 49 J
Temperature	-20°F, -29°C
Spoolarc 29S	
Tensile Strength	87 ksi, 600 MPa
Yield Strength	71 ksi, 490 MPa
Elongation in 2"	28%
CVN	24 ft-lb, 32 J
Temperature	-20°F, -29°C

TYPICAL WIRE CHEMISTRY

Spoolarc 81	
C	0.04%
Mn	1.80%
Si	0.70%
P	0.022%
S	0.010%
Spoolarc 80	
C	0.05%
Mn	1.40%
Si	0.50%
P	0.022%
S	0.015%
Spoolarc 29S	
C	0.04%
Mn	1.90%
Si	0.90%
P	0.023%
S	0.015%

OK FLUX 350 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
829AF09	OK FLUX 350 14X65 2200#BG	662303076832
8294F09	OK FLUX 350 14X65 55#BG	662303076870

OK FLUX 429 AWS A5.17/A5.23

FEATURES

OK Flux 429 is a neutral, bonded flux intended for butt and fillet welding of carbon and low alloy steel plate. It combines good as welded and stress relieved mechanical properties with excellent performance. Its slag is generally self peeling, even in tight, narrow groove butt welds. It provides moderate tolerance of rust and mill scale. OK Flux 429 is used in offshore oil rig, bridge, ship, pressure vessel, and structural fabrication. It will operate with DC and AC, single and multiwire systems at currents up to 1000 amps.

CLASSIFICATIONS AND APPROVALS

- AWS A5.17: F7A2-EM12K
- AWS A5.17: F6P4-EM12K
- AWS A5.17: F7A2-EM-13K
- AWS A5.17: F7P0-EM14K
- AWS A5.17: F7A4-EH12K
- AWS A5.23: F8A2-EA1-A2
- AWS A5.23: F8P2-EA1-A2
- AWS A5.23: F8A2-EA2-A3
- AWS A5.23: F8P0-EA2-A3
- AWS A5.23: F8A4-ENi1K-Ni1
- AWS A5.23: F9A4-ENi14-Ni4
- AWS A5.23: F8P4-ENi4-Ni4

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- Offshore
- Bridge
- Shipbuilding
- Pressure Vessel
- Process
- Structural
- Mobile Machinery
- Power Generation
- Pipeline
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

Spoolarc 81	
Tensile Strength	79 ksi, 545 MPa
Yield Strength	66 ksi, 455 MPa
Elongation in 2”	26%
CVN	48 ft-lb, 65 J
Temperature	-20°F, -29°C
Spoolarc40B	
Tensile Strength	88 ksi, 605 MPa
Yield Strength	77 ksi, 530 MPa
Elongation in 2”	25%
CVN	21 ft-lb, 28 J
Temperature	-20°F, -29°C
Spoolarc 29S	
Tensile Strength	83 ksi, 570 MPa
Yield Strength	67 ksi, 460 MPa
Elongation in 2”	27%
CVN	38 ft-lb, 42 J
Temperature	-20°F, -29°C
Spoolarc 53	
Tensile Strength	85 ksi, 585 MPa
Yield Strength	71 ksi, 490 MPa
Elongation in 2”	28%
CVN	30 ft-lb, 52 J
Temperature	-40°F, -40°C
Spoolarc 75	
Tensile Strength	86 ksi, 595 MPa
Yield Strength	73 ksi, 505 MPa
Elongation in 2”	28%
CVN	40 ft-lb, 54 J
Temperature	-40°F, -40°C

OK FLUX 429 continued

TYPICAL MECHANICAL PROPERTIES	
Spoolarc ENi4	
Tensile Strength	93 ksi, 640 MPa
Yield Strength	82 ksi, 565 MPa
Elongation in 2”	25%
CVN	44 ft-lb, 60 J
Temperature	-40°F, -40°C
Stress Relieved 1 hr @ 1150⁰F	
Spoolarc 81	
Tensile Strength	75 ksi, 515 MPa
Yield Strength	60 ksi, 5415 MPa
Elongation in 2”	30%
CVN	50 ft-lb, 68 J
Temperature	-40°F, -40°C
Spoolarc 71	
Tensile Strength	80 ksi, 550 MPa
Yield Strength	63 ksi, 430 MPa
Elongation in 2”	32%
CVN	20 ft-lb, 28 J
Temperature	-20°F, -29°C
Spoolarc 40B	
Tensile Strength	88 ksi, 605 MPa
Yield Strength	75 ksi, 515 MPa
Elongation in 2”	26%
CVN	26 ft-lb, 35 J
Temperature	0°F, -18°C
Spoolarc ENIi	
Tensile Strength	89 ksi, 615 MPa
Yield Strength	77 ksi, 530 MPa
Elongation in 2”	26%
CVN	24 ft-lb, 33 J
Temperature	-40°F, -40°C

TYPICAL WIRE CHEMISTRY	
As Welded	
Spoolarc 81	
C	0.06%
Mn	1.40%
Si	0.45%
P	0.020%
S	0.015%
Spoolarc 40B	
C	0.06%
Mn	1.40%
Si	0.40%
P	0.023%
S	0.012%
Mo	0.48%
Cu	0.48%
Spoolarc 29S	
C	0.07%
Mn	1.70%
Si	0.70%
P	0.020%
S	0.012%
Spoolarc 53	
C	0.06%
Mn	1.80%
Si	0.50%
P	0.026%
S	0.010%

OK FLUX 429 continued

TYPICAL WIRE CHEMISTRY continued	
Spoolarc 75	
C	0.05%
Mn	1.50%
Si	0.60%
P	0.018%
S	0.012%
Ni	0.80%
Spoolarc 4ENi4	
C	0.06%
Mn	1.30%
Si	0.40%
P	0.021%
S	0.009%
Cr	1.7%
Ni	1.79%
Mo	0.15%
Cu	0.15%
Spoolarc 71	
C	0.06%
Mn	1.58%
Si	0.58%
P	0.018%
S	0.009%

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
8424F09	OK FLUX 429 14X65 55#BG	662303055721

OK FLUX 10.62 AWS A5.5.17/A5.23

FEATURES

ESAB OK Flux 10.62 is a high basicity, neutral, bonded flux intended primarily for multipass butt welding carbon and low alloy steel plate. OK Flux 10.62 produces weld metal that is very clean metallurgically and exhibits exceptional impact toughness at low temperatures. OK Flux 10.62 provides well-shaped beads and free peeling slag. Applications for OK Flux 10.62 include offshore oil rigs (meets CTOD requirements), fracture critical bridge members, ship construction, pressure vessels, and tank cars. It is suitable for use with AC and DC, single and multiwire systems at currents up to 1000 amps. OK Flux 10.62 should only be used in applications where the base plate is free of rust and mill scale.

CLASSIFICATIONS AND APPROVALS

- AWS A5.17: F7A8-EH12K
- AWS A5.23: F12A6-EF5-G
- AWS A5.23: F11A6-EM4-M4
- AWS A5.23: F9A6-EM2-M2
- AWS A5.23: F8P2-EB-B3
- AWS A5.23: F8P2-EB2-B2
- AWS A5.23: F8P8-ENi4-Ni4
- AWS A5.23: F8A4-ENi4-Ni4
- AWS A5.23: F7A4-ENi1-Ni1
- AWS A5.23: F9P4-EA3-A3
- AWS A5.23: F9A8-EA3-A3
- AWS A5.23: F8A6-EA2-A2
- AWS A5.17: F7P6-EM14K
- AWS A5.17: F7A6-EM14K
- AWS A5.17: F6P8-EM12K
- AWS A5.17: F7P6-EH12K
- AWS A5.17: F7A8-EM12K

INDUSTRIES

- Civil Construction
- Shipbuilding
- Petrochemical
- Process
- Pipeline
- Rail Road Car
- General Fabrication
- Mobile Machinery
- Power Generation
- Bridge Construction
- Steel Industry

WELDING PROCESS

- SAW (Subarc)

TYPICAL MECHANICAL PROPERTIES

Spoolarc 81	
Tensile Strength	75 ksi, 555 MPa
Yield Strength	65 ksi, 450 MPa
Elongation in 2”	32%
CVN	110 ft-lb, 150 J
Temperature	-60°F, -51°C
Spoolarc 40B	
Tensile Strength	88 ksi, 605 MPa
Yield Strength	79 ksi, 545 MPa
Elongation in 2”	25%
CVN	33 ft-lb, 45 J
Temperature	-60°F, -51°C
Spoolarc 53	
Tensile Strength	82 ksi, 565 MPa
Yield Strength	70 ksi, 485 MPa
Elongation in 2”	29%
CVN	65 ft-lb, 88 J
Temperature	-80°F, -62°C
Spoolarc 75	
Tensile Strength	80 ksi, 550 MPa
Yield Strength	69 ksi, 475 MPa
Elongation in 2”	60%
CVN	100 ft-lb, 136 J
Temperature	-40°F, -40°C
Spoolarc ENi4	
Tensile Strength	86 ksi, 595 MPa
Yield Strength	74 ksi, 510 MPa
Elongation in 2”	29%
CVN	97 ft-lb, 132 J
Temperature	-40°F, -40°C

OK FLUX 10.62 continued

TYPICAL MECHANICAL PROPERTIES	
Spoolarc 71	
Tensile Strength	85 ksi, 590 MPa
Yield Strength	75 ksi, 515 MPa
Elongation in 2”	28%
CVN	100 ft-lb, 136 J
Temperature	-60°F, -51°C
Spoolarc 40	
Tensile Strength	102 ksi, 700 MPa
Yield Strength	87 ksi, 600 MPa
Elongation in 2”	27%
CVN	37 ft-lb, 50 J
Temperature	-80°F, -62°C
Spoolarc 95	
Tensile Strength	104 ksi, 715 MPa
Yield Strength	95 ksi, 655 MPa
Elongation in 2”	25%
CVN	49 ft-lb, 66 J
Temperature	-60°F, -51°C
Spoolarc 120	
Tensile Strength	120 ksi, 825 MPa
Yield Strength	110 ksi, 760 MPa
Elongation in 2”	21%
CVN	68 ft-lb, 89 J
Temperature	-60°F, -51°C
Spoolarc 100	
Tensile Strength	134 ksi, 925 MPa
Yield Strength	124 ksi, 855 MPa
Elongation in 2”	20%
CVN	52 ft-lb, 70 J
Temperature	-60°F, -51°C

TYPICAL MECHANICAL PROPERTIES	
Stress Relieved 1 hr @ 1150ºF	
Spoolarc 81	
Tensile Strength	70 ksi, 480 MPa
Yield Strength	54 ksi, 370 MPa
Elongation in 2”	32%
CVN	160 ft-lb, 217 J
Temperature	-50°F, -46°C
Spoolarc 71	
Tensile Strength	83 ksi, 575 MPa
Yield Strength	72 ksi, 500 MPa
Elongation in 2”	30%
CVN	119 ft-lb, 160 J
Temperature	-60°F, -51°C
Spoolarc ENi4	
Tensile Strength	89 ksi, 610 MPa
Yield Strength	75 ksi, 515 MPa
Elongation in 2”	28%
CVN	47 ft-lb, 64 J
Temperature	-100°F, -73°C
Spoolarc 53	
Tensile Strength	77 ksi, 530 MPa
Yield Strength	63 ksi, 430 MPa
Elongation in 2”	31%
CVN	84 ft-lb, 114 J
Temperature	-60°F, -51°C
Spoolarc 40	
Tensile Strength	96 ksi, 660 MPa
Yield Strength	86 ksi, 595 MPa
Elongation in 2”	27%
CVN	21 ft-lb, 28 J
Temperature	-80°F, -62°C

OK FLUX 10.62 continued

TYPICAL MECHANICAL PROPERTIES	
Stress Relieved 1 hr @ 1150°F continued	
Spoolarc U515	
Tensile Strength	87 ksi, 600 MPa
Yield Strength	75 ksi, 515 MPa
Elongation in 2”	27%
CVN	140 ft-lb, 190 J
Temperature	-20°F, -29°C
OK Autrod 13.20SC	
Tensile Strength	91 ksi, 630 MPa
Yield Strength	77 ksi, 530 MPa
Elongation in 2”	25%
CVN	59 ft-lb, 80 J
Temperature	-20°F, -29°C
Stress Relieved 8 hrs @ 1150°F	
Spoolarc 71	
Tensile Strength	83 ksi, 570 MPa
Yield Strength	74 ksi, 515 MPa
Elongation in 2”	28%
CVN	138 ft-lb, 187 J
Temperature	-60°F, -51°C
Spoolarc ENi4	
Tensile Strength	90 ksi, 645 MPa
Yield Strength	78 ksi, 540 MPa
Elongation in 2”	27%
CVN	62 ft-lb, 84 J
Temperature	-100°F, -73°C
Spoolarc 40	
Tensile Strength	93 ksi, 640 MPa
Yield Strength	83 ksi, 570 MPa
Elongation in 2”	26%
CVN	67 ft-lb, 91 J
Temperature	-40°F, -40°C

TYPICAL MECHANICAL PROPERTIES	
Stress Relieved 8 hrs @ 1150°F continued	
Spoolarc U515	
Tensile Strength	87 ksi, 600 MPa
Yield Strength	75 ksi, 515 MPa
Elongation in 2”	27%
CVN	140 ft-lb, 190 J
Temperature	-20°F, -29°C

TYPICAL WIRE CHEMISTRY	
As Welded	
Spoolarc 81	
C	0.07%
Mn	1.0%
Si	0.3%
P	0.016%
S	0.007%
Spoolarc 40B	
C	0.09%
Mn	1.0%
Si	0.2%
P	0.016%
S	0.010%
Mo	0.5%
Cu	0.50%
Spoolarc 53	
C	0.08%
Mn	1.5%
Si	0.3%
P	0.018%
S	0.009%

OK FLUX 10.62 continued

TYPICAL WIRE CHEMISTRY continued	
As Welded	
Spoolarc 75	
C	0.07%
Mn	1.0%
Si	0.5%
P	0.009%
S	0.005%
Ni	0.8%
Spoolarc ENi4	
C	0.01%
Mn	1.8%
Si	0.3%
P	0.004%
S	0.004%
Ni	1.8%
Mo	0.16%
Spoolarc 71	
C	0.06%
Mn	1.1%
Si	0.4%
P	0.012%
S	0.004%
Spoolarc 40	
C	0.06%
Mn	1.7%
Si	0.2%
P	0.012%
S	0.004%
Mo	0.5%
Cu	0.5%

TYPICAL WIRE CHEMISTRY continued	
As Welded	
Spoolarc 95	
C	0.05%
Mn	1.4%
Si	0.4%
P	0.008%
S	0.006%
Cr	0.2%
Ni	1.60%
Mo	0.3%
Cu	0.30%
Spoolarc 120	
C	0.07%
Mn	1.6%
Si	0.3%
P	0.006%
S	0.013%
Cr	0.3%
Ni	2.3%
Mo	0.5%
Cu	0.50%
Spoolarc 100	
C	0.09%
Mn	1.9%
Si	0.3%
P	0.014%
S	0.003%
Cr	0.4%
Ni	2.4%
Mo	0.5%
Cu	0.50%

OK FLUX 10.62 continued

TYPICAL WIRE CHEMISTRY continued	
As Welded	
Spoolarc U515	
C	0.05%
Mn	0.70%
Si	0.19%
P	0.011%
S	0.007%
Cr	1.60%
Ni	0.04%
Mo	0.52%
Cu	0.52%
Spoolarc 13.20SC	
C	0.08%
Mn	0.60%
Si	0.20%
P	0.010%
S	0.005%
Cr	2.0%
Mo	0.85%
Cu	0.85%

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1062000U00	OK FLUX 10.62 55#BG	662303085124
1062300U00	OK FLUX 10.62 50#SB	662303087425
1062400U00	OK FLUX 10.62 50#SG	662303086787

OK FLUX 10.71 AWS A5.17

FEATURES

OK Flux 10.71 is a neutral, bonded flux intended primarily for multipass butt and fillet welding of carbon and low alloy steels. It combines outstanding welding performance with excellent weld properties. OK Flux 10.71 is suitable for use with AC and DC, single and multiwire systems at currents up to 1000 amps. It should not be used in applications where there is heavy rust or mill scale on the base plate. Among the many areas where OK 10.71 is used are general structural welding, bridge fabrication, heavy equipment fabrication, and line pipe welding.

CLASSIFICATIONS AND APPROVALS

- AWS A5.17: F7A4-EM13K
- AWS A5.17: F7P4-EM14K
- AWS A5.17: F7A5-EH12K
- AWS A5.23: F8A4-ENi1K-Ni1
- AWS A5.17: F7P5-EH12K
- AWS A5.17: F7A2-EM14K
- AWS A5.17: F7A4-EM12K

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- General Fabrication
- Bridge
- Heavy Equipment
- Pipeline

TYPICAL MECHANICAL PROPERTIES

Spoolarc 81	
Tensile Strength	81 ksi, 560 MPa
Yield Strength	68 ksi, 470 MPa
Elongation in 2”	30%
CVN	44 ft-lb, 60 J
Temperature	-40°F, -40°C
Spoolarc 29S	
Tensile Strength	87 ksi, 600 MPa
Yield Strength	73 ksi, 505 MPa
Elongation in 2”	30%
CVN	30 ft-lb, 41 J
Temperature	-40°F, -40°C
Spoolarc 53	
Tensile Strength	91 ksi, 625 MPa
Yield Strength	77 ksi, 530 MPa
Elongation in 2”	28%
CVN	45 ft-lb, 61 J
Temperature	-50°F, -46°C
Spoolarc 75	
Tensile Strength	91 ksi, 625 MPa
Yield Strength	78 ksi, 540 MPa
Elongation in 2”	28%
CVN	43 ft-lb, 58 J
Temperature	-40°F, -40°C
Spoolarc 71	
Tensile Strength	87 ksi, 600 MPa
Yield Strength	76 ksi, 525 MPa
Elongation in 2”	27%
CVN	48 ft-lb, 65 J
Temperature	-20°F, -29°C

OK FLUX 10.71 continued

TYPICAL MECHANICAL PROPERTIES	
Stress Relieved 1 hr @1150ºF	
Spoolarc 71	
Tensile Strength	92 ksi, 635 MPa
Yield Strength	74 ksi, 510 MPa
Elongation in 2”	30%
CVN	38 ft-lb, 51 J
Temperature	-40°F, -40°C
Spoolarc 53	
Tensile Strength	79 ksi, 545 MPa
Yield Strength	65 ksi, 448 MPa
Elongation in 2”	32%
CVN	80 ft-lb, 108 J
Temperature	-50°F, -46°C
Stress Relieved 8 hrs @1150ºF	
Spoolarc 71	
Tensile Strength	91 ksi, 625 MPa
Yield Strength	74 ksi, 510 MPa
Elongation in 2”	30%
CVN	35 ft-lb, 47 J
Temperature	-40°F, -40°C

TYPICAL WIRE CHEMISTRY	
As Welded	
Spoolarc 81	
C	0.07%
Mn	1.50%
Si	0.50%
P	0.020%
S	0.011%
Spoolarc 29S	
C	0.06%
Mn	1.80%
Si	0.80%
P	0.014%
S	0.007%
Spoolarc 53	
C	0.07%
Mn	1.80%
Si	0.50%
P	0.022%
S	0.010%
Spoolarc 75	
C	0.07%
Mn	1.70%
Si	0.70%
P	0.016%
S	0.012%
Ni	0.90%
Spoolarc 71	
C	0.06%
Mn	1.70%
Si	0.60%
P	0.018%
S	0.009%

OK FLUX 10.71 continued

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1071H00U00	OK FLUX 10.71 2200#BG	662303086459
1071000U00	OK FLUX 10.71 55#BG	662303085100

OK FLUX 10.72 AWS A5.17/A5.23

FEATURES

OK Flux 10.72 is a neutral, bonded aluminate-basic flux. It is primarily used for for applications with toughness requirements down to -50°C in high dilution joints. It provides excellent slag removal also in narrow V-joints. It is recommended for joining structural steels, fine grained steels and creep resistant steels. It has proved to be especially appropriate for wind tower productions. OK Flux 10.72 features extremely high current carrying capacity and is intended for single or multi wire procedures using DC and AC power. It can be used for single layer and multi layer welding of unlimited plate thickness.

