NATIONAL STANDARD

Because performance comes down to the wire.

NS Plus®-102 AWS ER80S-D2, ER90S-D2

DESCRIPTION

NS Plus™ 102 is a premium copper-coated low alloy, high-strength solid filler metal containing 0.5% molybdenum to maintain hardness and strength following post weld heat treatment. The manganese and silicon assist in producing a smooth, uniform weld bead and help minimize spatter.

CHARACTERISTICS

NS Plus™ Premium Copper-Coated Welding Wire sets the standard in quality to support your GMAW operations.

- Cast of 35" (.88m) to 55" (1.3m) and Helix below 1" (25.4mm) improve feedability and provide accurate wire positioning
- Excellent mechanical properties
- Manufactured according to ISO9001:2008 quality standards
- Excellent arc starts, arc stability and feedability
- Minimal spatter and copper flaking
- High level de-oxidizers
- Excellent weld appearance and post weld cleaning

PRODUCED IN: Stillwater, Oklahoma

SPECIFICATIONS

Meets or exceeds:

- AWS A5.28: ER80S-D2 (100% CO2), ER90S-D2 (Mixed)
- AWS A5.28M: ER55S-D2 (100% CO2), ER62S-D2 (Mixed)
- ASME SFA-5.28: ER80S-D2
- MIL-E-23765/2: MIL-80S-3
- CWB W48-01: ER55S-D2
- AWS A5.23/A5.23M: EA3K (1/16" dia. only)

APPLICATIONS

Well-suited for these applications:

- ASTM A182, A217, A234 and A335 high temperature pipe, fittings, flanges and valves and A336 pressure vessel forgings
- Excellent for applications needing strength after post weld heat treatment
- All metal transfer modes of GMAW
- Robotic, mechanized or semi-automatic welding

SHIELDING GAS BLENDS

Typical Application Sheilding Gas Blends:

- 100% CO2: ER80S-D2
- 75-95% Argon/Balance CO2
- 95-98% Argon/Balance O2 ER90S-D2
- Flow Rate: 35-50 CFH

WELDING POSITIONS

All position welding is possible when using the correct shielding gas blends, welding process and welding parameters.

STORAGE

Welding wire should be stored in a dry, enclosed environment and in its originally-sealed package.

National Standard Customer Service:
1-800-777-1618
405-372-7954 (fax)

www.NationalStandard.com

9/14/2017

NATIONAL STANDARD

Because performance comes down to the wire.

NS-102 CopperFree™ AWS ER80S-D2, ER90S-D2

DESCRIPTION

NS-102 CopperFree™ is a low alloy, high strength solid filler metal containing 0.5% molybdenum to maintain hardness and strength following post weld heat treatment. The manganese and silicon assist in producing a smooth, uniform weld bead and help minimize spatter.

CHARACTERISTICS

NS-102 CopperFree™ provides the ultimate in flexibility to support your GMAW operations.

- Cast of 35 in. (.88m) to 55 in. (1.3m) and Helix below 1 in. (25.4mm) improve feedability and provide accurate wire positioning.
- Excellent mechanical properties
- Manufactured according to ISO9001:2008 quality standards
- Excellent arc starts, arc stability and feedability
- Minimal spatter
- No copper flaking
- Moderate de-oxidizers
- Excellent weld appearance and post weld cleaning

PRODUCED IN: Stillwater, Oklahoma

SPECIFICATIONS

Meets or exceeds:

- AWS A5.28: ER80S-D2 (100% CO2), ER90S-D2 (Mixed)
- AWS A5.28M: ER55S-D2 (100% CO2), ER62S-D2 (Mixed)
- ASME SFA-5.28: ER80S-D2
- MIL-E-23765/2: MIL-80S-3
- CWB W48-01: ER55S-D2
- AWS A5.23/A5.23M: EA3K (1/16" dia. only)

APPLICATIONS

Well-suited for these applications:

- ASTM A182, A217, A234 and A335 high temperature pipe, fittings, flanges and valves and A336 pressure vessel forgings
- Applications needing strength after post weld heat treatment
- All metal transfer modes of GMAW
- Robotic, mechanized or semi-automatic welding
- Best results when using 95-98% Argon/Balance Oxygen shielding gas

SHIELDING GAS BLENDS

Typical Application Sheilding Gas Blends:

- 100% CO2: ER80S-D2
- 75-95% Argon/Balance CO2
- 95-98% Argon/Balance O2 ER90S-D2
- Flow Rate: 35-50 CFH

WELDING POSITIONS

All position welding is possible when using the correct shielding gas blends, welding process and welding parameters.

