The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, Ohio 44117-1199

CERTIFICATE OF CONFORMANCE

LINCOLN ELECTRIC
THE WELDING EXPERTS®

Electrode: **Innershield® NR®-311 Ni**
Electrode Size **3/32" (2.4 mm)**
Specification: **AWS D1.8:2016**
Date: **May 27, 2020**

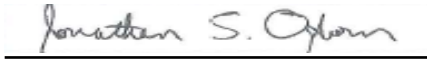
This is to certify that the above listed product was manufactured to meet the Class T4 requirement of AWS A5.01 as required by clause 6.3.1.2 of AWS D1.8:2016.

It was manufactured and supplied according to a Quality System Program that meets the requirements of ISO9001 among others as documented on The Lincoln Electric web page (<http://www.lincolnelectric.com/en-us/company/Pages/certifications.aspx>).

Operating Settings	High Heat Input Requirements	Low Heat Input Requirements	High Heat Input Results	Low Heat Input Results
Electrode Lot			15962375	15962375
Base Material			ASTM A572 steel (Grade 50)	ASTM A36 steel
Current Type/Polarity			DC-	DC-
Plate Thickness, mm (in)	(3/4)	(3/4)	19 (3/4)	19 (3/4)
Nominal Voltage, V			25	25
Nominal Current, A			315	315
Wire Feed Speed, cm/min (in/min)			381 (150)	381 (150)
Average Heat Input, kJ/cm (kJ/in)	Not Specified	Not Specified	2.7 (69.6)	1.8 (44.8)
Travel Speed, cm/min (in/min)			17 (6.8)	27 (10.6)
Contact Tip to Work Distance, mm (in)			35 (1.375)	35 (1.375)
Pass/Layers			7/4	13/6
Preheat Temperature, °C (°F)	(250 min.)	(120 max.)	135 (275)	20 (70)
Interpass Temperature, °C (°F)	(450 min.)	(250 max.)	230 (450)	120 (250)
Postweld Heat Treatment	As-welded	As-welded	As-welded	As-welded
Weld Position			1G	1G
Mechanical properties of weld deposits				
Tensile Strength, MPa (ksi)	(70 min.)	(70 min.)	630 (91)	640 (94)
Yield Strength, 0.2% Offset, MPa (ksi)	(58 min.)	(58 min.)	510 (73)	550 (80)
Elongation %	22 min.	22 min.	25	24
Average Impact Energy Joules @ 0 °C (ft-lbs @ 32 °F)	(40 min.)	(40 min.)	110 (81) 96,113,121 (71,83,89)	108 (79) 99,109,114 (73,81,84)

1. This product satisfies the requirements of AWS D1.8:2016, Annex E, after exposure for 2 weeks at 80°F / 80% relative humidity.
2. This document meets the requirements of AWS A5.01M/A5.01 Schedule F. When a specific lot number is referenced it also meets the requirements of EN10204, type 2.2. It does not meet the requirements of type 3.1.
3. The Charpy V-notch impact values reported at 0 °C (32 °F) are required when the Lowest Anticipated Service Temperature (LAST) is -11 °C (12 °F).
4. The strength and elongation properties reported here were obtained from tensile specimens artificially aged at 105°C (220°F) for 48 hours.
5. Strength values in SI units are reported to the nearest 10 MPa converted from actual data. Preheat and interpass temperature values in SI units are reported to the nearest 5 degrees.

May 27, 2020
Daniel Gaul, Certification Supervisor — Date



May 27, 2020
Jon Ogborn, Manager, Consumable Compliance — Date

Cert. No. 23115-5

The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, Ohio 44117-1199

CERTIFICATE OF CONFORMANCE

LINCOLN ELECTRIC
THE WELDING EXPERTS®

Electrode: **Innershield® NR®-311 Ni**
Electrode Size **3/32" (2.4 mm)**
Specification: **AWS D1.8:2016**
Date: **December 23, 2019**

This is to certify that the above listed product was manufactured to meet the Class T4 requirement of AWS A5.01 as required by clause 6.3.1.2 of AWS D1.8:2016.

It was manufactured and supplied according to a Quality System Program that meets the requirements of ISO9001 among others as documented on The Lincoln Electric web page (<http://www.lincolnelectric.com/en-us/company/Pages/certifications.aspx>).