CLASSIFICATIONS AND APPROVALS

- AWS A5.23: F9A4-ENi4-Ni4
- AWS A5.17: F7P5-EM14K
- AWS A5.17: F7A8-EM12K
- AWS A5.23: F8A4-ENi1K-Ni1
- AWS A5.17: F6P8-EM12K

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- Structural
- Wind Towers

TYPICAL MECHANICAL PROPERTIES

Spoolarc 81	
Tensile Strength	75 ksi, 515 MPa
Yield Strength	62 ksi, 425 MPa
Elongation in 2”	30%
CVN	35 ft-lb, 50 J
Temperature	-80°F, -62°C
Spoolarc 75	
Tensile Strength	89 ksi, 655 MPa
Yield Strength	76 ksi, 550 MPa
Elongation in 2”	28%
CVN	110 ft-lb, 149 J
Temperature	-40°F, -40°C
Spoolarc ENi4	
Tensile Strength	96 ksi, 680 MPa
Yield Strength	85 ksi, 585 MPa
Elongation in 2”	26%
CVN	115 ft-lb, 156 J
Temperature	-40°F, -40°C
Stress Relieved 1 hr @ 1150°F	
Spoolarc 81	
Tensile Strength	74 ksi, 510 MPa
Yield Strength	59 ksi, 405 MPa
Elongation in 2”	32%
CVN	35 ft-lb, 50 J
Temperature	-80°F, -62°C
Stress Relieved 8 hrs @ 1150°F	
Spoolarc 81	
Tensile Strength	74 ksi, 510 MPa
Yield Strength	58 ksi, 400 MPa
Elongation in 2”	34%
CVN	120 ft-lb, 163 J
Temperature	-50°F, -46°C

OK FLUX 10.72 continued

TYPICAL WIRE CHEMISTRY	
Spoolarc 81	
C	0.06%
Mn	1.60%
Si	0.30%
P	0.013%
S	0.009%
Spoolarc 75	
C	0.06%
Mn	1.80%
Si	0.50%
P	0.013%
S	0.009%
Ni	0.90%
Spoolarc ENi4	
C	0.07%
Mn	1.60%
Si	0.20%
P	0.012%
S	0.006%
Ni	1.80&
Mo	0.15%
Cu	0.15%

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1072H00U00	OK FLUX 10.72 2200#BG	662303086473
1072000U00	OK FLUX 10.72 55#BG	662303085117

OK FLUX 10.77 AWS A5.17/A5.23

FEATURES

OK Flux 10.77 is an aglomerated, basic flux designed primarily for multi-wire procedures in the production of spiral welded line pipes.

The flux alloys some Si and mn to the weld metal and it works equally well on DC and AC current. It is used in single wire, tandem and 3-wire systems and it is also suitable for longitudinal welded pipes of limited plate thicknesses.

OK Flux 10.77 produces welded joints with shallow reinforcement, low transition angles and smooth surface finish even at high welding speeds. A shallow reinforcement means cost saving in the later pipe coating operation, since the coating thickness can be reduced. With different wires it is suitable for all mild and high strength line pipe steels.

CLASSIFICATIONS AND APPROVALS

- AWS A5.17: F7A5-EM12K
- AWS A5.23: F7P2-EA2-A2
- AWS A5.23: F8A4-EA2-A2
- AWS A5.23: F8TA6-EG

WELDING PROCESS

- SAW (Subarc)

INDUSTRIES

- Spiral Pipe

TYPICAL MECHANICAL PROPERTIES

As Welded	
Spoolarc 81	
Tensile Strength	75 ksi, 520 MPa
Yield Strength	61 ksi, 420 MPa
Elongation in 2”	26%
CVN	81 ft-lb, 110 J
Temperature	-20°F, -29°C
OK Autrod 13.64	
Tensile Strength	94 ksi, 650 MPa
Yield Strength	80 ksi, 550 MPa
Elongation in 2”	24%
CVN	44 ft-lb, 60 J
Temperature	-60°F, -51°C
OK Autrod 12.24	
Tensile Strength	84 ksi, 580 MPa
Yield Strength	72 ksi, 495 MPa
Elongation in 2”	25%
CVN	30 ft-lb, 40 J
Temperature	-40°F, -49°C
Stress Relieved 1 hr @ 1150^{0}F	
OK Autrod 12.24	
Tensile Strength	80 ksi, 550 MPa
Yield Strength	65 ksi, 450 MPa
Elongation in 2”	25%
CVN	18 ft-lb, 25 J
Temperature	-40°F, -40°C

OK FLUX 10.77 continued

TYPICAL WIRE CHEMISTRY	
Spoolarc 81	
C	0.07%
Mn	1.4%
Si	0.4%
OK Autrod 12.24	
C	0.07%
Mn	1.3%
Si	0.3%

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
1077H00U00	OK FLUX 10.77 2200#BG	662303087876
1077000U00	OK FLUX 10.77 55#BG	662303086619

Additional SAW Wire Products

- Spoolarc 86
- Spoolarc 36
- Spoolarc 83
- Spoolarc 40
- Spoolarc 100

Additional SAW Flux Products

- OK Flux 10.69

For additional information on the above products, please visit us at www.esabna.com

OK AUTROD 308L AWS A5.9: 308/308L

FEATURES

A continuous, solid, corrosion-resistant, chromium-nickel wire. OK Autrod 308L has good general corrosion resistance. The alloy has a low carbon content which makes it particularly suitable for applications where there is a risk of intergranular corrosion. OK Autrod 308L is widely used in the chemical and food-processing industries, as well as for pipes, tubes and boilers and can be used in combination with OK Flux 10.93, OK Flux 10.94 or OK Flux 10.95.

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 6
- ASME II SFA 5.9 ER308/308L
- CWB
- ABS
- VdTUV

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Shipbuilding
- Automotive
- General Fabrication
- Food and Beverage
- Process

TYPICAL MECHANICAL PROPERTIES

As Welded	
Tensile Strength	54 ksi, 370 MPa
Yield Strength	90 ksi, 620 MPa
Elongation in 2”	36%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 68°F (20°C)	
	81 ft-lb, 110 J
Testing Temperature -130°F (-900°C)	
	66 ft-lb, 90 J
Testing Temperature -76°F (-60°C)	
	44 ft-lb, 60 J

TYPICAL WIRE CHEMISTRY

C	0.030%
Mn	1.5%
Si	0.3%
P	.030%
S	.020%
Cr	19.5%
Ni	9%
Mo	.3%
N	.08%
Cu	.3%

OK AUTROD 308L continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Wire Feed Speed in/min (cm/min)	Deposition Rate lb/hr (kg/hr)
5/64 (2.0)	250	118 (300)	9.6 (21.2)
	300	142 (361)	11.6 (25.6)
	350	166 (422)	13.6 (30.0)
	400	189 (480)	15.4 (33.9)
3/32 (2.4)	300	108 (274)	12.7 (28.0)
	350	126 (320)	14.8 (32.6)
	400	144 (366)	17 (37.5)
	450	162 (411)	19.1 (42.1)
1/8 (3.2)	350	56 (142)	11.7 (25.8)
	400	63 (160)	13.2 (29.1)
	450	71 (180)	14.9 (32.8)
	500	79 (201)	16.5 (36.4)
	550	87 (221)	18.2 (40.1)
5/32 (4.0)	400	39 (99)	12.8 (28.2)
	450	43 (109)	14.1 (31.1)
	500	48 (122)	15.7 (34.6)
	550	53 (135)	17.3 (38.1)
	600	58 (147)	19 (41.9)
	650	63 (160)	20.6 (45.5)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
161016311A	ES OK ER308L 1/6X55#CL	662303077556
161024311A	ES OK ER308L 3/32X55#CL	662303089306
161032311A	ES OK ER308L 1/8X55#CL	662303089313
161040311A	ES OK ER308L 5/32X55#CL	662303089320

OK AUTROD 309L AWS A5.9: ER309/309L

FEATURES

A continuous, solid, corrosion resisting chromium-nickel wire for welding of similar steels, wrought and cast steels of 23% Cr-12% Ni types. The alloy is also used for welding of buffer layers on CMn steels and welding of dissimilar joints. When using the wire for buffer layers and dissimilar joints it is necessary to control the dilution of the weld.

OK Autrod 309L has a good general corrosion resistance. When used for joining dissimilar materials the corrsion resistance is of secondary importance.

CLASSIFICATIONS AND APPROVALS

- ASME IX F No. 6
- ABS
- CWB
- ASME II SFA 5.9 ER309/309L

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Shipbuilding
- Process
- General Fabrication
- Automotive

TYPICAL MECHANICAL PROPERTIES

As Welded	
Tensile Strength	64 ksi, 440 MPa
Yield Strength	87 ksi, 600 MPa
Elongation in 2”	41%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 68°F (20°C)	
	118 ft-lb, 160 J
Testing Temperature -76°F (-60°C)	
	96 ft-lb, 130 J
Testing Temperature -166°F (-110°C)	
	66 ft-lb, 90 J

TYPICAL WIRE CHEMISTRY

C	0.3%
Mn	1.5%
Si	0.4%
P	0.01%
S	0.005%
Cr	23.5%
Ni	12.5%
Mo	.1%
N	.11%
Cu	.1%

OK AUTROD 309L continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Wire Feed Speed in/min (cm/min)	Deposition Rate lb/hr (kg/hr)
5/64 (2.0)	250	118 (300)	9.6 (21.2)
	300	142 (361)	11.6 (25.6)
	350	166 (422)	13.6 (30.0)
	400	189 (480)	15.4 (33.9)
3/32 (2.4)	300	108 (274)	12.7 (28.0)
	350	126 (320)	14.8 (32.6)
	400	144 (366)	17 (37.5)
	450	162 (411)	19.1 (42.1)
1/8 (3.2)	350	56 (142)	11.7 (25.8)
	400	63 (160)	13.2 (29.1)
	450	71 (180)	14.9 (32.8)
	500	79 (201)	16.5 (36.4)
	550	87 (221)	18.2 (40.1)
5/32 (4.0)	400	39 (99)	12.8 (28.2)
	450	43 (109)	14.1 (31.1)
	500	48 (122)	15.7 (34.6)
	550	53 (135)	17.3 (38.1)
	600	58 (147)	19 (41.9)
	650	63 (160)	20.6 (45.5)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
257033324	AB ER309L 3/32X60#CL	662303008444
165332311A	ES OK ER309L 1/8X55#CL	662303089337

OK AUTROD 316L AWS A5.9: ER316/316L

FEATURES

A continuous, solid, corrosion-resistant wire for welding austenitic stainless alloys of the 18% Cr-8% Ni-3% Mo types. OK Autrod 316L has good general corrosion resistance. In particular, the alloy has very good resistance to corrosion in acid and chlorinated environments. Arcaloy ER316L has a low carbon content which makes it particularly recommended where there is a risk of intergranular corrosion. The alloy is widely used in chemical and food-processing industries, as well as shipbuilding and various types of architectural structure. OK Autrod 316L can be used in combination with OK Flux 10.93 or OK Flux 10.95.

CLASSIFICATIONS AND APPROVALS

- AWS A5.9: ER316/316L
- ASME SFA 5.9: ER316/316L
- VdTUV

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Shipbuilding
- Rail Road Car
- Automotive
- Process
- Petrochemical
- General Fabrication

TYPICAL MECHANICAL PROPERTIES

As Welded	
Tensile Strength	64 ksi, 440 MPa
Yield Strength	90 ksi, 620 MPa
Elongation in 2”	37%

CHARPY V-NOTCH PROPERTIES

Testing Temperature 68°F (20°C)	
	89 ft-lb, 120 J
Testing Temperature -76°F (-60°C)	
	70 ft-lb, 95 J
Testing Temperature -321°F (-196°C)	
	41 ft-lb, 55 J

TYPICAL WIRE CHEMISTRY

C	.03%
Mn	1.3%
Si	.3%
P	.030%
S	.02%
Cr	18%
Ni	11%
Mo	2.5%
N	.08%
Cu	.03%

OK AUTROD 316L continued

SUBARC DEPOSITION TABLE			
Diameter in (mm)	Amps	Wire Feed Speed in/min (cm/min)	Deposition Rate lb/hr (kg/hr)
5/64 (2.0)	250	118 (300)	9.6 (21.2)
	300	142 (361)	11.6 (25.6)
	350	166 (422)	13.6 (30.0)
	400	189 (480)	15.4 (33.9)
3/32 (2.4)	300	108 (274)	12.7 (28.0)
	350	126 (320)	14.8 (32.6)
	400	144 (366)	17 (37.5)
	450	162 (411)	19.1 (42.1)
1/8 (3.2)	350	56 (142)	11.7 (25.8)
	400	63 (160)	13.2 (29.1)
	450	71 (180)	14.9 (32.8)
	500	79 (201)	16.5 (36.4)
	550	87 (221)	18.2 (40.1)
5/32 (4.0)	400	39 (99)	12.8 (28.2)
	450	43 (109)	14.1 (31.1)
	500	48 (122)	15.7 (34.6)
	550	53 (135)	17.3 (38.1)
	600	58 (147)	19 (41.9)
	650	63 (160)	20.6 (45.5)

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
257061127	AB ER316L 1/16X60#CL	662303027308
257063321	AB ER316L 3/32X60#CL	662303008499
257061820	AB ER316L 1/8X60#CL	662303027322
163024311A	ES OK ER316L 3/32X55#CL	662303077655
1603032311A	ES OK ER316L 1/8X55#CL	662303089344

OK FLUX 10.93

FEATURES

OK Flux 10.93 is a basic non-alloying agglomerated flux for the submerged arc welding of stainless steels and high-alloyed CrNiMo steels including duplex stainless steels.

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Power Generation
- Rail Road Car
- Petrochemical
- General Fabrication
- Pipeline
- Process

TYPICAL MECHANICAL PROPERTIES

Arcaloy ER308L	
Tensile Strength	81 ksi, 560 MPa
Yield Strength	58 ksi, 400 MPa
Elongation in 2”	38%
CVN	122 ft-lb, 90 J
Temperature	70 °F, 20 °C
Arcaloy ER309L	
Tensile Strength	83 ksi, 570 MPa
Yield Strength	62 ksi, 430 MPa
Elongation in 2”	33%
CVN	122 ft-lb, 90 J
Temperature	70 °F, 20 °C
Arcaloy ER316L	
Tensile Strength	82 ksi, 565 MPa
Yield Strength	57 ksi, 390 MPa
Elongation in 2”	42%
CVN	136 ft-lb, 100 J
Temperature	70 °F, 20 °C

OK FLUX 10.93 continued

TYPICAL WIRE CHEMISTRY	
OK Autrod 308L	
C	0.03% Max.
Si	0.3%
Mn	0.8%
P	0.03% Max.
S	0.025% Max.
Cr	18.5%
Ni	8.5%
Mo	0.75% Max.
Cu	0.75% Max.
N	0.5%
OK Autrod 309L	
C	0.03% Max.
Si	0.3%
Mn	0.6%
P	0.03% Max.
S	0.03% Max.
Cr	22.5%
Ni	11.0%
Mo	0.5% Max.
Cu	0.5% Max.
N	0.5%

TYPICAL WIRE CHEMISTRY continued	
OK Autrod 316L	
C	0.03% Max.
Si	0.3%
Mn	0.8%
P	0.03% Max.
S	0.025% Max.
Cr	17.0%
Ni	10.0%
Mo	2.2%
Cu	0.75% Max.
N	0.5%

PART NUMBER / PRODUCT INFORMATION		
Part Number	Description	UPC
109310000A	OK Flux 10.93 20KG BG	662303079642

Additional (SS-SAW) Products

- OK Autrod 2209
- OK Autrod 2509
- OK Flux 10.94
- OK Flux 10.95

For additional information on the above products, please visit us at www.esabna.com

OK BAND 308L AWS A5.9 EQ308L

FEATURES

OK Band 308L is a stainless welding strip designed for surfacing using the Submerged Arc Welding process. Together with OK Band 309L and OK Flux 10.05, produces a type 308L weld deposit.

TYPICAL WIRE CHEMISTRY

C	0.02%
Mn	1.80%
Si	0.50%
P	-
S	-
Cr	20.0%
Ni	10.0%
Mo	<0.3%
Other	-

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.9 EQ308L
- ASME SFA 5.9: EQ308L

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Pressure Vessel
- Petrochemical

RECOMMENDED WELDING PARAMETERS AND DEPOSTION DATA

Amps	Volts	Welding Parameters	Deposition Rate
750	28	5 in/min (12 cm/min)	31 lbs/h (14 kg/h), 345 inch^2/h (0.23 m^2/h)

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
1161560200	ES OKBAND 308L 60MMX25KG CL	662303071097

OK BAND 309L AWS A5.9 EQ309L

FEATURES

OK Band 309L is a stainless welding strip intended for the initial cladded layer with OK Flux 10.05. It provides a buffer layer when used with 308L, 316L, 317L, or 347 to produce the desired analysis of the second layer.

OK Band 309L ESW is a stainless strip for single-layer electroslag strip surfacing. Together with OK FLux 10.10, it produces a 308L type of weld deposit.

Former product name was OK Band 11.65

*This item is subject to Industry Alloy Surcharges.

TYPICAL WIRE CHEMISTRY

C	0.02%
Mn	1.80%
Si	0.50%
P	-
S	-
Cr	24.0%
Ni	13.0%
Mo	<0.3%
Other	-

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.9 EQ309L
- ASME SFA 5.9: EQ309L

WELDING PROCESS

- SAW (Sub Arc)
- ESW (Electroslag)

INDUSTRIES

- Petrochemical
- Pressure Vessel

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
1165530200	ES OKBAND 309L 30MMX25KG CL	662303084936
1165560200	ES OKBAND 309L 60MMX25KG CK	662303071059

OK BAND 316L AWS A5.9 EQ316L

FEATURES

OK Band 316L is a stainless welding strip designed for surfacing using the Submerged Arc Welding process. Together with OK Band 309L and OK Flux 10.05, produces a type 316L weld deposit.

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.9 EQ316L

TYPICAL WIRE CHEMISTRY

C	0.02%
Mn	1.80%
Si	0.50%
P	-
S	-
Cr	19.0%
Ni	12.50%
Mo	2.80%
Other	-

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Petrochemical
- Pressure Vessel

RECOMMENDED WELDING PARAMETERS AND DEPOSTION DATA

Amps	Volts	Welding Parameters	Deposition Rate
750	28	5 in/min (12 cm/min)	31 lbs/h (14 kg/h), 345 inch^2/h (0.23 m^2/h)

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
1163530200	ES OKBAND 316L 30MMX25KG CL	662303084851
1163560200	ES OKBAND 316L 60MMX25KG CL	662303071080

OK BAND 317L AWS A5.9 EQ317L

FEATURES

OK Band 317L is a stainless welding strip designed for surfacing using the Submerged Arc Welding process. Together with OK Band 309L and OK Flux 10.05, produces a type 317L weld deposit.

TYPICAL WIRE CHEMISTRY

C	0.03%
Mn	2.0%
Si	0.60%
P	-
S	-
Cr	20.0%
Ni	1.50%
Mo	4.0%
Other	Cu <1%

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.9 EQ317L

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Petrochemical
- Pressure Vessel

RECOMMENDED WELDING PARAMETERS AND DEPOSTION DATA

Amps	Volts	Welding Parameters	Deposition Rate
750	28	5 in/min (12 cm/min)	31 lbs/h (14 kg/h), 345 $inch^2$/h (0.23 m^2/h)

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
1167560200	ES OKBAND 317L 60MMX25KG CL	662303081683

OK BAND 347 AWS A5.9 EQ347

FEATURES

OK Band 347 is a stainless welding strip designed for surfacing using the Submerged Arc Welding process. Together with OK Band 309L and OK Flux 10.05, produces a type 347 weld deposit.

TYPICAL WIRE CHEMISTRY

C	0.02%
Mn	1.80%
Si	0.50%
P	-
S	-
Cr	20.0%
Ni	10.0%
Mo	<0.3%
Other	Nb 1.0%

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.9 EQ347

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Petrochemical
- Pressure Vessel

RECOMMENDED WELDING PARAMETERS AND DEPOSTION DATA

Amps	Volts	Welding Parameters	Deposition Rate
750	28	5 in/min (12 cm/min)	31 lbs/h (14 kg/h), 345 inch^2/h (0.23 m^2/h)

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
1162560200	ES OKBAND 347 60MMX25KG CL	662303073220

OK BAND 309LNb AWS A5.9 EQ309LNb

FEATURES

OK Band 309LNb is a stainless welding strip designed for the electroslag welding process. Together with OK Flux 10.10, produces a type 347 weld deposit.