STORAGE

Welding wire should be stored in a dry, enclosed environment and in its originally-sealed package.

National Standard Customer Service:
1-800-777-1618
405-372-7954 (fax)

www.NationalStandard.com

9/14/2017

NS Plus® and NS CopperFree™ CARBON WELDING WIRES

TYPICAL MECHANICAL PROPERTIES (as welded)

		TENSILE STRENGTH PSI	YIELD STRENGTH PSI	MINIMUM ELONGATION %	CVN IMPACT VALUES @ 0° F
101	NS Plus®-101	77,100	61,700	29	90 ft-lbf
	NS 101 CopperFree™	79,900	66,200	28	68 ft-lbf
	AWS MINIMUM	**70,000**	**58,000**	**22**	**20 ft-lbf**
	Typical conducted with CO_2 shielding gas. Wire performance data available upon request				

		TENSILE STRENGTH PSI	YIELD STRENGTH PSI	MINIMUM ELONGATION %	CVN IMPACT VALUES @ -20° F
102 (ER80S-D2)*	NS Plus®-102	95,700	80,800	24	34 ft-lbf
	NS 102 CopperFree™	95,700	80,800	24	34 ft-lbf
	AWS MINIMUM (ER80S-D2)	**80,000**	**68,000**	**17**	**20 ft-lbf**
102 (ER90S-D2)*	NS Plus®-102	98,700	84,400	27	52 ft-lbf
	NS 102 CopperFree™	98,700	84,400	27	52 ft-lbf
	AWS MINIMUM (ER90S-D2)	**90,000**	**78,000**	**17**	**20 ft-lbf**
	*ER80S-D2 (100% CO2), ER90S-D2 (98% Ar/2% O2) Wire performance data available upon request				
115	NS Plus®-115	82,200	65,200	29	60 ft-lbf
	NS 115 CopperFree™	88,800	73,500	27	39 ft-lbf
	AWS MINIMU	**70,000**	**58,000**	**22**	**20 ft-lbf**

NS Plus® and NS CopperFree™ CARBON WELDING WIRES

APPROXIMATE WELDING PARAMETERS

GRADE	DIA.	POLARITY	TRANSFER MODE	WIRE FEED SPEED in/min (m/min)		VOLTAGE		AMPERAGE	
				Min.	Max.	Min.	Max.	Min.	Max.
NS Plus® Copper-Coated	0.035	DCEP	Short Circuit	100 (2.5)	400 (10.1)	18	24	75	180
	0.035		Spray	375 (9.5)	625 (15.9)	24	30	180	280
	0.040		Short Circuit	115 (2.9)	425 (10.8)	17	24	100	205
	0.040		Spray	365 (9.3)	560 (14.2)	24	30	215	315
	0.045		Short Circuit	125 (3.2)	450 (11.4)	19	25	125	225
	0.045		Spray	350 (8.9)	500 (12.7)	27	31	250	350
	0.052		Short Circuit	200 (5.1)	325 (8.3)	23	27	200	300
	0.052		Spray	300 (7.6)	500 (12.7)	30	32	300	425
	0.062		Short Circuit	190 (4.8)	325 (8.3)	24	28	200	325
	0.062		Spray	200 (5.1)	375 (9.5)	28	32	325	420
NS CopperFree™	0.030	DCEP	Short Circuit	75 (1.9)	300 (7.6)	17	22	45	130
	0.035		Short Circuit	100 (2.5)	400 (10.1)	17	24	75	180
	0.035		Spray	375 (9.5)	625 (15.9)	23	29	180	280
	0.040		Short Circuit	115 (2.9)	425 (10.8)	17	24	100	205
	0.040		Spray	365 (9.3)	560 (14.2)	24	30	215	315
	0.045		Short Circuit	125 (3.2)	450 (11.4)	18	24	125	225
	0.045		Spray	350 (8.9)	500 (12.7)	26	30	250	350
	0.052		Short Circuit	200 (5.1)	325 (8.3)	22	26	200	300
	0.052		Spray	300 (7.6)	500 (12.7)	27	31	300	425
	0.062		Short Circuit	190 (4.8)	325 (8.3)	23	27	200	325
	0.062		Spray	200 (5.1)	375 (9.5)	27	31	325	425
	0.062		Spray	200 (5.1)	375 (9.5)	27	31	325	425

