



NS Plus[®]-101 AWS ER70S-3, EM13K

DESCRIPTION

NS Plus™ 101 is a premium copper-coated mild steel solid filler metal designed to extract maximum weld quality and user appeal from ER70S-3 wire. Careful attention to the manganese and silicon contents assure maximum deoxidation, flat bead profiles and low-spatter welds.

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.
- Manufactured according to ISO9001:2008 quality standards
- Excellent arc starts, arc stability and feedability
- Minimal spatter and copper flaking
- Moderate de-oxidizers
- Excellent weld appearance and post weld cleaning

PRODUCED IN: Stillwater, Oklahoma

SPECIFICATIONS

Meets or exceeds:

- AWS A5.18: ER70S-3, AWS A5.18M: ER48S-3
- AWS A5.17: EM13K (1/16" dia. only)
- ASME SFA-5.18: ER70S-3
- MIL-E-23765/1: MIL-70S-3
- CWB W48-01: ER49S-3

APPLICATIONS

Well-suited for these applications:

- Low carbon killed and semi killed steel
- All metal transfer modes of GMAW
- Robotic, mechanized or semi-automatic welding
- Welding steel with light mill scale, light rust or thin oil
- Used for single and multi-pass weldments
- Pipe welding, structural steel and steel buildings
- Applications requiring a minimum 70,000 psi tensile strength

SHIELDING GAS BLENDS

Typical Application Shielding Gas Blends:

- 100% CO₂
- 75-95% Argon/Balance CO₂
- 95-98% Argon/Balance O₂
- 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.

The information contained or otherwise referenced herein is presented only in "typical" without guarantee or warranty, and National Standard expressly disclaims any liability incurred from any reliance thereon. Typical data are obtained when welded and tested in accordance with AWS specifications. Specification, other tests and procedures may produce different results. No data is to be construed as a recommendation for any welding condition or technique not controlled by National Standard LLC.



NS-101 CopperFree™ AWS ER70S-3, EM13K

DESCRIPTION

NS-101 CopperFree™ is a premium copper-free mild steel solid filler metal designed to extract maximum weld quality and user appeal from ER70S-3 wire. Careful attention to the manganese and silicon contents assure maximum deoxidation, flat bead profiles and low-spatter welds.

CHARACTERISTICS

NS 101 CopperFree™ provides the ultimate in flexibility to support your GMAW welding operations.

- Cast of 35" (0.88 m) to 55" (1.3 m) and helix below 1" (25.4 mm) improve feedability and provide accurate wire positioning
- 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 A5.18: ER70S-3, AWS A5.18M: ER48S-3
- AWS A5.17: EM13K (1/16" dia. only)
- ASME SFA-5.18: ER70S-3
- MIL-E-23765/1: MIL-70S-3
- CWB W48-01: ER49S-3

APPLICATIONS

Well-suited for these applications:

- Low carbon killed and semi killed steel
- Well suited for all metal transfer modes of GMAW
- Robotic, mechanized or semi-automatic welding
- Welding steel with light mill scale, light rust or thin oil
- Single and multi-pass weldments
- Pipe welding, structural steel and steel buildings
- Applications requiring a minimum 70,000 psi tensile strength

SHIELDING GAS BLENDS

Typical Application Shielding Gas Blends:

- 100% CO₂
- 75-95% Argon/Balance CO₂
- 95-98% Argon/Balance O₂
- 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.

The information contained or otherwise referenced herein is presented only in "typical" without guarantee or warranty, and National Standard expressly disclaims any liability incurred from any reliance thereon. Typical data are obtained when welded and tested in accordance with AWS specifications. Specification, other tests and procedures may produce different results. No data is to be construed as a recommendation for any welding condition or technique not controlled by National Standard LLC.

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
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