TYPICAL WIRE CHEMISTRY

C	0.01%
Mn	1.8%
Si	0.5%
P	-
S	-
Cr	24%
Ni	13%
Mo	0.5%
Other	-

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.9 EQ309LNb

WELDING PROCESS

- ESW (Electroslag)
- SAW (Sub Arc)

INDUSTRIES

- Pressure Vessel
- Petrochemical

RECOMMENDED WELDING PARAMETERS AND DEPOSTION DATA

Amps	Volts	Welding Parameters	Deposition Rate
1250	25	6 in/min (16 cm/min)	51 lbs/h (23 kg/h), 555 inch²/h (0.35 m²/h)

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
1172560200	ES OKBAND 309LNB 60MMX25KG CL	662303084950

OK BAND 309LMo AWS A5.9 EQ309LMo

FEATURES

OK Band 309LMo is a stainless welding strip designed for the electroslag welding process. Together with OK Flux 10.10, produces a type 316L weld deposits.

TYPICAL WIRE CHEMISTRY

C	0.015%
Mn	1.8%
Si	0.4%
P	-
S	-
Cr	20.5%
Ni	13.5%
Mo	3.1%
Other	-

CLASSIFICATIONS AND APPROVALS

- SFA/AWS A5.9 EQ309LMo

WELDING PROCESS

- ESW (Electroslag)
- SAW (Sub Arc)

INDUSTRIES

- Petrochemical
- Pressure Vessel

RECOMMENDED WELDING PARAMETERS AND DEPOSTION DATA

Amps	Volts	Welding Parameters	Deposition Rate
1250	25	6 in/min (16 cm/min)	51 lbs/h (23 kg/h), 555 inch²/h (0.35 m²/h)

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
1173530200	ES OKBAND 309LMO 30MMX25KG CL	662303085384
1173560200	ES OKBAND 309LMO 60MMX25KG CL	662303071035
1173560600	ES OKBAND 309LMO 60MMX60KG CL	662303084974

OK FLUX 10.05

FEATURES

OK Flux 10.05 is an agglomerated flux for submerged arc strip cladding. It is recommended for cladding with the Cr, CrNi and CrNiMo types of stainless strips. Slag removal and overlapping with this flux are excellent.

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Process
- Petrochemical

TYPICAL WIRE CHEMISTRY

1st layer welded with OK Band 309L	
EQ308L	
C	0.02%
Mn	1%
Si	0.6%
P	-
S	-
Cr	19%
Ni	10.6%
Mo	-
Cu	-
N	-
FN	6

TYPICAL WIRE CHEMISTRY continued

EQ347L	
C	0.02%
Mn	1.1%
Si	0.7%
P	-
S	-
Cr	19%
Ni	10.3%
Mo	-
Cu	-
N	-
FN	8
EQ316L	
C	0.02%
Mn	1.1%
Si	0.7%
P	-
S	-
Cr	18%
Ni	13%
Mo	2.5%
Cu	-
N	-
FN	7

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
100510000A	OK FLUX 10.05 20KG BG	662303076955

OK FLUX 10.10

FEATURES

OK Flux 10.10 is an agglomerated flux designed for electroslag strip surfacing. This flux is particular suitable for strip surfacing with stainless strips of the Cr, CrNi and CrNiMo types, with or without Nb stabilization. The weldability, bead appearance and slag removal of OK Flux 10.10 are excellent.

OK Flux 10.10 together with OK Band 309L produces a 308L weld deposit analysis in one layer.

OK Flux 10.10 together with OK Band 309LNb produces a 347 weld deposit analysis in one layer.

Ok Flux 10.10 together with OK Band 309LMo produces a 316L weld deposit analysis in one layer.

TYPICAL WIRE CHEMISTRY

309LMo	
C	0.02%
Mn	1.2%
Si	0.4%
P	-
S	-
Cr	18%
Ni	12.5%
Mo	2.8%
Nb	-
Fe	6

TYPICAL WIRE CHEMISTRY continued

309LNb	
C	0.03%
Mn	1.3%
Si	0.5%
P	-
S	-
Cr	19%
Ni	10%
Mo	-
Nb	0.4%
Fe	4
309L	
C	0.03%
Mn	1.2%
Si	0.4%
P	-
S	-
Cr	19%
Ni	10%
Mo	-
Nb	-
Fe	4%

INDUSTRIES

- Petrochemical
- Process

WELDING PROCESS

- SAW (Sub Arc)

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
101000000A	OK FLUX 10.10 25KG BG	662303079659

OK FLUX 601

FEATURES

OK Flux 601 is a neutral, bonded flux specifically designed for surfacing applications with type 420 and modified 420 stainless steel wires. When used with Alloy Shield 420 series wires, it produces smooth, well washed beads. The slag is self-peeling even at temperatures over 700°F (371°C). Applications include the rebuilding of continuous caster rolls, crane wheels, and pickler rolls.

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Continuous Caster Rolls

TYPICAL MECHANICAL PROPERTIES

AS 420S Wire	
As Welded	51 Rc
Stress Relieved 7 hr @ 1050^{0}F (565^{0}C)	
	29 Rc
AS 276 Wire	
As Welded	37 Rc
Stress Relieved 7 hr @ 1050^{0}F (565^{0}C)	
	37 Rc

TYPICAL WIRE CHEMISTRY

AS 420S	
C	0.2%
Mn	1.2%
Si	0.3%
P	-
S	-
Cr	11%
Ni	-
Mo	-
V	-
Nb	2.9%
AS 423LS	
C	0.09%
Mn	1.4%
Si	0.6%
P	-
S	-
Cr	12%
Ni	2%
Mo	1.3%
V	0.2%
Nb	3.2%

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
8454F09	OK FLUX 601 55KG BG	662303072896

OK BAND NiCrMo-3

FEATURES

OK Band NiCrMo3 is a nickel-based strip for submerged arc or electroslag strip cladding. Together with OK Flux 10.11 for electroslag welding or OK Flux 10.16 for subarc welding, produces a weld overlay with good corrosion resistance and high-temperature properties.

TYPICAL WIRE CHEMISTRY

C	<0.1%
Mn	0.3%
Si	0.1%
P	-
S	-
Cr	22%
Ni	>58.0%
Mo	9%
N	0.05%
Fe	<2.0%
Other	-

WELDING PROCESS

- SAW (Sub Arc)
- ESW (Electroslag)

INDUSTRIES

- Nuclear

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
1192530200	ES OKBAND NICROMO-3 30MMX25KG	662303087449
119256060A	ES OKBAND NICROMO-3 60MMX60KGCL	662303082932

OK FLUX 10.11

FEATURES

OK Flux 10.11 is a very high basic agglomerated flux for electroslag strip cladding. The flux has low viscosity and is suitable for cladding with Ni-base, Co and fully-austenitic alloys due to its good wetting behavior. It is also suitable for welding at higher travel speeds.

WELDING PROCESS

- ESW (Electroslag)

INDUSTRIES

- Nuclear

TYPICAL WIRE CHEMISTRY

ERNiCrMo-3 First Layer	
C	0.025%
Mn	0.07%
Si	0.45%
P	-
S	-
Cr	19.6%
Ni	Bal.
Mo	8.1%
N	0.01%
Nb + Ta	2.9%
Fe	7%
ERNiCrMo-3 Second Layer	
C	0.02%
Mn	0.03%
Si	0.5%
P	-
S	-
Cr	21.6%
Ni	Bal.
Mo	8%
N	0.01%
Nb + Ta	3.2%
Fe	4%

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
101100000A	OK FLUX 10.11 25#KG BG	662303082741

OK FLUX 10.16

FEATURES

OK Flux 10.16 is an agglomerated fluoride basic, non-alloying flux for submerged arc welding specially designed for joining as well as overlay applications on Ni-based alloys.

WELDING PROCESS

- SAW (Sub Arc)

INDUSTRIES

- Nuclear

TYPICAL WIRE CHEMISTRY

ERNiCr-3	
C	0.04%
Mn	3%
Si	0.5%
P	-
S	-
Cr	19%
Ni	Bal.
Mo	2%
Cu	-
ERNiCrMo-3	
C	0.02%
Mn	1.2%
Si	0.2%
P	-
S	-
Cr	21%
Ni	Bal.
Mo	9%
N	-%

PART NUMBER / PRODUCT INFORMATION

Part Number	Description	UPC
101600000A	OK Flux 10.16 25Kg BG	662303081706

Additional Products

- OK Band NiCr-3
- OK Flux 10.90

For additional information on the above products, please visit us at www.esabna.com

Filler Metal Calculations

Filler Metal Calculations - Section Five

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Calculating Filler Metal Consumption

The number of pounds of welding electrodes or welding wire necessary to complete a given weld joint may be calculated by the formula:

$$P = \frac{WL}{E}$$

Where:

P = Pounds of electrode or wire required

W = Weight per foot of weld metal

L = Length of weld (feet)

E = Deposition efficiency

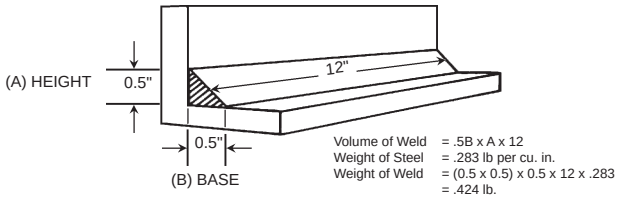
Weight Per Foot of Weld Metal

Calculating the weight of weld metal requires that we consider the following items.

1. Area of the cross-section of the weld.
2. Length of the weld.
3. Volume of the weld in cubic inches.
4. Weight of the weld metal per cubic inch.

In the fillet weld shown below, the area of the cross-section (the triangle) is equal to one half the base times the height, the volume of the weld is equal to the area times the length, and the weight of the weld then, is the volume times the weight of the material (steel) per cubic inch.

This example is for a fillet weld with no reinforcement. Similar calculations can be made for butt or lap joints.



CALCULATING THE WEIGHT PER FOOT OF A FILLET WELD

Deposition Efficiency

The deposition efficiency of an electrode or welding wire indicates the portion of that product you can expect to be deposited as weld metal. Losses due to slag, spatter, fume and in the case of semi automatic or automatic welding processes, the ends cut before each weld and the wire left in the feed cable make no process 100% efficient.

For estimates of electrode or wire consumption, the following average values of deposition efficiency may be used.

Process	Deposition Efficiency
Submerged Arc	99%
Gas Metal Arc (98%A, 2%O2)	98%
Gas Metal Arc (75%A, 25%CO2)	96%
Gas Metal Arc (C02)	93%
Metal Cored Wires	93%
Gas Shielded Flux Cored Wires	86%
Self Shielded Flux Cored Wires	78%
*Shielded Metal Arc (Stick 12” long)	59%
*Shielded Metal Arc (Stick 14” long)	62%
*Shielded Metal Arc (Stick 18” long)	66%

*** Includes 2” stub loss.**

It must be remembered that when deposition tests are performed in the laboratory, the deposition efficiency is calculated by the formula:

$$\text{Deposition Efficiency} = \frac{\text{Weight of Metal Deposited}}{\text{Weight of Electrode Consumed}}$$

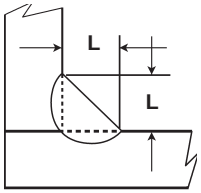
This does not take stub loss into consideration. The chart below shows how the laboratory established efficiency is effected by the length of the stub.

Stub Loss Correction Table for Coated Electrodes

Electrode Length in (mm)	Deposition Efficiency	2” (50 mm) STUB	3” (75 mm) STUB	4” (100 mm) STUB	5” (125 mm) STUB
12 (300)	60%	50.0%	45.0%	40.0%	35.0%
	65%	54.2%	48.7%	43.3%	37.9%
	70%	58.3%	52.5%	46.6%	40.8%
	75%	62.5%	56.2%	50.0%	43.7%
	80%	66.6%	60.0%	53.3%	46.6%
14 (350)	60%	51.4%	47.1%	42.8%	38.5%
	65%	55.7%	51.1%	46.4%	41.8%
	70%	60.0%	55.0%	50.0%	45.0%
	75%	64.3%	58.9%	53.6%	48.2%
	80%	68.5%	62.8%	57.1%	51.4%
18 (450)	60%	53.3%	50.0%	46.6%	43.3%
	65%	57.7%	54.2%	50.5%	46.9%
	70%	62.2%	58.3%	54.4%	50.5%
	75%	66.6%	62.5%	58.3%	54.2%
	80%	71.1%	66.6%	62.2%	57.7%

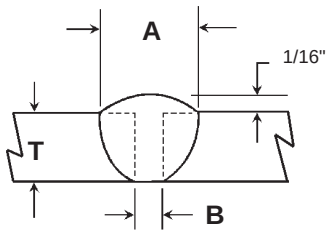
Electrode or Welding Wire Consumption

Horizontal Fillet Welds



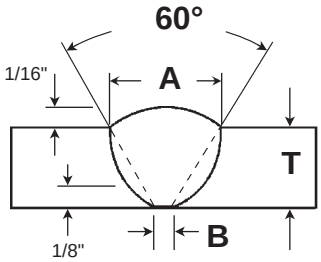
Fillet Size (L) in (mm)		Weld Metal Required lb/ft (kg/m)		Pounds/Foot (Kilos/Meter) of Electrode or Wire Required per Lineal Foot (Meter) of Weld							
				SMAW - Stick Electrodes		GMAW - Solid Wires		FCAW - Gas Sheilded		Metal Cored Wires	
1/8	(3.2)	.027	(0.04)	.043	(0.064)	.028	(0.042)	.032	(0.048)	.029	(0.043)
3/16	(4.7)	.060	(0.089)	.097	(0.144)	.063	(0.094)	.070	(0.104)	.065	(0.097)
1/4	(6.3)	.106	(0.158)	.171	(0.254)	.112	(0.167)	.125	(0.186)	.115	(0.171)
5/16	(7.9)	.166	(0.247)	.268	(0.399)	.175	(0.26)	.195	(0.29)	.180	(0.268)
3/8	(9.5)	.239	(0.356)	.385	(0.573)	.252	(0.375)	.282	(0.42)	.260	(0.387)
1/2	(12.7)	.425	(1.632)	.686	(1.02)	.447	(0.665)	.50	(0.744)	.462	(0.688)
5/18	(15.8)	.664	(0.988)	1.071	(1.594)	.699	(1.04)	.781	(1.162)	.722	(1.074)
3/4	(19.1)	.956	(1.423)	1.542	(2.295)	1.010	(1.503)	1.125	(1.674)	1.039	(1.546)
1	(25.4)	1.698	(2.527)	2.739	(4.076)	1.787	(2.659)	2.0	(2.976)	1.846	(2.747)

Square Butt Joint



Joint Dimensions in (mm)						Weld Metal Required lb/ft (kg/m)		Stick Electrodes Required lb/ft (kg/m)	
T		B		A					
3/16	(4.7)	1/16	(1.6)	3/8	(9.5)	.093	(.138)	.150	(.223)
1/4	(6.3)	1/16	(1.6)	7/16	(11.1)	.115	(.171)	.185	(.275)
		3/32	(2.4)			.142	(.211)	.229	(.341)
5/16	(7.9)	1/16	(1.6)	1/2	(12.7)	.137	(.204)	.220	(.327)
		3/32	(2.4)			.165	(.245)	.266	(.396)

Electrode or Welding Wire Consumption continued



Single V-Butt Joint

Joint Dimensions in (mm)						Weld Metal Required lb/ft (kg/m)		Stick Electrodes Required lb/ft (kg/m)	
T		B		A					
1/4	(6.3)	1/16	(1.6)	5/16	(7.9)	.127	(.189)	.205	(.305)
5/16	(7.9)	3/32	(2.4)	3/8	(9.5)	.222	(.33)	.358	(.533)
3/8	(9.5)	1/8	(3.2)	1/2	(12.7)	.352	(.524)	.568	(.845)
1/2	(12.7)	1/8	(3.2)	5/8	(15.8)	.523	(.778)	.844	(1.26)
5/8	(15.8)	1/8	(3.2)	13/16	(20.6)	.87	(1.29)	1.403	(2.09)
3/4	(19.1)	1/8	(3.2)	15/16	(23.8)	1.217	(1.81)	1.963	(2.92)
1	(25.4)	1/8	(3.2)	1	(31.7)	2.104	(3.13)	3.394	(5.05)

ESAB Weld Metal Cost Worksheet

Prepared For:	Customer Name	Date:	
Formulas for Calculating Cost per Pound Deposited Weld Metal	(1) Proposed Method Cost Calculation **Dual Shield 7100 Ultra (E71T-1)** **1/16" (1.6 mm) @ 300 Amps**	(2) Present Method Cost Calculation **E7018 3/16" (4.8 mm)** **@250 Amps**	Result (Cost Reduction) Cost Increase
	(3) (4) (5)	(4) (6)	(5-6)
Labor & Overhead = Labor & Overhead Cost/Hr ÷ Deposition Rate X Operating Factor	$45.00 ÷ 10.2 X 0.45 = $45.00 ÷ 4.59 = $9.80	$45.00 ÷ 5.4 X 0.3 = $45.00 ÷ 1.62 = $27.78	**($17.98)**
	(3) (4) (9) (5)	(4) (6)	(5-6)
Electrode = Electrode Cost/lb ÷ Deposition Efficiency	1.78 ÷ 0.87 = 2.05	0.85 ÷ 0.64 = 1.33	**0.72**
		2" (50mm) stub	
	(3) (4) (5)	(4) (6)	(5-6)
Gas = Gas Flow Rate (Cu ft/hr) X Gas Cost/Cu ft. ÷ Deposition Rate (lbs/hr)	40 X 0.02 = 0.8 ÷ 10.2 = 0.08	0 X 0 = 0 ÷ 5.4 = 0	**0.08**
	(7)	(8)	(7-8)
Sum of the Above	Total Variable Cost/lb Deposited Weld Metal = **$11.93**	Total Variable Cost/lb Deposited Weld Metal = **$29.11**	**($17.18)** **Total**

Pounds of Weld Metal and Welder Man Hours Required to Amortize Equipment Cost

Equipment Cost		Equipment Cost in Dollars Savings/lb		Pounds of Weld Metal Required to Amortize Cost		Deposition Factor		Welder Man Hours Required to Amortize Cost
Power Supply Wire Feeder Gun & Accessories		$2,900				(9)		
Total	$2,900	$17.18	=	168.8	÷	4.59	=	37 Hours

Instructions

To help you quantify your specific cost of weld metal deposited, ESAB has developed the weld metal cost worksheet. These instructions will assist you in calculating your specific cost to deposit weld metal while comparing it to alternative methods or product.

1. Indicate the complete descriptions of the proposed and present products at (1) and (2).
2. Secure the following information for the formulas (3), and write the data in the proper blanks in the proposed method and present method columns (4).
   a. Labor and Overhead
   Actual labor and overhead rate of your customer. If this figure is unknown, select a reasonable rate for your area. This figure will be the same in the proposed and present method columns.
   b. Deposition Rate in Pounds Per Hour
   The deposition rate is the actual weight of weld metal which can be deposited in one hour at a given welding current at 100% operating factor. In other words, it is the amount of weld metal which could be deposited in one hour if the welder could weld for a full hour without stopping.
   c. Operating Factor
   Operating factor is the percentage of a welder's working day that is actually spent welding. It is the arc time divided by the total hours worked multiplied by 100 and expressed as a percentage. A 30% (.30) operating factor means that only 30% of the welder's day is actually spent welding.

c. Operating Factor (continued)
If the customer's operating factor is not known, assume a 30% operating factor for SMAW and a 45% operating factor for semi-automatic GMAW and FCAW. For automatic GMAW and FCAW, an operating factor of 60% to 80% may be assumed.

d. Electrode Cost Per Pound
Select the quantity price bracket in which the customer now purchases his filler metal. If unknown, select the price bracket you think is applicable and use for both the present and proposed calculations.

e. Deposition Efficiency
The deposition efficiency is the relationship of the electrode used to the amount of the weld metal deposited expressed in percent or:

$$DE = \frac{\text{Weight of Weld Metal}}{\text{Weight of Electrode Used}}$$

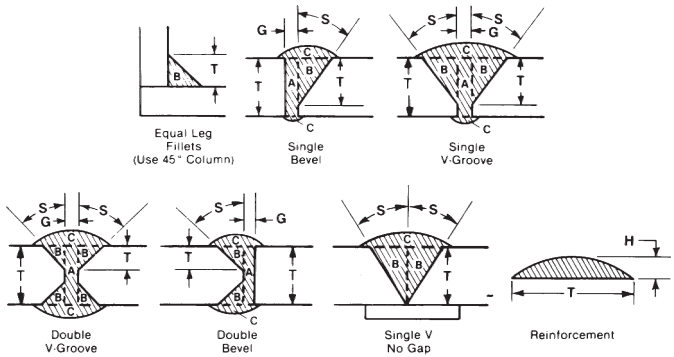
For instance, if it takes 4 lbs. of electrode to deposit 3 lbs. (1.4 kg) of weld metal, E = 3/4 = .75 or 75%.

f. Gas Flow Rate (Cubic Feet/Hour)
For GMAW with solid wires, use a shielding gas flow rate of 25 to 30 cubic feet per hour. For small diameter flux cored electrodes (1/16" (1.6mm) diameter and under), use 35 cubic feet per hour. For large diameter flux cored electrodes (5/64 and over), use 40-45 cubic feet per hour.

g. Gas Cost Per Cubic Foot
Gas cost per cubic foot will vary depending on the type of shielding gas being used and your location.