NS Plus® and NS CopperFree™ CARBON WELDING WIRES

TYPICAL WIRE CHEMISTRY PERCENTAGES (as required per AWS)

		C	Mn	Si	P	S	Cu	Ni	Cr	Mo	V
101	NS Plus®-101 Typ.	0.09	1.17	0.59	0.009	0.009	0.16	0.04	0.04	0.012	0.005
	NS 101 CopperFree™ Typ.	0.09	1.17	0.60	0.012	0.014	0.07	0.06	0.07	0.008	0.005
	AWS A5.18/A5.18M	**0.06/0.15**	**0.90/1.40**	**0.45/0.70**	**0.025 (max.)**	**0.035 (max.)**	**0.50 (max.)**	**0.15 (max.)**	**0.15 (max.)**	**0.15 (max.)**	**0.03 (max.)**
	AWS A5.17/A5.17M	**0.06/0.16**	**0.90/1.40**	**0.35/0.75**	**0.030 (max.)**	**0.030 (max.)**	**0.35 (max.)**	-	-	-	-
102	NS Plus®-102 Typ.	0.09	1.76	0.66	0.009	0.01	0.14	0.07		0.46	
	NS 102 CopperFree™ Typ.	0.1	1.81	0.63	0.016	0.016	0.06	0.06		0.47	
	AWS A5.28/A5.28M	**0.07/0.12**	**1.60/2.10**	**0.50/0.80**	**0.025 (max.)**	**0.025 (max.)**	**0.50 (max.)**	**0.15 (max.)**		**0.40/0.60**	
	AWS A5.23/A5.23M	**0.05/0.15**	**1.60/2.10**	**0.50/0.80**	**0.025 (max.)**	**0.025 (max.)**	**0.35 (max.)**			**0.40/0.60**	
115	NS Plus®-115 Typ.	0.08	1.49	0.9	0.011	0.01	0.14	0.05	0.04	0.008	0.006
	NS 115 CopperFree™ Typ.	0.09	1.52	0.91	0.012	0.011	0.07	0.06	0.06	0.01	0.01
	AWS A5.18/A5.18M	**0.06/0.15**	**1.40/1.85**	**0.80/1.15**	**0.025 (max.)**	**0.035 (max.)**	**0.50 (max.)**	**0.15 (max.)**	**0.15 (max.)**	**0.15 (max.)**	**0.03 (max.)**
	AWS A5.17/A5.17M	**0.06/0.15**	**1.40/1.85**	**0.80/1.15**	**0.030 (max.)**	**0.030 (max.)**	**0.35 (max.)**				

NS Plus® and NS CopperFree™ CARBON WELDING WIRES

STANDARD DIAMETERS AND PACKAGING

(Note: Contact NS Customer Service for wire diameter availability of each alloy.)

Package	Package Size	.035	.040	.045	.052	.062
Coil	1000	x				
Drum	250	x		x		
Drum	500	x	x	x	x	x
Drum	900	x	x	x	x	x
Drum	1000			x		
Masonite Spool	33	x	x	x	x	x
Masonite Spool	45	x	x	x	x	x
Masonite Spool	60	x	x	x	x	x
Smart Pak Single Skid	250	x				
Smart Pak® 100% Recyclable	250	x	x	x	x	
Smart Pak® 100% Recyclable	500	x	x	x	x	
Smart Pak® 100% Recyclable	900	x	x	x	x	x
Smart Pak® 100% Recyclable	1000	x	x	x	x	x
Tru-Trac® Wood Reel	300	x	x	x	x	x
Tru-Trac® Wood Reel	500	x		x	x	
Tru-Trac® Wood Reel	600					x
Tru-Trac® Wood Reel	1000	x	x	x	x	x
Tru-Trac® Wood Reel	1500			x		
Wood Reel	1000	x	x	x	x	x
Wire Basket - Precision Layer Level Wound	33	x	x	x	x	x
Wire Basket - Precision Layer Level Wound	45	x	x	x	x	x