3. Complete the calculations in the "Proposed Method" and "Present Method" columns and record the calculated costs in the blanks on the far right, (5) & (6) of each column.
4. Add the calculated cost and record the sums at the bottom, (7) & (8) of each column.
5. Subtract "present Method" cost (6) from "Proposed Method" cost (5) for each of the sections titled "Labor & Overhead", "Electrode", and "Gas". Enter the differences in the blanks indicated at right (5 minus 6). Negative numbers should be enclosed in parenthesis "( )".
6. In the "Total Variable Cost/lb" section, subtract "Present Method" cost (8) from "Proposed Method" cost (7). Enter the difference in the blank indicated as "Total". Negative numbers should be enclosed in parenthesis "( )".
NOTE: A (negative) number in "Total" represents the cost reduction you will realize as a dollar saving per pound of weld metal deposited.
7. The bottom section of the form will be useful if you must buy new equipment to use the proposed product. That part of the form is self-explanatory with the exception of the "Deposition Factor". The deposition factor is simply the deposition rate multiplied by the operating factor and is already a part of the calculation as shown at (9) in the labor and overhead formula for the proposed method.

Weight Per Meter of Weld Metal for Fillet Welds and Elements of Common Butt Joints Steel



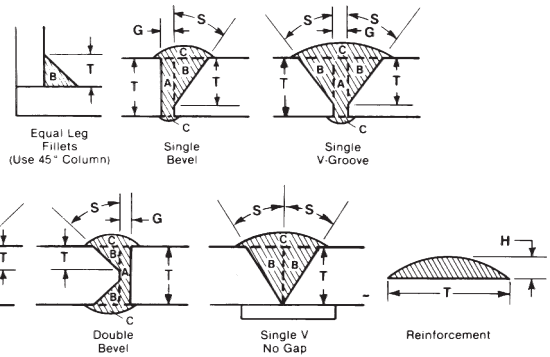
Instructions

1. Make a drawing of the cross-section of the joint to exact scale.
2. Divide the cross-section into right triangles, rectangles and sketch in the desired reinforcement.
3. Measure the thickness, angles angle leg lengths, root opening and the length and height of the reinforcement.
4. Total the weight per foot of each of the elements from the chart for the weight per foot of the weld.

T Inches	lbs/ft of Rectangle A G						lbs/ft of Triangle S						lbs/ft Reinforcement C H			
	1/16"	1/8"	3/16"	1/4"	3/8"	1/2"	5⁰	10⁰	15⁰	22-1/2⁰	30⁰	45⁰	1/16"	1/8"	3/16"	1/4"
1/8	.027	.053	.080	.106	.159	.212	.002	.005	.007	.011	.015	.027				
3/16	.040	.080	.119	.159	.239	.318	.005	.011	.016	.025	.035	.060	.027			
1/4	.053	.106	.159	.212	.318	.425	.009	.019	.028	.044	.061	.106	.035			
5/16	.066	.133	.199	.265	.390	.531	.015	.029	.044	.069	.096	.166	.044	.884		
3/8	.080	.159	.239	.318	.478	.637	.021	.042	.064	.099	.138	.239	.053	.106		
7/16	.091	.186	.279	.371	.557	.743	.028	.057	.087	.129	.188	.325	.062	.124		
1/2	.106	.212	.318	.425	.637	.849	.037	.075	.114	.176	.245	.425	.071	.141	.212	

T Inches	lbs/ft of Rectangle A G						lbs/ft of Triangle S						lbs/ft Reinforcement C H			
	1/16”	1/8”	3/16”	1/4”	3/8”	1/2”	5⁰	10⁰	15⁰	22-1/2⁰	30⁰	45⁰	1/16”	1/8”	3/16”	1/4”
9/16	.119	.239	.358	.478	.716	.955	.047	.095	.144	.223	.311	.451	.080	.159	.239	
5/8	.133	.265	.398	.531	.796	1.061	.058	.117	.178	.275	.383	.664	.088	.177	.265	.354
11/16	.146	.292	.438	.584	.876	1.167	.070	.142	.215	.332	.464	.804	.097	.195	.292	.389
3/4	.159	.318	.478	.637	.995	1.274	.084	.169	.256	.396	.552	.956	.106	.212	.318	.424
13/16	.172	.345	.517	.690	1.035	1.380	.098	.198	.301	.464	.648	1.121	.115	.230	.345	.460
7/8	.186	.371	.557	.743	1.114	1.486	.114	.230	.349	.538	.751	1.300	.124	.248	.371	.495
15/16	.199	.398	.597	.796	1.194	1.592	.131	.263	.400	.618	.863	1.493	.133	.266	.398	.530
1	.212	.425	.637	.849	1.274	1.698	.149	.300	.456	.703	.981	1.698	.141	.283	.424	.566
1 1/8	.239	.478	.716	.955	1.433	1.910	.188	.379	.577	.890	1.241	2.149	.159	.318	.477	.637
1 1/4	.265	.531	.796	1.061	1.592	2.123	.232	.468	.712	1.099	1.532	2.653	.177	.354	.531	.707
1 3/8	.292	.584	.876	1.167	1.751	2.335	.281	.567	.861	1.330	1.853	3.210	.195	.389	.584	.777
1 1/2	.318	.637	.955	1.274	1.910	2.547	.334	.674	1.023	1.582	2.206	3.821	.212	.424	.637	.849
1 5/8	.345	.690	1.035	1.380	2.069	2.759	.393	.792	1.201	1.857	2.589	4.484	.230	.460	.690	.920
1 3/4	.371	.743	1.114	1.486	2.229	2.972	.455	.918	1.393	2.154	3.002	5.200	.248	.495	.743	.990
1 7/8	.390	.796	1.194	1.592	2.388	3.184	.523	1.053	1.599	2.473	3.447	5.970	.266	.531	.796	1.061
2	.425	.649	1.274	1.698	2.547	3.396	.594	1.197	1.820	2.813	3.921	6.792	.283	.566	.849	1.132
2 1/4	.478	.955	1.433	1.910	2.865	3.821	.752	1.516	2.303	3.561	4.963	8.596	.318	.637	.955	1.273
2 1/2	.530	1.061	1.592	2.123	3.184	4.245	.928	1.871	2.844	4.396	6.127	10.613	.354	.707	1.061	1.415
2 3/4	.584	1.167	1.751	2.335	3.502	4.669	1.123	2.264	3.441	5.319	7.414	12.841	.389	.778	1.167	1.556
3	.636	1.274	1.910	2.547	3.821	5.094	1.337	2.695	4.095	6.330	8.823	15.282	.424	.849	1.273	1.698

Weight Per Foot of Weld Metal for Fillet Welds and Elements of Common butt Joints (lb/ft) Steel



Instructions

1. Make a drawing of the cross-section of the joint to exact scale.
2. Divide the cross-section into right triangles, rectangles and sketch in the desired reinforcement.
3. Measure the thickness, angles angle leg lengths, root opening and the length and height of the reinforcement.
4. Total the weight per foot of each of the elements from the chart for the weight per foot of the weld.

T mm	kg/m of Rectangle A G						kg/m of Triangle S						kg/m Reinforcement C H			
	1.588	3.175	4.783	6.350	9.525	12.700	5⁰	10⁰	15⁰	22-1/2⁰	30⁰	45⁰	1.588	3.175	4.783	6.350
0.040	0.079	0.119	0.158	0.237	0.315	0.003	0.007	0.010	0.016	0.022	0.040					
0.060	0.119	0.177	0.237	0.356	0.473	0.007	0.016	0.024	0.037	0.052	0.089	0.040	.027			
0.079	0.158	0.237	0.315	0.473	0.632	0.013	0.028	0.042	0.065	0.091	0.158	0.052	.035			
0.098	0.198	0.296	0.394	0.580	0.790	0.022	0.043	0.065	0.102	0.143	0.247	0.065	1.315			
0.119	0.237	0.356	0.473	0.711	0.948	0.031	0.062	0.095	0.147	0.205	0.356	0.079	0.158			
0.135	0.277	0.415	0.552	0.829	1.106	0.042	0.085	0.129	0.192	0.280	0.484	0.092	0.185			
0.158	0.315	0.473	0.632	0.948	1.263	0.055	0.112	0.170	0.262	0.365	0.632	0.106	0.210	0.315	.212	

T mm	kg/m of Rectangle A G						kg/m of Triangle S						kg/m Reinforcement C H			
	1.588	3.175	4.783	6.350	9.525	12.700	5^0	10^0	15^0	$22\text{-}1/2^0$	30^0	45^0	1.588	3.175	4.783	6.350
14.29	0.177	0.356	0.533	0.711	1.065	1.421	0.070	0.141	0.214	0.332	0.463	0.671	0.119	0.237	0.356	
15.88	0.198	0.394	0.592	0.790	1.184	1.579	0.086	0.174	0.265	0.409	0.570	0.988	0.131	0.263	0.394	0.527
17.46	0.217	0.434	0.652	0.869	1.303	1.736	0.104	0.211	0.320	0.494	0.690	1.196	0.144	0.290	0.434	0.579
19.05	0.237	0.473	0.711	0.948	1.481	1.896	0.125	0.251	0.381	0.589	0.821	1.423	0.158	0.315	0.473	0.631
20.64	0.256	0.513	0.769	1.027	1.540	2.053	0.146	0.295	0.448	0.690	0.964	1.668	0.171	0.342	0.513	0.684
22.23	0.277	0.552	0.829	1.106	1.658	2.211	0.170	0.342	0.519	0.800	1.117	1.934	0.185	0.369	0.552	0.737
23.81	0.296	0.592	0.888	1.184	1.777	2.369	0.195	0.391	0.595	0.919	1.284	2.222	0.198	0.396	0.592	0.789
25.40	0.315	0.632	0.948	1.263	1.896	2.527	0.222	0.446	0.679	1.056	1.460	2.527	0.210	0.421	0.631	0.842
28.58	0.356	0.711	1.065	1.421	2.132	2.842	0.280	0.564	0.859	1.324	1.847	3.198	0.237	0.473	0.710	0.948
31.75	0.394	0.790	1.184	1.579	2.369	3.159	0.345	0.696	1.059	1.635	2.280	3.948	0.263	0.527	0.790	1.052
34.93	0.434	0.869	1.303	1.738	2.605	3.474	0.418	0.844	1.281	1.979	2.757	4.776	0.290	0.579	0.869	1.156
38.10	0.473	0.948	1.421	1.896	2.842	3.790	0.497	1.003	1.522	2.354	3.283	5.686	0.315	0.631	0.948	1.263
41.28	0.513	1.027	1.540	2.053	3.079	4.105	0.585	1.178	1.787	2.763	3.852	6.672	0.342	0.684	1.027	1.369
44.45	0.552	1.106	1.658	2.211	3.317	4.422	0.677	1.366	2.073	3.205	4.467	7.738	0.369	0.737	1.106	1.473
47.63	0.580	1.184	1.777	2.369	3.553	4.738	0.778	1.567	2.379	3.679	5.129	8.883	0.396	0.790	1.184	1.579
50.80	0.632	1.263	1.896	2.527	3.790	5.053	0.884	1.781	2.708	4.186	5.834	10.106	0.421	0.842	1.263	1.684
57.15	0.711	1.421	2.132	2.842	4.263	5.686	1.119	2.256	3.427	5.298	7.385	12.791	0.473	0.948	1.421	1.894
63.50	0.789	1.579	2.369	3.159	4.723	6.317	1.381	2.784	4.232	6.542	9.117	15.792	0.527	1.052	1.579	2.106
69.85	0.869	1.736	2.605	3.474	5.211	6.947	1.671	3.369	5.120	7.916	11.032	19.107	0.579	1.158	1.736	2.315
76.20	0.946	1.898	2.842	3.790	5.686	7.580	1.989	4.010	6.093	9.420	13.129	22.740	0.631	1.263	1.894	2.527

Filler Metal Recommendations for Welding ASTM Steels

Recommended ESAB Filler Metals for Welding the ASTM Steels - Section Six

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Recommended ESAB Filler Metals for Welding the ASTM Steels
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Recommended ESAB Filler Metals

This section lists the ESAB filler metals that can be used to weld the following ASTM steels. Those steels that have been discontinued as of 1990 in the ASTM Book of Standards have been deleted. Properties and chemical deposits can change depending on your specific welding conditions. No attempt has been made to recommend welding procedures since they vary with the process being used, metal thickness, carbon content, alloy content and other factors. Preheat temps are suggested ranges for different types of steels. Check your welding procedure for a more specific preheat temperature. When more than one filler metal is listed, consult the individual product listings in this booklet and select the one most suitable for your application.

PREHEAT TEMP:

A - 250°-350° F (121°-177° C)
B - 350°-450° F (177°-232° C)
C - 500°-600° F (260°-316° C)
D - 600°-800° F (316°-427° C)

NOTES:

SMAW - Shielded Metal Arc Welding
GMAW - Gas Metal Arc Welding
SAW - Submerged Arc Welding
FCAW - Flux Cored Arc Welding
MCAW - Metal Cored Arc Welding

AA - Atom Arc
AR - Arcaloy
AS - Alloy Shield
CB - Core-Bright
CS - Coreshield

CW - Coreweld
DS - Dual Shield
N A - Nickel Arc
NC - Nicore
SA - Spoolarc

SB - Shield-Bright
SW - Sureweld
UM - Unionmelt
WA - Wear-Arc
WM - Wear-O-Matic

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW	SAW	FCAW/MCAW
A27	All	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS6, CS 8 CW 70, CW Ultra, CW C-6
A36		A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
A47	All	D	NA 99, NA 55, NA 550			NC: 55
A48	All	D	NA 99, NA 55, NA 550			NC: 55

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A63		A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CS40, CS7, CS 11, CS6, CS 8
A105		A	AA 7018, SW-15IP, SW 7024	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
A106	Grades A, B	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS6, CS 8 CW 70, CW Ultra, CW C-6
	C	A	SW 710P, AA 7018, SW-15IP, SW 7024	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS6, CS 8 CW 70, CW Ultra, CW C-6
A108	1008-1030	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
A109	All	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15, CS 11 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A126		D	NA 99, NA 55, NA 550			NC: 55
A128			WA, niMn, WA, WH			
A131	A, B, D, DS, AH32, AH36	A	AA 7018, SW-15IP, SW 7024	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS6, CS 8 CW 70, CW Ultra, CW C-6
	DH32, DH36		AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 81	II 70 Ultra, II 71 Ultra, DS II 711X CS6, CS 8 CW 70, CW Ultra, CW C-6
	E, CS, EH32, EH36		AA 7018-1	SA 82, SA 87HP	OK 10.62/SA 53	II 70T-12H4, T-5, T-75, DS II 712X CW C80Ni1
	AH40, DH40, EH40		AA 8018	SA 75	OK 10.62/SA 75	DS II 80Ni1H4 CW C80Ni1
A134	all except A570-50, A570-55	A	SW 10P, SW 10P Plus, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	A570-50, A570-55		SW 710P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A135	A & B	A	SW 10P, SW 10P Plus, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
A139	A, B, C, D	A	SW 710P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	E	A	SW 710P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
A148	80-40, 80-50	B	AA 8018	SA 76, SA 83	OK 10.71/SA 75	DS II 80Ni1H4, DS 88C3 CW 80C Ni1
	90-60	C	AA 9018	SA 83, SA 95	OK 10.62/SA 95	DS II 101H4M, DS II 101TC, CW 80 D2
	105-85	C	AA 10018	SA 120	OK 10.62/SA 100	DS II 100, DS T-8 CW 110
	115-95	C	AA 12018	SA 120	OK 10.62/SA 120	DS T-115, DS II 110 CW 110

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A159	All	D	NA 99, NA 55, NA 550			NC: 55
A167	302B, 308		308	ER308/308H	OK 10.93/ER308	SB 308L CB 308L MC 308L
	309		309	ER309	OK 10.93/ER309	SB 309L CB 309L MC 309L
	310		310	ER310		
A176	403	C	309, 410	ER309, ER410		MC 309, MC 410
A178	A & C	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		CW 70, CW Ultra, CW C-6
	D	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP		CW 70, CW Ultra, CW C-6
A179		A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
A181	60 & 70	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CS6, CS 8 CW 70, CW Ultra, CW C-6
A182	F1	B	AA 7018-Mo	SA 83	OK 10.62/SA 40B	DS: 7000-A1 CW 80D2
	F2, F11, F12	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A182 (continued)	F5, F5a, F21	C	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	F6a Classes 1 & 2	D	410, 309	ER410, ER309		MC 309L
	F9	D	AA 8018-B8			
	F91	D	AA 9018-B9	ER90S-B9		DS B9
	F22	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
	F304H, F304N		308/308H	ER308/308H	OK 10.93/ER308	CB 308H
	F304, F304L, F304LN		308L	ER308L	OK 10.93/ER308L	SB 308L CB 308L MC 308L
	F309H		309/309H	ER309	OK 10.93/ER309	
	F310, 310H		310	ER310		
	F316, F316H, F316N		316/316H	ER316L	OK 10.93/ER316L	SB316L CB 316L MC 316L
	F316L, F316LN		316L	ER316L	OK 10.93/ER316L	SB 316L CB 316L MC 316L
	F317L		317L			SB 317L MC 317L
	F321, F321H		347	ER347	OK 10.93/ER347	SB 347 CB 347
	F347, F347H,		347	ER347	OK 10.93/ER347	SB 347 CB 347
	F348, F348H		347	ER347	OK 10.93/ER347	SB 347 CB 347

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A182 (continued)	F20		320LR	ER320LR		
	F44, F47, F48, F58		112	ARCALOY ER625		
	F51, F60		OK 67.55, OK 67.53, OK 67.50	OK 16.86		SB 2209
	F53		OK 68.55, OK 68.53	OK 16.88		OK 14.28
A192		A	SW 10P, SW 1P Plus, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
A 202	A	B	AA 7018-Mo	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1 CW 80D2
	B	B	AA 9018	SA 83, SA 95	OK 10.62/SA 40	DS 9000-D1, DS 150 CW 80D2
A 203	A, B	B	AA 8018-C1	OK 13.28	OK 10.62/OK 13.27	DS: 85-C1, 8000 Ni2
	D, E, F	B	AA 8018-N			DS: 9000-C1
A 204	A, B	B	AA 7018-Mo	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1 CW 80D2
	C	B	AA 8018-NM	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1 CW 80D2
A209	All	B	AA 7018-Mo, SW-75	SA 83		DS: 7000-A1 CW 80D2
A210	All	A	SW 10P, SW 1P Plus, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A213	T2, T11, T12	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	T5, T5B, T5C, T21	C	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	T9	D	AA 8018-B8			
	T22	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
	T91	D	AA 9018-B9	ER90S-B9		DS B9
	TP201, TP202		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	TP 304H, TP308N		308/308H	ER308/308H		SB308H CB308H
	TP304, TP304L, TP 304LN		308L	ER308L	OK 10.93/ER308L	SB 308L CB 308L MC 308L
	TP309Cb		309Cb			
	TP309H		309/309H	ER309	OK 10.93/ER309	
	TP309S		309L	ER309L	OK 10.93/ER309L	SB 309L CB 309L MC 309L
	TP310Cb, TP310HCb		310CB			
	TP310H, TP310S		310	ER310		
	TP316, TP316L		316L	ER316L	OK 10.93/ER316L	SB 316L CB316L MC316L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A213 (continued)	TP316H, TP316N		316/316H	ER316H	OK 10.93/ER316H	
	TP317, TP317L		317L	ER317L		SB 317L MC317L
	TP321, TP347, TP348		347	ER347		SB 347 CB 347
A214		A	SW 10P, SW 1P Plus, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
A216	WCA	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 6, CS 8 CW 70, CW Ultra, CW C-6
	WCB, WCC	A	SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 71	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 6, CS 8 CW 70, CW Ultra, CW C-6
A217	WC1	B	AA 7018-Mo	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1 CW 80D2
	WC4, WC5, WC6, WC11	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	WC9	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
	C5	C	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	C12	D	AA 8018-B8			

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A217 (continued)	C12A	D	AA 9018-B9	ER90S-B9		DS B9
	CA15	D	410, 308L, 309L	ER308L, ER309L		SB 308L, SB 309L MC410, MC 308L
A225	Grade C	B	AA T	SA 120	OK 10.62/SA 120	DS II 10, DS T115 CW 110
	Grade D	B	AA 8018-SR	SA 75	OK 10.62/SA 75, OK 429 /SA 75, OK 10.71/SA 75	DS II 80Ni1H4 CW 80CNi1
A234	WPB, WPC	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 71	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	WP1	B	AA 7018-Mo	SA 83	OK 10.62/SA 40B	DS: 7000-A1 CW 80D2
	WP11, WP12	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	WP22	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
	WP5	C	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	WP9	D	AA 8018-B8			
	WP91	D	AA 9018-B9	ER90S-B9		DS B9
A240	201, 301, 302, 304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	201L, 301L, 301LN, 304L, 304LN		308L	ER308L		SB308L CB308L MC308L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A240 (continued)	202, 304H, 304N		308/308H	ER308/308H		SB309H CB 308H MC 308L
	305		308/308H, 309/309H	ER308/308H, ER309		SB308H, SB309H CB308H
	309Cb, 309HCb		309Cb			
	309H		309/309H			SB309H
	309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	310S, 310H		310	ER310		
	310Cb, 310HCb		310Cb			
	310MoLN		310Mo			
	316H		316/316H	ER316L	OK 10.93/ER316L	SB316L CB316L * MC316L *
	316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L * CB316L * MC316L *
	316L, 444		316L	ER316L		SB316L CB316L MC316L
	317		317	ER317L		SB317L
	317L		317L	ER317L		SB317L
	321, 321H, 347, 347H, 348, 348H		347	ER347	OK 10.93/ER347	SB347 CB347

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A240 (continued)	405, S41500	C	410NiMo			
	409, S40910, S40920, S40930	C	309/309H, 308/308H	ER409CB, ER309		SB309H, SB308H CB308H 409Ti
	410, S41003, 410S	D	410	ER410		
	429		309L, 310	ER309L, ER310		SB309L CB309L MC309L
	430			ER439Ti, ER430LNb		439Ti, 430LCb
	439			ER439Ti		439Ti, 18CrCb
	N08367, N08926		112, 276	ARCALOY ER625, ER 276		
	N08020		320LR	ER320LR		
	N08904	250 max	OK 69.33, 276, OK 92.45	OK 16.55; ARCALOY ER625;ER276	OK 16.55/OK 10.93, ER625/OK10.16, ER276/ OK 10.16	
	N08800, N08810, N08811		OK 92.15	ARCALOY ER82		
	S20400		312	ER312		SB312
	S31254	250 max	276. OK 92.45	ARCALOY ER625, ARCALOY ER276		
	S31803, S32205, S32304, S31200, S31260		OK 67.55, OK 67.53	OK 16.86		SB 2209
	S31260, S32550, S32750, S32760, S32950		OK 68.55, OK 68.53	OK 16.88		SB 2509
	S40945, S40975, S40977	C	309/309H, 308/308H	ER409CB, ER309		SB309H, SB308H CB308H 409Ti

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A 240 (continued)	S43940			ER439Ti		18CrCb
A242	All	A	AA 8018, AA 8018-W	SA 75	OK 429/SA 75, OK 10.71/ SA 75	DS II80Ni1H4, DS 8100W, DS 80-C3 CS 8-Ni1 CW C80Ni1
A249	TP201, TP304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	TP202, TP304N		308/308H	ER308/308H		SB309H CB 308H MC 308L
	TP304L, TP304LN		308L	ER308L		SB308L CB308L MC308L
	TP305		308/308H, 309/309H	ER308/308H, ER309		SB308H, SB309H CB308H
	TP309Cb, TP309HCb		309Cb			
	TP309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	TP309H		309/309H			SB309H
	TP310S, TP310H		310	ER310		
	TP310Cb, TP310HCb		310Cb			
	TP316H		316/316H	ER316L	OK 10.93/ER316L	SB316L CB316L * MC316L *

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A249 (continued)	TP316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L * CB316L * MC316L *
	TP316L		316L	ER316L		SB316L CB316L MC316L
	TP317		317	ER317L		SB317L
	TP317L		317L	ER317L		SB317L
	TP321, TP321H, TP347, TP347H, TP348, TP348H		347	ER347	OK 10.93/ER347	SB347 CB347
	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	S31725, S31726		112	ARCALOY ER625		
	N08367, N08926		112, 276	ARCALOY ER625, ARCALOY ER276		
	N08904	250 max	OK 69.33, 276, OK 92.45	OK 16.55; ER625;ER276	OK 16.55/OK 10.93, ER625/OK10.16, ER276/ OK 10.16	
A250	T1, T1a, T1b	A	AA 7018-Mo	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1 CW 80D2
	T2, T-11, T-12	B	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	T-22	B	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
A252	All		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A266	1,2,4	B	AA 7018	SA 86, SA 87HP	OK 10.71/SA 71	DS II70T-12H4, T-75 CW 70, CW Ultra, CW C-6
	3	C	AA 7018-Mo, AA 8018-SR	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1, DS II 80Ni1H4 CW 80D2
A268	TP405	C	410NiMo			
	TP409	C	309/309H, 308/308H	ER409CB, ER309		SB309H, SB308H CB308H 409Ti
	TP410	D	410	ER410		
	TP429	C	309L, 310	ER309L, ER310		SB309L CB309L MC309L
	TP430Ti	C		ER439Ti, ER430LNb		439Ti, 430LCb
	TP439	C		ER439Ti		439Ti, 18CrCb
	TP444	C	316L	ER316L		SB316L CB316L MC316L
	MC316L					
	S43940	C		ER439Ti		18CrCb
A1269	304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	304L, 304LN		308L	ER308L		SB308L CB308L MC308L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A1269 (continued)	316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L2 CB316L2 MC316L2
	316H		316/316H	ER316L	OK 10.93/ER316L	SB316L CB316L2 MC316L2
	316L, 316LN		316L	ER316L		SB316L CB316L MC316L
	317		317	ER317L		SB317L
	321, 347, 348		347	ER347	OK 10.93/ER347	SB347 CB347
	405, S41500	C	410NiMo			
	409, S40910, S40920, S40930	C	309/309H, 308/308H	ER409CB, ER309		SB309H, SB308H CB308H 409Ti
	410, S41003, 410S	D	410	ER410		
	429		309L, 310	ER309L, ER310		SB309L CB309L MC309L
	430			ER439Ti, ER430LNb		439Ti, 430LCb
	439			ER439Ti		439Ti, 18CrCb
	N08020		320LR	ER320LR		
	N08367, N08926		112, 276	ARCALOY ER625, ARCALOY ER276		
	N08800, N08810, N08811		OK 92.15	ARCALOY ER82		

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A1269 (continued)	N08904 904L	250 max	OK 69.33, 276, OK 92.45	OK 16.55; ER625;ER276	OK 16.55/OK 10.93, ER625/OK10.16, ER276/ OK 10.16	
	S20400		312	ER312		SB312
	S30909 309H		309/309H			SB309H
	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	S31260, S32550, S32750, S32760, S32950		OK 68.55, OK 68.53	OK 16.88		SB 2509
	S31803, S32205, S32304, S31200, S31260		OK 67.55, OK 67.53	OK 16.86		SB 2209
	S40945, S40975, S40977	C	309/309H, 308/308H	ER409CB, ER309		SB309H, SB308H CB308H 409Ti
	S43940			ER439Ti		18CrCb
A270	TP304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	TP304L		308L	ER308L		SB308L CB308L MC308L
	TP316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L2 CB316L2 MC316L2
	TP316L		316L	ER316L		SB316L CB316L MC316L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A270 (continued)	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	N08367, N08926		112, 276	ARCALOY ER625, ARCALOY ER276		
A276	201, 302, 304. 308		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	202, 304N		308/308H	ER308/308H		SB309H CB 308H MC 308L
	304L, 304LN		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	309		309/309H			SB309H
	309CB		309Cb			
	309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	310, 310S		310	ER310		
	310CB		310Cb			
	316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L2 CB316L2 MC316L2
	316L, S44400		316L	ER316L		SB316L CB316L MC316L
	317		317	ER317L		SB317L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A276 (continued)	321, 347, 348		347	ER347	OK 10.93/ER347	SB347 CB347
	403, 410	D	410	ER410		
	405, S41500	C	410NiMo			
	429		309L, 310	ER309L, ER310		SB309L CB309L MC309L
	430			ER439Ti, ER430LNb		439Ti, 430LCb
	S31803, S32205, S32304, S32550, S32760		OK 67.55, OK 67.53	OK 16.86		SB 2209
A278	All	D	NA 99, NA 55, NA 550			NC: 55
A283	Grade A	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 or CS6, CS 8 CW 70, CW Ultra, CW C-6
	Grades B, C, D	A	SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 or CS6, CS 8 CW 70, CW Ultra, CW C-6
A285	Grades A, B, C	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 or CS6, CS 8 CW 70, CW Ultra, CW C-6
A299		B	AA 7018-Mo	SA 83	OK 429/SA 40B, OK 10.71/SA 40B	DS 7000-A1 CW 80-D2

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A302	Grade A, B	C	AA 7018-Mo	SA 83	OK 429/SA 40B, OK 10.71/SA 40B	DS 7000-A1 CW 80-D2
	Grade C, D	C	AA 8018-NM, AA 8018-SR		OK 10.62/SA 44	
A311	1018		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 or CS6, CS 8 CW 70, CW Ultra, CW C-6
	1035	B	AA 9018	SA 83		DS II 90K2 CW 80-D2
A312	TP304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	TP304N, TP304H		308/308H	ER308/308H		SB309H CB 308H MC 308L
	TP304L, TP304LN		308L	ER308L		SB308L CB308L MC308L
	TP309Cb, TP309HCb		309Cb			
	TP309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	TP309H		309/309H			SB309H
	TP310S, TP310H		310	ER310		
	TP310Cb, TP310HCb		310Cb			

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A312 (continued)	TP316H		316/316H	ER316L	OK 10.93/ER316L	SB316L CB316L2 MC316L2
	TP316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L2 CB316L2 MC316L2
	TP316L		316L	ER316L		SB316L CB316L MC316L
	TP317		317	ER317L		SB317L
	TP317L		317L	ER317L		SB317L
	TP321, TP321H, TP347, TP347H, TP348, TP348H		347	ER347	OK 10.93/ER347	SB347 CB347
	S31050		310Mo			
	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	S31725, S31726		112	ARCALOY ER625		
	N08367		112, 276	ARCALOY ER625, ARCALOY ER276		
	N08904	250 max	OK 69.33, 276, OK 92.45	OK 16.55; ER625;ER276	OK 16.55/OK 10.93, ER625/OK10.16, ER276/ OK 10.16	
A319	all		NA 55, NA 550, NA 99			NC: 55
A328			SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 or CS6, CS 8 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A333	Grade 1 & 6	A	AA 7018, SW 10P+, SW 10P	SA 29S, SA 82, SA 86	OK 10.62/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	Grade 3 & 7	A	AA 8018-N			
	Grade 8		OK 92.55			
	Grade 10	A	AA 8018-C1			
A334	Grade 1 & 6	A	SW 10P(root pass only), AA 7018	SA 29S, 66, 82, 85, 86, 87HP		II 70T-12H4, T-5, T-75, DS II 712X
	Grade 3 & 7	A	AA 8018-N			
	Grade 8		OK 92.55			
	Grade 10	A	AA 8018-C1			
A335	P1	B	AA 7018-Mo	SA 83	OK 10.62/SA 40B	DS: 7000-A1 CW 80D2
	P2, P11, P12	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	P5, P5B, P5C, P21	C	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	P9	D	AA 8018-B8			
	P22	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
	P91	D	AA 9018-B9	ER90S-B9		DS B9
A336	F1	B	AA 7018-Mo	SA 83	OK 10.62/SA 40B	DS: 7000-A1 CW 80D2
	F5, F5A, F21	C	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	F6	D	410, 309	ER410, ER309		MC 309L
	F9	D	AA 8018-B8			
	F11, F12	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A336 (continued)	F22	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
	F91	D	AA 9018-B9	ER90S-B9		DS B9
A338			NA 55, NA 550, NA 99			NC: 55
A350	LF1, LF2 Class 2	A	AA 7018, SW-15IP	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	LF2 Class 1	A	AA 7018-1	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	LF3	A	AA 8018-N			
	LF5, LF 6	A	AA 8018	SA 75	OK 10.62/SA 75	DS II 80Ni1H4,
A351	CF-3, CF-3A		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	CF-8, CF-8A		308/308H	ER308/308H		SB308H CB308H
	CF-3M, CF-3MA		316L	ER316L		SB316L CB316L MC316L
	CF-8M		316/316H			SB 316H
	CF-8C		347	ER347	OK 10.93/ER347	SB347 CB347
	CF-10		308/308H	ER308/308H		SB308H CB308H
	CH-8, CH10		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A351 (continued)	CH-20		309/309H			SB309H
	CK-20		310	ER310		
	CN-7M		320LR	ER320LR		
	CN-3MN	250 max	OK 69.33; OK 92.45	OK 16.55; ER625; ER276		
	CD4MCu, CE-8MN, CD3M-WCuN		OK 67.55, OK 67.53	OK 16.86		SB 2209
	CG-8M, CG-3M		317L	ER317L		SB317L
A352	LCA	A	AA 7018, SW-15IP	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	II 70 Ultra, II 71 Ultra, DS II 711X
	LCB, LCC	A	AA 7018-1	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	LC1	A	AA 7018-Mo	SA 83	OK 10.62/SA 40B	DS 7000-A1
	LC2	A	AA 8018-C1			DS 85C1
	LC9		OK 92.55			
	CA6NM	C	410NiMo			
A353			OK 92.55			
A356	Grade 1	A	AA 7018, SW-15IP	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	Grade 2	B	AA 7018-Mo	SA 83	OK 10.62/SA 40B	DS: 7000-A1 CW 80D2
	Grade 5, 6	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	Grades 8, 9, 10	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A356 (continued)	Grade 12	D	AA 9018-B9	ER90S-B9		DS B9
	CA6NM	C	410NiMo			
A358	304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	304H, 304N		308/308H	ER308/308H		SB309H CB 308H MC 308L
	304L, 304LN		308L	ER308L		SB308L CB308L MC308L
	309Cb		309Cb			
	309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	310Cb		310Cb			
	310S		310	ER310		
	316H		316/316H			
	316L		316L	ER316L		SB316L CB316L MC316L
	321, 347, 348		347	ER347	OK 10.93/ER347	SB347 CB347
	N08020		320LR	ER320LR		
	N08367, N08926, S31254, S31725, S31726	250 max	112, 276	ARCALOY ER625, ARCALOY ER276		

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A358 (continued)	N08800, N08810		OK 92.15	ARCALOY ER82		
	N08904	250 max	OK 69.33, 276, OK 92.45	OK 16.55; ER625;ER276	OK 16.55/OK 10.93, ER625/OK10.16, ER276/ OK 10.16	
A366			SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15, CS 11 CW 70, CW Ultra, CW C-6
A369	FPA, FPB	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	FP1	B	AA 7018-Mo	SA 83	OK 10.62/SA 40B	DS: 7000-A1 CW 80D2
	FP2, FP11, FP12	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	FP5, FP21	C	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	FP9	D	AA 8018-B8			
	FP91	D	AA 9018-B9	ER90S-B9		DS B9
	FP22	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
A376	TP304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	TP304H, TP304N		308/308H	ER308/308H		SB309H CB 308H MC 308L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A376 (continued)	TP304LN		308L	ER308L		SB308L CB308L MC308L
	TP316, TP316H		316/316H			
	TP321, TP347, TP348		347	ER347	OK 10.93/ER347	SB347 CB347
A381	Y35 thru Y48		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	Y50 thru Y56		SW 10P(root pass only), AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	Y60, Y65		AA 8018	SA 75	Ok 10.71/SA 75	DS II 80Ni1H4 CW 80C-Ni1
A387	Grade 2, 11, 12	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	Grade 22, 22L	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
	Grade 5, 21, 21L	D	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	Grade 9	D	AA 8018-B8			
	Grade 91	D	AA 9018-B9	ER90S-B9		DS B9
A389	C-23	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A389 (continued)	C-24	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
A395			NA 55, NA 550, NA 99			NC: 55
A403	WP/CP 304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	WP/CP 304H, WP/CP 304N		308/308H	ER308/308H		SB309H CB 308H MC 308L
	WP/CP 304L, WP/CP 304LN		308L	ER308L		SB308L CB308L MC308L
	WP/CP 309		309/309H	ER309		SB309H
	WP/CP 310		310	ER310		
	WP/CP 316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L2 CB316L2 MC316L2
	WP/CP 316H		316/316H	ER316L	OK 10.93/ER316L	SB316L CB316L2 MC316L2
	WP/CP 316L		316L	ER316L		SB316L CB316L MC316L
	WP/CP 317		317	ER317L		SB317L
	WP/CP 317L		317L	ER317L		SB317L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A403 (continued)	WP/CP 321, WP/ CP 321H, WP/ CP 347, WP/ CP 347H, WP/ CP 348, WP/CP 348H		347	ER347	OK 10.93/ER347	SB347 CB347
	WP/CP S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
A409	TP304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	TP304L		308L	ER308L		SB308L CB308L MC308L
	TP309Cb		309Cb			
	TP309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	TP310S		310	ER310		
	TP310Cb		310Cb			
	TP316		316/316H			SB 316H
	TP316L		316L	ER316L		SB316L CB316L MC316L
	TP317		317	ER317L		SB317L
	TP321, TP347, TP348		347	ER347	OK 10.93/ER347	SB347 CB347

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A409 (continued)	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	S31725, S31726		112	ARCALOY ER625		
	N08367		112, 276	ARCALOY ER625, ARCALOY ER276		
A414	Grade A, B, C, D		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 281/SA 29S, OK 231/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 11, CS 15 CW 70, CW Ultra, CW C-6
	Grade E, F, G		AA 7018, SW-15IP	SA 29S, 66, 82, 85, 86, 87HP	OK 281/SA 29S, OK 231/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 11, CS 15 CW 70, CW Ultra, CW C-6
A420	WPL6		AA 7018, AA 7018-1	SA 87HP	OK 10.62/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	WPL3		AA 8018-N			
	WPL8		OK 92.55			
A426	CP1, CP15	B	AA 7018-Mo	SA 83	OK 10.62/SA 40B	DS: 7000-A1 CW 80D2
	CP2, CP11, CP12	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	CP5, CP5b, CP21	C	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	CP22	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
	CP9	D	AA 8018-B8			

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A426 (continued)	CPCA15	D	410, 308L, 309L	ER308L, ER309L		SB 308L, SB 309L MC410, MC 308L
A436	All	D	NA 55, NA 550, NA 99			NC: 55
A439	All	D	NA 55, NA 550, NA 99			NC: 55
A451	CF-3, CF-3A		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	CF-8, CF-8A		308/308H, 308L	ER308/308H, ER308L	OK 10.93/ER308L	SB308H, SB308L CB308H, CB308L MC308L
	CF-3M		316L	ER316L		SB316L CB316L MC316L
	CF-8M		316/316H			SB 316H
	CF-8C		347	ER347	OK 10.93/ER347	SB347 CB347
	CF-10		308/308H	ER308/308H		SB308H CB308H
	CH-8, CH10		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	CH-20		309/309H			SB309H
	CK-20		310	ER310		

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A455		A	AA 8018	SA 75	OK 10.71/SA 71	II 70 Ultra, II 71 Ultra, DS II 711X, DS II 80Ni1H4 CW 80C-Ni1
A463	CS, FS, DDS, EDDS,, AA, HSLAS		SW 10P Plus, SW 10P, SW-14	SA 29S, 66, 82, 85, 86, 87HP		CS 15 CW 70, CW Ultra, CW C-6
	FSS Type 409			ER409CB		409Ti
	FSS Type 439			ER439Ti		439Ti
A473	201, 302		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	202		308/308H	ER308/308H		SB309H CB 308H MC 308L
	304, 308		308/308H, 308L	ER308/308H, ER308L	OK 10.93/ER308L	SB308H, SB308L CB308H, CB308L MC308L
	304L		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	305		308/308H, 309/309H	ER308/308H, ER309		SB308H, SB309H CB308H
	309		309/309H			SB309H
	309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	310, 310S		310	ER310		

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A473 (continued)	316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L2 CB316L2 MC316L2
	316L		316L	ER316L		SB316L CB316L MC316L
	317		317	ER317L		SB317L
	321, 347, 348		347	ER347	OK 10.93/ER347	SB347 CB347
	403, 410, 410S	D	410	ER410		
	405	C	410NiMo			
	429		309L, 310	ER309L, ER310		SB309L CB309L MC309L
	430			ER439Ti, ER430LNb		439Ti, 430LCb
	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	S32550, S32760, S32950		OK 67.55, OK 67.53	OK 16.86		SB 2209
	501A, 501B	D	AA 8018-B8			
	502	C	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
A479	302		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	304, 308		308/308H, 308L	ER308/308H, ER308L	OK 10.93/ER308L	SB308H, SB308L CB308H, CB308L MC308L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A479 (continued)	304H, 304N		308/308H	ER308/308H		SB309H CB 308H MC 308L
	304L, 304LN		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	309Cb		309Cb			
	309H		309/309H			SB309H
	309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	310Cb		310Cb			
	310S, 310H		310	ER310		
	316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L2 CB316L2 MC316L2
	316H		316/316H	ER316L	OK 10.93/ER316L	SB316L CB316L2 MC316L2
	316L, 444		316L	ER316L		SB316L CB316L MC316L
	317		317	ER317L		SB317L
	321, 321H, 347, 347H, 348, 348H		347	ER347	OK 10.93/ER347	SB347 CB347
	403, 410,	D	410	ER410		
	405	C	410NiMo			

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A479 (continued)	430			ER439Ti, ER430LNb		439Ti, 430LCb
	439			ER439Ti		439Ti, 18CrCb
	N08367		112, 276	ARCALOY ER625, ARCALOY ER276		
	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	S31803, S32205, S32550, S32750, S32760, S32950		OK 67.55, OK 67.53	OK 16.86		SB 2209
A487	2A, 11A, 12A,	C	AA 8018-NM			
	2B, 2C	B	AA 10018MM			
	4A, 4C, 13A	B	AA 9018-SR			
	4B, 4D	B	AA T			DS T-115
	4E	B	AA 12018			
	6A, 6B, 7A, 10B	C	AA 12018			
	8A, 9A, 9C	C	AA 9018-CM			DS 98CM
	10A, 11B, 12B	C	AA T			DS T-115
	13A	400 min	AA 9018-SR			
	13B	400 min	AA T			DS T-115
	14A	400 min	AA 12018			
	16A		AA 8018			DS II 80Ni1H4
	CA15B, CA15C, CA15D	400 min	410			
	CA6MNA, CA6NMB		410NiMo			
A494	M-35-1, M-30C		Arcaloy 9N10			
	CW-12MW, CW-6M, CW-2M			ARCALOY ER276		
	CW-6MC			ARCALOY ER625		

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A496		B	SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
A497		B	SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
A500	All	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 or CS6, CS 8 CW 70, CW Ultra, CW C-6
A501	All	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 or CS6, CS 8 CW 70, CW Ultra, CW C-6
A508	1, 1A	A	AA 7018-SR	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 71	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	2 Class 1, 3 Class 1	A	AA 8018-NM		OK 10.62/SA 44	
	2 Class 2, 3 Class 2	A	AA 9018-SR			
	4N Class 1, 5 Class 1	B	AA T			

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A508 (continued(	4N Class 3	B	AA 9018-SR			DS: T-100
	22 Class3	C	AA 9018-CM	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 98-CM CW 90B3
A511	MT302		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	MT304		308/308H, 308L	ER308/308H, ER308L	OK 10.93/ER308L	SB308H, SB308L CB308H, CB308L MC308L
	MT304L		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	MT305		308/308H, 309/309H	ER308/308H, ER309		SB308H, SB309H CB308H
	MT309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	MT310S		310	ER310		
	MT316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L2 CB316L2 MC316L2
	MT316L MT317		316L 317	ER316L ER317L		SB316L CB316L MC316L SB317L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A511 (continued)	MT321, MT347		347	ER347	OK 10.93/ER347	SB347 CB347
	MT403, MT410,	D	410	ER410		
	MT405	C	410NiMo			
	MT430			ER439Ti, ER430LNb		439Ti, 430LCb
A512	1008 - 1025		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
	1030, 1035	A	AA 7018, SW-15IP	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
A513	1008 - 1025		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
	1025 - 1035	A	AA 7018, SW-15IP	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
	1040	B	AA 8018	SA 83		DS II 80Ni1H4 CW 80D-2
A514	All	B	AA T	SA 120	OK 10.62/SA 100	DS T-115, DS II 110

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A515	60	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	65, 70	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 71	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
A516	55, 60	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	Ok 10.71/SA 81, OK 10.62/SA 81	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X
	65, 70	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 71, OK 10.62/SA 71	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X
A517	All	B	AA T	SA 120	OK 10.62/SA 100	DS T-115, DS II 110
A521	CA, CC, CC1	B	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	CE, CF	B	AA 8018-SR	SA 75	OK 10.71/SA 75	DS II 80Ni1H4
	CF1, CG	B	AA 9018-SR	SA 83		DS II90K2
A522	All		OK 92.55			
A523	All		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
A524	All		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A529	All	A	SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
A533	Type A1		AA 7018-Mo	SA 83	OK 10.62/SA 40B	DS 7000-A1
	Type B1, B2, C1, C2, D1, D2		AA 8018-NM		OK 10.62/SA44	DS 85NM
	Type A3, B3, C3, D3	A	AA T	SA 95	OK 10.62/SA 95	DS T-100, DS II 100, DS II 100D-1
A536	60-40-18,		NA 99, NA 55, NA 550			Nicore 55
	65-45-12, 70-50-5		NA 99			
A537	Class 1	A	AA 7018, AA 8018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW C-6
	Class 2, Class 3	A	AA 8018, AA 8018-SR	SA 75, SA 83	OK10.62/SA75, OK 10.71/SA 71, OK 10.72/ SA 71, OK 10.62/ SA 71	DS: II 80Ni1, 85-C1, II 81K2 CW 80CNi1, CW 80D2
A541	1, 1A	A	AA 7018, AA 7018SR	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
	2 Cl 1, 3 Cl 1, 1C	B	AA 8018, AA 8018-SR	SA 75, SA 83	OK10.62/SA75, OK 10.71/SA 71, OK 10.72/ SA 71, OK 10.62/ SA 71	DS 80-C3, DS II 80Ni1H4, DS II 81K2 CW 80D2, CW 80CNi1
	2 Cl 2, 3 Cl 2	B	AA 9018-SR, AA 8018-NM	SA 83	OK 10.62/SA 44	DS II 101H4M, DS II 101TC, DS II 90K2, DS 9000M
	11 Cl 4	B	AA 8018-CM	ER80S-B2	OK 10.62/SA U515	DS 88CM, DS 8000-B2 CW 80B2
	22 Cl 3	B	AA 9018-CM	ER90S-B3	OK 10.62/OK 13.20SC	DS 98CM, DS 9000-B3

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A542	Type A Cl 3, Cl 4, Cl 4A	B	AA 9018-CM	ER90S-B3	OK 10.62/OK 13.20SC, OK 10.63/OK 13.20SC	DS 98CM, DS 9000-B3
	Type B Cl 3, Cl 4, Cl 4A	B	AA 9018-CM	ER90S-B3	OK 10.62/OK 13.20SC, OK 10.63/OK 13.20SC	DS 98CM, DS 9000-B3
	Type C Cl 3, Cl 4, Cl 4A	B	AA 9018-CM	ER90S-B3	OK 10.62/OK 13.20SC, OK 10.63/OK 13.20SC	DS 98CM, DS 9000-B3
A543	all types Cl 1	B	AA T	SA 120	OK 10.62/SA 100, OK 10.62/SA 120	DS T-115,DS II 110 CW 110
	all types Cl 2	B	AA 12018	SA 140		DS II 120M2
	All Types Cl 3	B	AA 9018	SA 95	OK 10.62/SA 95	DS II 101H4M, DS II 101TC, DS II 90K2, DS 9000M
A553	Type 1, Type 2		OK 92.55	ARCALOY ER625		
A554	MT301, MT 302, MT 304		308/308H	ER308/308H	OK 10.93/ER308L	SB 308L, SB 308H CB 308L, CB 308H MC 308L
	MT305		308/308H, 309/309H	ER308/308H, ER309		SB308H, SB309H CB308H
	MT309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	MT309S-Cb		309Cb			
	MT310S		310	ER310		
	MT316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L CB316L MC316L
	MT316L		316L	ER316L		SB316L CB316L MC316L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A554 (continued)	MT317		317	ER317L		SB317L
	MT321, MT347		347	ER347	OK 10.93/ER347	SB347 CB347
	MT-429		309L, 310	ER309L, ER310		SB309L CB309L MC309L
	MT-430, MT-430-Ti			ER439Ti, ER430LNb		439Ti, 430LCb
A556	All Grades		AA 7018, SW 10P, SW10P+	SA 29S, 66, 82, 85, 86, 87HP		
A562			AA 7018	SA 29S, SA 82, SA 86	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CW 70, CW Ultra, CW C-6
A571		600F	NA 55, NA 550			Nicore 55
A572	42, 50, 55	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CS6, CS 8 CW 70, CW Ultra, CW C-6
	60, 65	A	AA 8018	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4, DS 80-C3 CW 80C-Ni1
A573	58, 65, 70	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CS6, CS 8 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A575	M1008 thru M1025	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	M1031 & M1044	B	AA 8018	SA 83	OK 10.71/SA 75	DS II 80Ni1H4, DS 80-C3 CW 80 D2
A576	1008 thru 1025		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
	1025 thru 1035	A	AA 7018, SW-15IP	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11 CW 70, CW Ultra, CW C-6
	1035 thri 1040	B	AA 8018	SA 83		DS II 80Ni1H4 CW 80D-2
A587			SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
A588	All	A	AA 8018, AA 8018-W	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4, DS 80-C3, DS 8100-W CW 80C-Ni1, CW W

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A589	All		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS40, CS7, CS 11, CS6, CS 8, CS 15 CW 70, CW Ultra, CW C-6
A592	all	B	AA 12018	SA 120	OK 10.62/SA 100	DS II 120M2, DS T-125
A595	A, B		AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	C	A	AA 8018, AA 8018-W	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4, DS 80-C3, DS 8100-W CW 80C-Ni1, CW W
A602	All	400F	NA 55, NA 550, NA 99			NC: 55
A606	All		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS 15 CW 70, CW Ultra, CW C-6
A612		A	AA 8018	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS: II 80Ni1 CW 80CNi1
A615	40	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A615 (continued)	60	A	AA 9018	SA 83		DS II 101H4M, DS II 101TC, DS II 90K2, DS 9000M
	75	A	AA 10018	SA 95		DS II 100, DS T-100
A618	All		AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
A633	A, C, D		AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	E		AA 8018	SA 75, SA 83	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4, DS 80-C3 CW 80CNi1
A645			OK 92.55	ARCALOY ER625		
A656	50, 60		AA 7018, SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	70	A	AA 8018	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4, DS 80-C3 CW 80CNi1
	80	A	AA 9018	SA 83	OK 10.62/SA ENi4	DS II 101H4M, DS II 90-K2, DS II 101TC

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A659	All		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CS40, CS7, CS 11, CS 15 CW 70, CW Ultra, CW C-6
A660	All		AA 7018, SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CW 70, CW Ultra, CW C-6
A662	all		AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
A663	45, 50, 55, 60, 65	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	70, 75, 80	B	AA 8018	SA 75, SA 83	OK10.62/SA75, OK 10.71/SA 71, OK 10.72/ SA 71, OK 10.62/ SA 71	DS II 80Ni1H4, DS 80-C3 CW 80CNi1, CW 80D2
A666	201, 202, 301, 302, 304, 304N		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	201L, 201LN, 301L, 301LN, 304L, 304LN		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A666 (continued)	316, 316N		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L CB316L MC316L
	316L		316L	ER316L	OK 10.93/ER316L	SB316L CB316L MC316L
A668	A, AH, B, BH, C, CH,	B	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
	D, DH, E, EH, G, GH	B	AA 8018	SA 75, SA 83	OK10.62/SA75, OK 10.71/SA 71, OK 10.72/ SA 71, OK 10.62/ SA 71	DS II 80Ni1H4, DS 80-C3 CW 80CNi1, CW 80D2
	F, FH, H, HH, J, JH	C	AA 9018	SA 83	OK 10.62/SA 44	DS II 101H4M, DS II 90-K2, DS II 101TC
	K, KH	C	AA 11018	SA 95	OK 10.62/SA 95	DS II 100
	L, LH	C	AA T	SA 120	OK 10.62/SA 100	DS II 110, DS T-115T-115
A671	CA 55, CB 60, CB 65, CB 70	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS6, CS 8 CW 70, CW Ultra, CW C-6
	CC 60	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	Ok 10.71/SA 81, OK 10.62/SA 81	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X
	CC 65, CC 70	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 71, OK 10.62/SA 71	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X
	CD 70	A	AA 7018, AA 8018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A671 (continued)	CD 80	A	AA 8018, AA 8018-SR	SA 75, SA 83	OK10.62/SA75, OK 10.71/SA 71, OK 10.72/ SA 71, OK 10.62/ SA 71	DS: II 80Ni1, 85-C1, II 81K2 CW 80CNi1, CW 80D2
	CF 65, CF 70	B	AA 8018-C1	OK 13.28	OK 10.62/OK 13.27	DS: 85-C1, 8000 Ni2
	CF 66, CF 71	B	AA 8018-N			DS: 9000-C1
	CG 100, CH 100		OK 92.55	ARCALOY ER625		
	CJ all	B	AA T	SA 120	OK 10.62/SA 100	DS T-115, DS II 110
	CK 75	B	AA 7018-Mo	SA 83	OK 429/SA 40B, OK 10.71/SA 40B	DS 7000-A1 CW 80-D2
A672	A45, A50, A55	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	B55, B60	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	B65, B70	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 71	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	C55, C60	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	Ok 10.71/SA 81, OK 10.62/SA 81	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X
	C65, C70	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 71, OK 10.62/SA 71	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X
	D70	A	AA 7018, AA 8018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW C-6
	D80	A	AA 8018, AA 8018-SR	SA 75, SA 83	OK10.62/SA75, OK 10.71/SA 71, OK 10.72/ SA 71, OK 10.62/ SA 71	DS: II 80Ni1, 85-C1, II 81K2 CW 80CNi1, CW 80D2
	H75, H80, J80 , J90	C	AA 8018-NM		OK 10.62/SA44	DS 85NM

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A672 (continued)	J100	A	AA T	SA 95	OK 10.62/SA 95	DS T-100, DS II 100, DS II 100D-1
	K75, L65, L70, N75	B	AA 7018-Mo	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1 CW 80D2
	K85	B	AA 9018	SA 83, SA 95	OK 10.62/SA 40	DS 9000-D1, DS 150 CW 80D2
	L75	B	AA 8018-NM	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1 CW 80D2
A675	45, 50, 55, 60, 65, 70	B	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	80	C	AA 8018	SA 75, SA 83	OK 10.71/SA 75	DS II 80Ni1H4, DS 80-C3 CW 80CNi1, CW 80D2
	90	C	AA 9018	SA 83	OK 429/SA ENi4, OK 10.62/SA ENi4	DS II 101H4M, DS II 101TC, DS II 90K2, DS 9000M
A678	A		AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	B		AA 8018	SA 75, SA 83	OK10.62/SA75, OK 10.71/SA 71, OK 10.72/ SA 71, OK 10.62/ SA 71	DS II 80Ni1H4, DS 80-C3 CW 80CNi1, CW 80D2
	C, D	A	AA 9018	SA 83	OK 429/SA ENi4, OK 10.62/SA ENi4	DS II 101H4M, DS II 101TC, DS II 90K2, DS 9000M

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A688	TP304, TP304N		308/308H, 308L	ER308/308H, ER308L	OK 10.93/ER308L	SB308H, SB308L CB308H, CB308L MC308L
	TP304L, TP304LN		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	TP316, TP316N		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L CB316L MC316L
	TP316L, TP316LN		316L	ER316L	OK 10.93/ER316L	SB316L CB316L MC316L
	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	N08367, N08926		112, 276	ARCALOY ER625, ARCALOY ER276		
A690		A	AA 8018, AA 8018-W	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4, DS 80-C3, DS 8100-W CW 80C-Ni1, CW W
A691	CM-65, CM-70, CMS-75	B	AA 7018-Mo	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1 CW 80D2
	CM-75	B	AA 8018-NM	SA 83	OK 429/SA 40B, OK 10.62/SA 40B	DS 7000-A1 CW 80D2
	CMSH-70	A	AA 7018, AA 8018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A691 (continued)	CMSH-80	A	AA 8018, AA 8018-SR	SA 75, SA 83	OK10.62/SA75, OK 10.71/SA 71, OK 10.72/ SA 71, OK 10.62/ SA 71	DS: II 80Ni1, 85-C1, II 81K2 CW 80CNi1, CW 80D2
	½CR, 1CR, 1¼Cr	C	AA 8018-CM, AA 7018-B2L	ER80S-B2	OK 10.62/U515	DS 8000-B2, DS 8000-B2L, DS 88-CM CW 80B2
	2¼Cr	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
	3CR, 5CR	D	AA 8018-B6, AA 8018-B6L	ER80S-B6		DS B6
	9CR	D	AA 8018-B8			
	91	D	AA 9018-B9	ER90S-B9		DS B9
A692			AA 7018-Mo	SA 83		DS: 7000-A1
A694	F42,F46, F48, F50, F52, F56		AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
	F60, F65, F70		AA 8018	SA 75, SA 83	OK10.62/SA75, OK 10.71/SA 71, OK 10.72/ SA 71, OK 10.62/ SA 71	DS II CW 80CNi1, CW 80D2
A696	B, C		AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
A704	40	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A704 (continued)	60	A	AA 9018	SA 83		DS II 101H4M, DS II 101TC, DS II 90K2, DS 9000M
A706	60	A	AA 9018	SA 83		DS II 101H4M, DS II 101TC, DS II 90K2, DS 9000M
A707	L1 Cl 1, L1 Cl 2		AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 81, SA 10.72/SA 81, OK 10.62/ SA 81	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X
	L1 Cl 3		AA 8018	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4
	L1 Cl4		AA 9018	SA 83	OK 429/SA ENi4	DS II 101H4M
	L2 Cl1, L2 Cl 2, L3 Cl 1, L3 Cl 2		AA 7018-1	SA 82, SA 83, SA 87HP	OK 10.62/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	L2 CL 3, L3 Cl 3		AA 8018	SA 75	OK 10.62/SA 75, OK 10.72/SA 75	DS II 80Ni1H4
	L 2 Cl 4, L3 Cl 4		AA 9018	SA 95	OK 10.62/SA ENi4	DS II 101H4M
	L4 Cl 1, L4 Cl 2, L5 CL 1, L5 Cl2, L6 Cl 1, L6 Cl2		AA 8018-C1		OK 10.62/SA 81, OK 10.62/SA 53	
	L4 CL3, L5 Cl 3, L6 Cl 3		AA 8018-C1		OK 10.62/SA 75	
A709	36, 50, 50S	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
	50W, HPS 50W	A	AA 8018	SA 75	OK 10.71/SA 75, OK 10.72/SA 75, OK 10.62/ SA 75	DS II 80Ni1H4 CW 80C-Ni1
	HPS 70W	A	AA 9018		OK 429/SA ENi4, OK 10.62/SA ENi4	DS II 101H4M
	100, 100W, HPS 100W	B	AA T	SA 120	OK 10.62/SA 120	DS II 110, DS T-115

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A710	A CL 1		AA 9018	SA 95	OK 10.62/SA 95	DS II 101H4M
	A Cl 2		AA 7018		OK 10.62/SA 75	DS II 70T-12H4
	A Cl 3		AA 8018-C1			
	B CL1, B Cl 2, B Cl 3		AA 8018	SA 75	OK 10.62/SA 75	DS II 80Ni1H4
A714	Class 2 all grades	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	Class 4 all grades	A	AA 8018, AA 8018-W	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4, DS 80-C3, DS 8100-W CW 80C-Ni1, CW W
A724	All		AA 9018, AA 9018-SR	SA 95	OK 10.62/SA 95	
A727		A	AA 7018, AA 7018-Mo	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
A730	A & B	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
A734	A	A	AA 8018-C1	SA 75	OK 10.62/SA 75	
	B	A	AA 8018	SA 75	OK 10.62/SA 75, OK 10.72/SA 75	DS II 80Ni1H4 CW 80CNi1
A735	CL 1	A	AA 8018, AA 8018-SR	SA 75	OK 10.62/SA 75, OK 429 /SA 75, OK 10.71/SA 75	DS II 80Ni1H4 CW 80CNi1
	Cl 2, Cl 3	B	AA 9018	SA 95	OK 10.62/SA 44, OK 10.62/SA ENi4	DS II 101H4M

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A735 (continued)	Cl 4	B	AA 10018	SA 95	OK 10.62/SA 95	DS II 101H4M
A736	A Cl2	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 71, OK 10.72/SA 71, OK 10.62/SA 71	II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
	A Cl1, A Cl3	B	AA 9018	SA 95	OK 10.62/SA 44, OK 10.62/SA ENi4	DS II 101H4M
	C Cl1, C Cl3	B	AA 11018	SA 95	OK 10.62/SA 95	DS II 101H4M
A737	B	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.71/SA 71, OK 10.72/SA 71, OK 10.62/SA 71	II 70T-12H4, T-5, T-75, DS II 712X CW 70, CW Ultra, CW C-6
	C	A	AA 8018, AA 8018-SR	SA 75	OK 10.62/SA 75, OK 429 /SA 75, OK 10.71/SA 75	DS II 80Ni1H4 CW 80C-Ni1
A738	A, C	A	AA 8018, AA 8018-SR	SA 75	OK 10.62/SA 75	DS II 80Ni1H4 CW 80CNi1
	B, D, E	B	AA 9018	SA 95	OK 10.62/SA 95	DS II 101H4M
A739	B11	B	AA 8018-CM, AA 7018-B2L		OK 10.62/SA U515, OK 10.63/SA U515	DS 8000-B2, DS 8000-B2L, DS 88-CM
	B22	B	AA 9018CM, AA 8018-B3L		OK 10.62/OK 13.20SC, OK 10.63/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM
A743	CF-8, CF-20		308/308H	ER308/308H		SB308H CB308H
	CG-12, CH-10, CH-20		309/309H	ER309	OK 10.93/ER309	
	CF-8M		316/316H			SB 316H
	CF-8C		347	ER347	OK 10.93/ER347	SB347 CB347
	CH-10		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A743 (continued)	CK-20		310	ER310		
	CE-30		312	ER312		SB312
	CA-15		410	ER410		
	CA-15M, CA-6NM	C	410NiMo			
	CF-3		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	CF-3M, CF3MN		316L	ER316L		SB316L CB316L MC316L
	CG-8M, CG-3M,		317L	ER317L		SB317L
	CN-7M		320LR	ER320LR		
A744	CF-8		308/308H	ER308/308H		SB308H CB308H
	CF-8M		316/316H			SB 316H
	CF-8C		347	ER347	OK 10.93/ER347	SB347 CB347
	CF-3		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	CF-3M		316L	ER316L		SB316L CB316L MC316L
	CG-8M, CG-3M, CN-7M		317L 320LR	ER317L ER320LR		SB317L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A757	A1Q, A2Q	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81, OK 10.72/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	B2N, B2Q	B	AA 8018-C1			
	C1Q	B	AA 8018, AA 8018-SR	SA 75	OK 10.62/SA ENi4	DS II 80Ni1H4
	B3N, B3Q	B	AA 8018-N			
	D1N1, D1N2, D1N3,	B	AA 9018CM, AA 8018-B3L		OK 10.62/OK 13.20SC, OK 10.63/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM
A758	All	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CS6, CS 8 CW 70, CW Ultra, CW C-6
A765	I	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	II	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81, OK 10.72/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	III	B	AA 8018-N			
	IV	B	AA 8018, AA 8018-SR	SA 75	OK 10.62/SA 75, OK 429 /SA 75, OK 10.71/SA 75	DS II 80Ni1H4 CW 80CNi1
	V	B	AA 8018-C1		OK 10.62/ SA 75	
A769	36, 40, 45, 50, 60	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A769 (continued)	60	A	SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, II 70T-12H4, T-5, T-75, DS II 712X CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	45W, 50W	A	AA 8018, AA 8018-W	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4, DS 80-C3, DS 8100-W CW 80C-Ni1, CW W
	80	B	AA 9018	SA 95, SA 83	OK 429/SA ENi4, OK 10.71/SA ENi4	DS II 101H4M
A774	TP304L		308L	ER308L		SB308L CB308L MC308L
	TP316L		316L	ER316L		SB316L CB316L MC316L
	TP317L		317L	ER317L		SB317L
	TP321, TP347		347	ER347	OK 10.93/ER347	SB347 CB347
A778	TP304L		308L	ER308L		SB308L CB308L MC308L
	TP316L		316L	ER316L		SB316L CB316L MC316L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A778 (continued)	TP317L		317L	ER317L		SB317L
	TP321, TP347		347	ER347	OK 10.93/ER347	SB347 CB347
A782	1	A	AA 10018	SA 95	OK 10.62/SA 95	DS II 101H4M
	2	B	AA T	SA 120	OK 10.62/SA 120	DS T-115, DS II 110
	3	B	AA 12018	SA 120	OK 10.62/SA 120	
A789	S31803, S32205, S32550, S32304		OK 67.55, OK 67.53	OK 16.86		SB 2209
	S31200, S31260, S32750, S32760, S32520,		OK 68.55, OK 68.53	OK 16.88		SB 2509
A790	S31803, S32205, S32550, S32304		OK 67.55, OK 67.53	OK 16.86		SB 2209
	S31200, S31260, S32750, S32760, S32520,		OK 68.55, OK 68.53	OK 16.88		SB 2509
A793	304, 304L		308L	ER308L		SB308L CB308L MC308L
	316, 316L		316L	ER316L		SB316L CB316L MC316L
A803	S40900 TP409	C	309/309H, 308/308H	ER409CB, ER309		SB309H, SB308H CB308H 409Ti
	S43035 TP409			ER439Ti		439Ti, 18CrCb
A808		A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81, OK 10.72/SA 81	II 70T-12H4, T-5, T-75, DS II 712X

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A813	TP304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	TP304N, TP304H		308/308H	ER308/308H		SB309H CB 308H MC 308L
	TP304L, TP304LN		308L	ER308L		SB308L CB308L MC308L
	TP309Cb		309Cb			
	TP309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	TP310Cb		310Cb			
	TP310S		310	ER310		
	TP316H, TP316N		316/316H	ER316L	OK 10.93/ER316L	SB316L CB316L * MC316L *
	TP316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L * CB316L * MC316L *
	TP316L, TP316LN		316L	ER316L		SB316L CB316L MC316L
	TP317		317	ER317L		SB317L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A813 (continued)	TP317L		317L	ER317L		SB317L
	TP321, TP321H, TP347, TP347H, TP348, TP348H		347	ER347	OK 10.93/ER347	SB347 CB347
	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	N08367		112, 276	ARCALOY ER625, ARCALOY ER276		
A814	TP304		308/308H, 308L	ER308/308H, ER308L		SB308H, SB308L CB308H, CB308L MC308L
	TP304N, TP304H		308/308H	ER308/308H		SB309H CB 308H MC 308L
	TP304L, TP304LN		308L	ER308L		SB308L CB308L MC308L
	TP309Cb		309Cb			
	TP309S		309L	ER309L	OK 10.93/ER309L	SB309L CB309L MC309L
	TP310Cb		310Cb			
	TP310S		310	ER310		
	TP316H, TP316N		316/316H	ER316L	OK 10.93/ER316L	SB316L CB316L * MC316L *

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A814 (continued)	TP316		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L * CB316L * MC316L *
	TP316L, TP316LN		316L	ER316L		SB316L CB316L MC316L
	TP317		317	ER317L		SB317L
	TP317L		317L	ER317L		SB317L
	TP321, TP321H, TP347, TP347H, TP348, TP348H		347	ER347	OK 10.93/ER347	SB347 CB347
	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	N08367		112, 276	ARCALOY ER625, ARCALOY ER276		
A815	S31803, S32205, S32550, S32750, S32760, S32950		OK 67.55, OK 67.53	OK 16.86		SB 2209
	TP410, S41008	D	410	ER410		
	TP429	C	309L, 310	ER309L, ER310		SB309L CB309L MC309L
	TP430, TP430Ti	C		ER439Ti, ER430LNb		439Ti, 430LCb
	S41500	C	410NiMo			
A823	All		NA 99, NA 55, NA 550			NC: 55
A831	316		316/316H	ER316L	OK 10.93/ER316L	SB316L CB 316L MC 316L
	T91	D	AA 9018-B9	ER90S-B9		DS B9

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A832	21V, 22V, 23V	C	AA 9018-CM, AA 8018-B3L	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 9000-B2L, DS 98-CM CW 90B3
A841	Gr A, B, and C, Cl 1	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81, OK 10.72/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	Gr A, B, and C, Cl 2	A	AA 8018, AA 8018-SR	SA 75	OK 10.62/SA 75, OK 10.71 SA 75, OK 10.72/SA 75	DS II 80Ni1H4
	Gr E Cl 4 and 5	B	AA 9018, AA 9018-SR	SA 95	OK 10.62/SA 95	
	Gr F, Cl 6	A	AA 8018, AA 8018-SR	SA 75	OK 10.62/SA 75, OK 429 /SA 75, OK 10.71/SA 75	DS II 80Ni1H4 CW 80CNi1
	Gr F Cl 7 and 8	B	AA 9018, AA 9018-SR	SA 95	OK 10.62/SA 95	
A844			OK 92.55			OK 10.90/ER625
A847		A	SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
A852		B	AA 9019	SA 95, SA 83	OK 429/SA ENi4	DS II 101H4M
A857		A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV, SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
A858		A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81, OK 10.72/SA 81	II 70T-12H4, T-5, T-75, DS II 712X

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A859	Gr A, Cl 1	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81, OK 10.72/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	Gr A, Cl 2	A	AA 8018, AA 8018-SR	SA 75	OK 10.62/SA 75, OK 10.71 SA 75, OK 10.72/SA 75	DS II 80Ni1H4
A860	WPHY42, WPHY46, WPHY52	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81, OK 10.72/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	WPHY60, WPHY65, WPHY70	A	AA 8018, AA 8018-SR	SA 75	OK 10.62/SA 75, OK 10.71 SA 75, OK 10.72/SA 75	DS II 80Ni1H4
A871	All	A	AA 8018, AA 8018-W	SA 75	OK 10.71/SA 75, OK 10.72/SA 75	DS II 80Ni1H4, DS 80-C3, DS 8100-W CW 80C-Ni1, CW W
A872	J93183		OK 67.55, OK 67.53	OK 16.86		SB 2209
	J93550		OK 68.55, OK 68.53	OK 16.88		SB 2509
A873	1, 2, 3, 4	B	AA 9018-CM, AA 8018-B3L			DS: T-98-B3, 9000-B3, 9000-B3L
A890	1A, 1B, 2A, 3A, 5A, 6A		OK 68.55, OK 68.53	OK 16.88		SB 2509
	4A		OK 67.55, OK 67.53	OK 16.86		SB 2209
A913	50	A	SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	60, 65	B	AA 8018	SA 75	OK 429/SA 75	DS II 80Ni1H4, DS 80-C3, DS 8100-W CW 80CNi1
	70	B	AA 9018	SA 83, SA 95	OK 429/SA ENi4	DS II 101H4M

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A928	S31803, S32205, S32304		OK 67.55, OK 67.53	OK 16.86		SB 2209
	S31260, S32550, S32750, S32760, S32950		OK 68.55, OK 68.53	OK 16.88		SB 2509
A943	TP 304H, TP304N		308/308H	ER308/308H		SB308H CB308H
	TP304, TP304L, TP 304LN		308L	ER308L	OK 10.93/ER308L	SB 308L CB 308L MC 308L
	TP309Cb, TP309HCb		309Cb			
	TP309H		309/309H	ER309	OK 10.93/ER309	
	TP309S		309L	ER309L	OK 10.93/ER309L	SB 309L CB 309L MC 309L
	TP310Cb, TP310HCb		310CB			
	TP310H, TP310S		310	ER310		
	TP316, TP316L		316L	ER316L	OK 10.93/ER316L	SB 316L CB316L MC316L
	TP316H, TP316N		316/316H	ER316H	OK 10.93/ER316H	
	TP317, TP317L		317L	ER317L		SB 317L MC317L
	TP321, TP347, TP348, TP 321H, TP 347H, TP348H		347	ER347		SB 347 CB 347

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A943 (continued)	S31254	250 max	276, OK 92.45	ARCALOY ER625, ARCALOY ER276		
	S31050		310Mo			
A945	50	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 10.62/SA 81, OK 10.72/SA 81	II 70T-12H4, T-5, T-75, DS II 712X
	65	A	AA 8018	SA 75	OK 10.62/SA 75, OK 10.71 SA 75, OK 10.72/ SA 75	DS II 80Ni1H4
A949	S31803, S32205, S32304, S31200		OK 67.55, OK 67.53	OK 16.86		SB 2209
	S31260, S32550, S32750, S32760, S32950		OK 68.55, OK 68.53	OK 16.88		SB 2509
A965	F 304H, F304N		308/308H	ER308/308H		SB308H CB308H
	F304, F304L, F 304LN		308L	ER308L	OK 10.93/ER308L	SB 308L CB 308L MC 308L
	F309H		309/309H	ER309	OK 10.93/ER309	
	F310, F310H		310	ER310		
	F316, F316L, F16LN		316L	ER316L	OK 10.93/ER316L	SB 316L CB316L MC316L
	F316H, F316N		316/316H	ER316H	OK 10.93/ER316H	
	F321, F347, F348, F 321H, F 347H, F348H		347	ER347		SB 347 CB 347

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A984	35	A	SW 10P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	50	A	SW 710P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	60, 70	A	SW 810P, AA 8018	SA 75	OK 429/SA 75, OK 10.71/ SA 75	DS II 80Ni1H4 CW 80CNi1
	80	B	AA 9018	SA 83, SA 95	OK 429/SA ENi4, OK 10.71/SA ENi4	DS II 101H4M
A988	S41000	D	410	ER410		
	S30400		308/308H, 308L	ER308/308H, ER308L	OK 10.93/ER308L	SB308H, SB308L CB308H, CB308L MC308L
	S30403, S30453		308L	ER308L	OK 10.93/ER308L	SB308L CB308L MC308L
	S30451		308/308H	ER308/308H		SB308H CB308H
	S31600		316/316H, 316L	ER316L	OK 10.93/ER316L	SB 316H; SB316L CB316L MC316L
	S31603		316L	ER316L	OK 10.93/ER316L	SB316L CB316L MC316L

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A989	K90941	D	AA 8018-B8			
	K91650	D	AA 9018-B9	ER90S-B9		DS B9
	K31545, K21590	C	AA 9018-CM	ER90S-B3	OK 10.62/OK 13.20SC	DS 9000-B3, DS 98-CM CW 90B3
A992		A	SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
A995	1B, 2A, 3A, 5A, 6A		OK 68.55, OK 68.53	OK 16.88		SB 2509
	4A		OK 67.55, OK 67.53	OK 16.86		SB 2209
A1005	35	A	SW 10P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	50	A	SW 710P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	60, 70	A	SW 810P, AA 8018	SA 75	OK 429/SA 75, OK 10.71/ SA 75	DS II 80Ni1H4 CW 80CNi1
	80	B	AA 9018	SA 83, SA 95	OK 429/SA ENi4, OK 10.71/SA ENi4	DS II 101H4M

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A1006	35	A	SW 10P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	50	A	SW 710P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	60, 70	A	SW 810P, AA 8018	SA 75	OK 429/SA 75, OK 10.71/ SA 75	DS II 80Ni1H4 CW 80CNi1
	80	B	AA 9018	SA 83, SA 95	OK 429/SA ENi4, OK 10.71/SA ENi4	DS II 101H4M
A1008	CS, DS,DDS, EDDS		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	SS GR 25, 30, 33, 40		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	SS Gr 50		AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	SS Gr 60, 70, 80	A	AA 8018	SA 75		DS II 80Ni1H4

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A1008 (continued)	HSLAS GR 45, 50, 55		AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS Gr 60, 65	A	AA 8018	SA 75		DS II 80Ni1H4
	HSLAS Gr 70	A	AA 9019	SA 83, SA 95		DS II 101H4M
	HSLAS-F GR 50, 60		AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS-F Gr 70	A	AA 8018	SA 75		DS II 80Ni1H4
	HSLAS-F Gr 80	A	AA 9019	SA 83, SA 95		DS II 101H4M
A1011	CS, DS		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	SS GR 30, 33, 36, 40, 45		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	SS Gr 50, 55		AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	SS Gr 60	A	AA 8018	SA 75		DS II 80Ni1H4

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A1011 (continued)	SS Gr 70	A	AA 9019	SA 83, SA 95		DS II 101H4M
	SS Gr 80	B	AA 10018	SA 95		DS II 100
	HSLAS GR 45, 50, 55		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS GR 50, 55		AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS Gr 60, 65	A	AA 8018	SA 75		DS II 80Ni1H4
	HSLAS Gr 70	A	AA 9019	SA 83, SA 95		DS II 101H4M
	HSLAS-F GR 50		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS-F GR 60		AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS-F Gr 70	A	AA 8018	SA 75		DS II 80Ni1H4
	HSLAS-F Gr 80	A	AA 9019	SA 83, SA 95		DS II 101H4M

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A1018	CS, DS		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	SS GR 30, 33, 36, 40		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS GR 45		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS GR 50, 55		AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS Gr 60, 65	A	AA 8018	SA 75		DS II 80Ni1H4
	HSLAS Gr 70	A	AA 9019	SA 83, SA 95		DS II 101H4M
	HSLAS-F GR 50		SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A1018 (continued)	HSLAS-F GR 60		AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CS 15 CW 70, CW Ultra, CW C-6
	HSLAS-F Gr 70	A	AA 8018	SA 75		DS II 80Ni1H4
	HSLAS-F Gr 80	A	AA 9019	SA 83, SA 95		DS II 101H4M
A1020	Gr A, C	A	SW 10P, SW10P+, SW-14, SW-612, SW-15, SW 6013LV	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
	Gr D	A	AA 7018	SA 29S, 66, 82, 85, 86, 87HP		DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus CW 70, CW Ultra, CW C-6
A1024	35	A	SW 10P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	50	A	SW 710P, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	OK 429/SA 81, OK 10.71/ SA 81	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X CW 70, CW Ultra, CW C-6
	60, 70	A	SW 810P, AA 8018	SA 75	OK 429/SA 75, OK 10.71/ SA 75	DS II 80Ni1H4 CW 80CNi1
	80	B	AA 9018	SA 83, SA 95	OK 429/SA ENi4, OK 10.71/SA ENi4	DS II 101H4M

ASTM	Class or Grade	Preheat Temp.	SMAW	GMAW/GTAW	SAW	FCAW/MCAW
A1026	Gr 50		SW-15IP, SW 7024, AA 7018	SA 29S, 66, 82, 85, 86, 87HP	81/231, 81/350, 81/429, OK 429 / SA 81, OK 10.71/SA 81, OK 10.72/ SA 81, OK 10.62/SA 18	DS T-62, ARC-70, R-70 Ultra, 710X, 7100LC, 7100 Ultra, FC-717, 70 Ultra Plus, II 70 Ultra, II 71 Ultra, DS II 711X, DS 111AC, 111RB, 700X, ARC 87, 7000, Arc-71 CS40, CS7, CS 11, CS6, CS 8 CW 70, CW Ultra, CW C-6
	Gr 65	A	AA 8018	SA 75	OK 429/SA 75, OK 10.71/ SA 75	DS II 80Ni1H4 CW 80CNi1

Conversion Tables

Conversion Tables - Section Seven

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English/Metric Tensile Strength/Yield Strength Conversion Chart

Pounds per square inch (psi) to kilopascals (kPa)
Thousand pounds per square inch (ksi) to Megapascals (MPa)

	0	1	2	3	4	5	6	7	8	9
psi	**kPa (kN/m2)**									
ksi	**MPa (MN/m2)**									
40	275.7920	282.6868	289.5816	296.4764	303.3712	310.2660	317.1608	324.0556	330.9504	337.8452
50	344.7400	351.6348	358.5296	365.4244	372.3192	379.2140	386.1088	393.0036	399.8984	406.7932
60	413.6880	420.5828	427.4776	434.3724	441.2672	448.1620	455.0568	461.9516	468.8464	475.7412
70	482.6360	489.5308	496.4256	503.3204	510.2152	517.1100	524.0048	530.8996	537.7944	544.6892
80	551.5840	558.4788	565.3736	572.2684	579.1632	586.0580	592.9528	599.8476	606.7424	613.6372
90	620.5320	627.4268	634.3216	641.2164	648.1112	655.0060	661.9008	668.7956	675.6904	682.5852
100	689.4800	696.3748	703.2696	710.1644	717.0592	723.9540	730.8488	737.7436	744.6384	751.5332
110	758.4280	765.3228	772.2176	779.1124	786.0072	792.9020	799.7968	806.6916	813.5864	820.4812
120	827.3760	834.2708	841.1656	848.0604	854.9552	861.8500	868.7448	875.6396	882.5344	889.4292

Conversion Formulas:

psi x .0068948 MPa MPa x 145.03774
ksi x 6.8948 = MPa MPa x 0.14503774

English/Metric Impact Strength Conversion Chart

Find the impact strength to be converted in Column B. If in ft-lb., read joules in Column A. If in joules, read ft-lb. in Column C.

Fractional strengths over 10 and all strengths over 130 can be calculated by addition.

EXAMPLE: Convert 20.6 ft-lbs. to joules

20	ft-lbs.	=	27.1 joules
0.6	ft-lbs.	=	0.81 joules
20.6	ft-bls.	=	27.91 joules

Conversion Formula:

ft-lb x 1.355818 = J

J x .737562 = ft-lb

J		ft-lb	J		ft-lb	J		ft-lb	J		ft-lb
A	B	C	A	B	C	A	B	C	A	B	C
0.14	0.1	0.07	7.59	5.6	4.13	28.47	21.0	15.5	103.04	76.0	56.05
0.27	0.2	0.15	7.73	5.7	4.20	29.83	22.0	16.2	104.40	77.0	56.79
0.41	0.3	0.22	7.86	5.8	4.28	31.18	23.0	17.0	105.75	78.0	57.53
0.54	0.4	0.30	8.00	5.9	4.35	32.54	24.0	17.7	107.11	79.0	58.27
0.68	0.5	0.37	8.13	6.0	4.43	33.90	25.0	18.4	108.47	80.0	59.00
0.81	0.6	0.44	8.27	6.1	4.50	35.25	26.0	19.2	109.82	81.0	59.74
0.95	0.7	0.52	8.41	6.2	4.57	36.61	27.0	19.9	111.18	82.0	60.48
1.08	0.8	0.59	8.54	6.3	4.65	37.96	28.0	20.7	112.53	83.0	61.22
1.22	0.9	0.66	8.68	6.4	4.72	39.32	29.0	21.4	113.89	84.0	61.96
1.36	1.0	0.74	8.81	6.5	4.79	40.67	30.0	22.1	115.24	85.0	62.69
1.49	1.1	0.81	8.95	6.6	4.87	42.03	31.0	22.9	116.60	86.0	63.43
1.63	1.2	0.89	9.08	6.7	4.94	43.39	32.0	23.6	117.96	87.0	64.17
1.76	1.3	0.96	9.22	6.8	5.02	44.74	33.0	24.3	119.31	88.0	64.91
1.90	1.4	1.03	9.36	6.9	5.09	46.10	34.0	25.1	120.67	89.0	65.64
2.03	1.5	1.11	9.49	7.0	5.16	47.45	35.0	25.8	122.02	90.0	66.38
2.17	1.6	1.18	9.63	7.1	5.24	48.81	36.0	26.6	123.38	91.0	67.12
2.30	1.7	1.25	9.76	7.2	5.31	50.17	37.0	27.3	124.74	92.0	67.86
2.44	1.8	1.33	9.90	7.3	5.38	51.52	38.0	28.0	126.09	93.0	68.59
2.58	1.9	1.40	10.03	7.4	5.46	52.88	39.0	28.8	127.45	94.0	69.33
2.71	2.0	1.48	10.17	7.5	5.53	54.23	40.0	29.5	128.80	95.0	70.07
2.85	2.1	1.55	10.30	7.6	5.61	55.59	41.0	30.2	130.16	96.0	70.81
2.98	2.2	1.62	10.44	7.7	5.68	56.94	42.0	31.0	131.51	97.0	71.54
3.12	2.3	1.70	10.58	7.8	5.75	58.30	43.0	31.7	132.87	98.0	72.28
3.25	2.4	1.77	10.71	7.9	5.83	59.66	44.0	32.5	134.23	99.0	73.02
3.39	2.5	1.84	10.85	8.0	5.90	61.01	45.0	33.2	135.58	100.0	73.76
3.53	2.6	1.92	10.98	8.1	5.97	62.37	46.0	33.9	136.94	101.0	74.49
3.66	2.7	1.99	11.12	8.2	6.05	63.72	47.0	34.7	138.29	102.0	75.23
3.80	2.8	2.07	11.25	8.3	6.12	65.08	48.0	35.4	139.65	103.0	75.97
3.93	2.9	2.14	11.39	8.4	6.20	66.44	49.0	36.1	141.01	104.0	76.71
4.07	3.0	2.21	11.52	8.5	6.27	67.79	50.0	36.9	142.36	105.0	77.44
4.20	3.1	2.29	11.66	8.6	6.34	69.15	51.0	37.6	143.72	106.0	78.18
4.34	3.2	2.36	11.80	8.7	6.42	70.50	52.0	38.4	145.07	107.0	78.92
4.47	3.3	2.43	11.93	8.8	6.49	71.86	53.0	39.1	146.43	108.0	79.66
4.61	3.4	2.51	12.07	8.9	6.56	73.21	54.0	39.8	147.78	109.0	80.39
4.75	3.5	2.58	12.20	9.0	6.64	74.57	55.0	40.6	149.14	110.0	81.13
4.88	3.6	2.66	12.34	9.1	6.71	75.93	56.0	41.3	150.50	111.0	81.87
5.02	3.7	2.73	12.47	9.2	6.79	77.28	57.0	42.0	151.85	112.0	82.61
5.15	3.8	2.80	12.61	9.3	6.86	78.64	58.0	42.8	153.21	113.0	83.34
5.29	3.9	2.88	12.74	9.4	6.93	79.99	59.0	43.5	154.56	114.0	84.08
5.42	4.0	2.95	12.88	9.5	7.01	81.35	60.0	44.3	155.92	115.0	84.82
5.56	4.1	3.02	13.02	9.6	7.08	82.70	61.0	45.0	157.27	116.0	85.56
5.69	4.2	3.10	13.15	9.7	7.15	84.06	62.0	45.7	158.63	117.0	86.29
5.83	4.3	3.17	13.29	9.8	7.23	85.42	63.0	46.5	159.99	118.0	87.03
5.97	4.4	3.25	13.42	9.9	7.30	86.77	64.0	47.2	161.34	119.0	87.77
6.10	4.5	3.32	13.56	10.0	7.38	88.13	65.0	47.9	162.70	120.0	88.51
6.24	4.6	3.39	14.91	11.0	8.11	89.48	66.0	48.7	164.05	121.0	89.25
6.37	4.7	3.47	16.27	12.0	8.85	90.84	67.0	49.4	165.41	122.0	89.98
6.51	4.8	3.54	17.63	13.0	9.59	92.20	68.0	50.2	166.77	123.0	90.72
6.64	4.9	3.61	18.98	14.0	10.33	93.55	69.0	50.9	168.12	124.0	91.46
6.78	5.0	3.69	20.34	15.0	11.06	94.91	70.0	51.6	169.48	125.0	92.20
6.91	5.1	3.76	21.69	16.0	11.80	96.26	71.0	52.4	170.83	126.0	92.93
7.05	5.2	3.84	23.05	17.0	12.54	97.62	72.0	53.1	172.19	127.0	93.67
7.19	5.3	3.91	24.40	18.0	13.28	98.97	73.0	53.8	173.54	128.0	94.41
7.32	5.4	3.98	25.76	19.0	14.01	100.33	74.0	54.6	174.90	129.0	95.15
7.46	5.5	4.06	27.12	20.0	14.75	101.69	75.0	55.3	176.26	130.0	95.88

English/Metric Gas Flow Rate Conversion Chart

Find the flow rate to be converted in the center column. If in cfh, read L/min in column to right. If in L/min, read cfh in column to left.

cfh		L/min	cfh		L/min	cfh		L/min
2.12	1	0.472	72.08	34	16.055	142.04	67	31.637
4.24	2	0.944	74.20	35	16.527	144.16	68	32.109
6.36	3	1.417	76.32	36	16.999	146.28	69	32.581
8.48	4	1.889	78.44	37	17.471	148.40	70	33.054
10.60	5	2.361	80.56	38	17.943	150.52	71	33.526
12.72	6	2.833	82.68	39	18.416	152.64	72	33.998
14.84	7	3.305	84.80	40	18.888	154.76	73	34.470
16.96	8	3.778	86.92	41	19.360	156.88	74	34.942
19.08	9	4.250	89.04	42	19.832	159.00	75	35.415
21.20	10	4.722	91.16	43	20.304	161.12	76	35.887
23.32	11	5.194	93.28	44	20.777	163.24	77	36.359
25.44	12	5.666	95.40	45	21.249	165.36	78	36.831
27.56	13	6.139	97.52	46	21.721	167.48	79	37.303
29.68	14	6.611	99.64	47	22.193	169.60	80	37.776
31.80	15	7.083	101.76	48	22.665	171.72	81	38.248
33.92	16	7.555	103.88	49	23.138	173.84	82	38.720
36.04	17	8.027	106.00	50	23.610	175.96	83	39.192
38.16	18	8.500	108.12	51	24.082	178.08	84	39.664
40.28	19	8.972	110.24	52	24.554	180.20	85	40.137
42.40	20	9.444	112.36	53	25.026	182.32	86	40.609
44.52	21	9.916	114.48	54	25.499	184.44	87	41.081
46.64	22	10.388	116.60	55	25.971	186.56	88	41.553
48.76	23	10.860	118.72	56	26.443	188.68	89	42.025
50.88	24	11.333	120.84	57	26.915	190.80	90	42.498
53.00	25	11.805	122.96	58	27.387	192.92	91	42.970
55.12	26	12.277	125.08	59	27.860	195.04	92	43.442
57.24	27	12.749	127.20	60	28.332	197.16	93	43.914
59.36	28	13.221	129.32	61	28.804	199.28	94	44.386
61.48	29	13.694	131.44	62	29.276	201.40	95	44.859
63.60	30	14.166	133.56	63	29.748	203.52	96	45.331
65.72	31	14.638	135.68	64	30.220	205.64	97	45.803
67.84	32	15.110	137.80	65	30.693	207.76	98	46.275
69.96	33	15.582	139.92	66	31.165	209.88	99	46.747
						212.00	100	47.220

Conversion Formula:

cfh x .472195 = L/min L/min x 2.12 cfg

Hardness Conversion Chart

BRINELL			ROCKWELL			
Dia. in mm 3000 kg load 10mm ball	Vickers or Hardness No.	150 kg load Fifth Hardness No	C 100 kg load 120° Diamond Cone	B Tensile 1/16 in dia. Bail	Scleroscope No.	Strength 1000 psi
2.05	898					440
2.10	857					420
2.15	817					401
2.20	780	1150	70		106	334
2.25	745	1050	68		100	368
2.30	712	960	66		95	352
2.35	682	885	64		91	337
2.40	653	820	62		67	324
2.45	627	765	60		84	311
2.50	801	717	58		81	298
2.55	578	675	57		78	287
2.60	555	633	55	120	75	276
2.65	534	598	53	119	72	266
2.70	514	567	52	119	70	256
2.75	495	540	50	117	67	247
2.60	477	515	49	117	65	238
2.85	461	494	47	116	63	229
2.90	444	472	46	115	61	220
2.95	429	454	45	115	59	212
3.00	415	437	44	114	57	204
3.05	401	420	42	113	55	196
3.10	388	404	41	112	54	189
3.15	375	389	40	112	52	182
3.20	363	375	38	110	51	176
3.25	352	363	37	110	49	170
3.30	341	350	36	109	48	165
3.35	331	339	35	109	46	160
3.40	321	327	34	108	45	155
3.45	311	316	33	108	44	150
3.50	302	305	32	107	43	146
3.55	293	296	31	106	42	142
3.60	285	287	30	105	40	138
3.65	277	279	29	104	39	134
3.70	269	270	26	104	38	131
3.75	262	263	26	103	37	128
3.80	255	256	25	102	37	125
3.85	248	248	24	102	36	122
3.90	241	241	23	100	35	119
3.95	235	235	22	99	34	116
4.00	229	229	21	98	33	113
4.05	223	223	20	97	32	110
4.10	217	217	18	96	31	107
4.15	212	212	17	96	31	104
4.20	207	207	16	95	30	101
4.25	202	202	15	94	30	99
4.30	197	197	13	93	29	97
4.35	192	192	12	92	28	95
4.40	187	187	10	91	28	93
4.45	183	183	9	90	27	91
4.50	179	179	8	89	27	89
4.55	174	174	7	88	26	87
4.60	170	170	6	87	26	85
4.65	166	166	4	86	25	83
4.70	163	163	3	85	25	82
4.75	159	159	2	84	24	80
4.80	156	156	1	63	24	78
4.85	153	153	82	23		76
4.90	149	149	61	23		75
4.95	146	146	80	22		74
5.00	143	143	79	22		72
5.05	140	140	78	21		71
5.10	137	137	77	21		70
5.15	134	134	76	21		68
5.20	131	131	74	20		66
5.25	128	128	73	20		65
5.30	126	126	72			64
5.35	124	124	71			63
5.40	121	121	70			62
5.45	118	118	69			61
5.50	116	116	68			60
5.55	114	114	67			59
5.60	112	112	66			58
5.65	109	109	65			56
5.70	107	107	64			56
5.75	105	105	62			54
5.80	103	103	61			53
5.85	101	101	60			52
5.90	99	99	59			51
5.95	97	97	57			50
6.00	95	95	56			49

General Conversion Factors

The following conversion formulas provide one, but definitely not the only, calculation methodology for each of the suggested conversions.

To Convert	Multiply	Example		
ksi to MPa	ksi by 6.8948	92.1 ksi	=	635 MPa
MPa to ksi	MPa by 0.14503774	635 MPa	=	92.1 ksi
ft-lb to J	ft-lbs by 1.35582	43 ft/lb	=	58.3 J
J to ft-lb	Joule by 0.737562	58 J	=	42.78 ft-lb
ft-lb to kg-m	ft-lbs by 0.138255	21 ft-lb	=	2.903355 kg-m
kg-m to ft-lb	kg-m by 7.23301	2.9 kg-m	=	20.975729 ft-lb
kg-m to J	kg-m by 9.80665	15 kg-m	=	147.09975 J
J to kg-m	Joule by 0.1019716	147 J	=	14.9898252 kg-m
psi to MPa	psi by 0.0068948	92000 psi	=	634.3 MPa
MPa to psi	MPa by 145.03774	634 MPa	=	91954 psi
ft to mm	ft. by 304.8	6 ft	=	1829 mm
ft to cm	ft. by 30.48	3 ft	=	91.44 cm
ft to m	ft. by 0.3048	3 ft	=	0.91 m
in to mm	in. by 25.4	0.75 in	=	19.05 mm
in to cm	in. by 2.54	135 in	=	342.9 cm
in to m	in. by 0.0254	36 in	=	0.91 m
mm to ft	millimeter by 0.00328084	304.8 mm	=	1.00 ft
cm to ft	centimeter by 0.0328084	30.48 cm	=	1.00 ft
m to ft	meter by 3.2808	1 m	=	3.28 ft
mm to in	millimeter by 0.03937008	100 mm	=	3.94 in
cm to in	centimeter by 0.3937	100 cm	=	39.37 in
m to in	meter by 39.37	1 m	=	39.37 in
kg to lb	kilogram by 2.2046	5 kg	=	11.0 lb
lb to kg	pounds by 0.453597024	6.5 lb	=	2.95 kg
lb/ft to kg/m	pounds/foot by 1.48817	0.358 lb/ft	=	0.533 kg/m

Periodic Table

Elements with their symbol and atomic number

Symbol	Element	Atomic No.	Symbol	Element	Atomic No.	Symbol	Element	Atomic No.
Ac	Actinium	89	Hf	Hafnium	72	K	Potassium	19
Al	Aluminum	13	Ha	Hahnium	105	Pr	Praseodymium	59
Am	Americium	95	Hs	Hassium	108	Pm	Promethium	61
Sb	Antimony	51	He	Helium	2	Pa	Protactinium	91
Ar	Argon	18	Ho	Holmium	67	Ra	Radium	88
As	Arsenic	33	H	Hydrogen	1	Rn	Radon	86
At	Astatine	85	In	Indium	49	Re	Rhenium	75
Ba	Barium	56	I	Iodine	53	Rh	Rhodium	45
Bk	Berkelium	97	Ir	Iridium	77	Rb	Rubidium	37
Be	Beryllium	4	Fe	Iron	26	Ru	Ruthenium	44
Bi	Bismuth	83	Kr	Krypton	36	Rf	Rutherfordium	104
Bh	Bohrium	107	La	Lanthanum	57	Sm	Samarium	62
B	Boron	5	Lr	Lawrencium	103	Sc	Scandium	21
Br	Bromine	35	Pb	Lead	82	Sg	Seaborgium	106
Cd	Cadmium	48	Li	Lithium	3	Se	Selenium	34
Ca	Calcium	20	Lu	Lutetium	71	Si	Silicon	14
Cf	Californium	98	Mg	Magnesium	12	Ag	Silver	47
C	Carbon	6	Mn	Manganese	25	Na	Sodium	11
Ce	Cerium	58	Mt	Meitnerium	109	Sr	Strontium	38
Cs	Cesium	55	Md	Mendelevium	101	S	Sulfur	16
Cl	Chlorine	17	Hg	Mercury	80	Ta	Tantalum	73
Cr	Chromium	24	Mo	Molybdenum	42	Tc	Technetium	43
Co	Cobalt	27	Nd	Neodymium	60	Te	Tellurium	52
Cu	Copper	29	Ne	Neon	10	Tb	Terbium	65
Cm	Curium	96	Np	Neptunium	93	Tl	Thalium	81
Dy	Dysprosium	66	Ni	Nickel	28	Th	Thorium	90
Es	Einsteinium	99	Nb	Niobium	41	Tm	Thulium	69
Er	Erbium	68	N	Nitrogen	7	Sn	Tin	50
Eu	Europium	63	No	Nobelium	102	Ti	Titanium	22
Fm	Fermium	100	Os	Osmium	76	W	Tungsten	74
F	Fluorine	9	O	Oxygen	8	U	Uranium	92
Fr	Francium	87	Pd	Palladium	46	V	Vanadium	23
Gd	Gadolinium	64	P	Phosphorus	15	Xe	Xenon	54
Ga	Gallium	31	Pt	Platinum	78	Yb	Ytterbium	70
Ge	Germanium	32	Pu	Plutonium	94	Y	Yttrium	39
Au	Gold	79	Po	Polonium	84	Zn	Zinc	30
						Zr	Zirconium	40

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