Operating Settings	High Heat Input Requirements	Low Heat Input Requirements	High Heat Input Results	Low Heat Input Results
Electrode Lot			15509820	15509820
Base Material			ASTM A572 steel (Grade 50)	ASTM A36 steel
Current Type/Polarity			DC-	DC-
Plate Thickness, mm (in)	(3/4)	(3/4)	19 (3/4)	19 (3/4)
Nominal Voltage, V			25	25
Nominal Current, A			330	330
Wire Feed Speed, cm/min (in/min)			381 (150)	381 (150)
Average Heat Input, kJ/mm (kJ/in)	Not Specified	Not Specified	2.7 (69.3)	1.8 (45.1)
Travel Speed, cm/min (in/min)			18 (7.2)	28 (11)
Contact Tip to Work Distance, mm (in)			35 (1.375)	35 (1.375)
Pass/Layers			9/5	13/6
Preheat Temperature, °C (°F)	(250 min.)	(120 max.)	120 (250)	20 (71)
Interpass Temperature, °C (°F)	(450 min.)	(250 max.)	230 (450)	120 (250)
Postweld Heat Treatment	As-welded	As-welded	As-welded	As-welded
Weld Position			1G	1G
Mechanical properties of weld deposits				
Tensile Strength, MPa (ksi)	(70 min.)	(70 min.)	610 (88)	630 (91)
Yield Strength, 0.2% Offset, MPa (ksi)	(58 min.)	(58 min.)	500 (73)	540 (78)
Elongation %	22 min.	22 min.	27	24
Average Impact Energy	(40 min.)	(40 min.)	77 (57)	94 (70)
Joules @ 0 °C (ft-lbs @ 32 °F)			68,80,84 (50,59,62)	91,92,100 (67,68,74)

1. This product satisfies the requirements of AWS D1.8:2016, Annex E, after exposure for 2 weeks at 80°F / 80% relative humidity.
2. This document meets the requirements of AWS A5.01M/A5.01 Schedule F. When a specific lot number is referenced it also meets the requirements of EN10204, type 2.2. It does not meet the requirements of type 3.1.
3. The Charpy V-notch impact values reported at 0 °C (32 °F) are required when the Lowest Anticipated Service Temperature (LAST) is -11 °C (12 °F).
4. The strength and elongation properties reported here were obtained from tensile specimens artificially aged at 105°C (220°F) for 48 hours.
5. Strength values in SI units are reported to the nearest 10 MPa converted from actual data. Preheat and interpass temperature values in SI units are reported to the nearest 5 degrees.

December 30, 2019
Daniel Gaul, Certification Supervisor — Date

December 30, 2019
Jon Ogborn, Manager, Consumable Compliance — Date

Cert. No. 23115-4

The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, Ohio 44117-1199

CERTIFICATE OF CONFORMANCE

LINCOLN ELECTRIC
THE WELDING EXPERTS®

Product: **Innershield® NR®-311 Ni**
Electrode Lot Number: **14888245**
Classification: **E70T7-K2-H16, E80TG-K2**
Specification: **AWS D1.8:2009**
Date **December 23, 2016**

This is to certify that the above listed product was manufactured to meet the Class T4 requirement of AWS A5.01 as required by clause 6.3.8.1 of AWS D1.8:2009.

The product stated herein was manufactured and supplied in accordance with the Quality System Program of The Lincoln Eletric Co., Cleveland, Ohio, U.S.A. as outlined in our Quality Assurance Manual. The Quality System Program of The Lincoln Electric Co. has been accepted by ASME, ABS and approved by VdTUV, and is certified to ISO 9001:2013

Operating Settings	AWS D1.8 Requirements	High Heat Input Results	Low Heat Input Results
Electrode Size		3/32" (2.4 mm)	3/32" (2.4 mm)
Current Type/Polarity		DC-	DC-
Wire Feed Speed, cm/min (in/min)		381 (150)	381 (150)
Nominal Current, A		335	340
Nominal Voltage, V		25	25
Average Heat Input, kJ/mm (kJ/in)		2.7 (69)	1.7 (44)
Contact Tip to Work Distance, mm (in)		35 (1 3/8)	35 (1 3/8)
Pass/Layers		8/5	13/6
Travel Speed, cm/min (in/min)		18 (7)	28 (11)
Preheat Temperature, °C (°F)		135 (275)	20 (72)
Interpass Temperature, °C (°F)		230 (450)	120 (250)
Weld Position		1G	1G
Mechanical properties of weld deposits			
Tensile Strength, MPa (ksi)	(80 min.)	600 (86)	620 (89)
Yield Strength, 0.2% Offset, MPa (ksi)	(68 min.)	500 (72)	520 (76)
Elongation %	19 min.	27	25
Average Impact Energy	(40 min.)	178 (132)	165 (122)
Joules @ 21 °C (ft-lbs @ 70 °F)		178,178,179 (131,132,132)	162,165,170 (119,121,125)
Average Impact Energy	(40 min.)	126 (93)	108 (80)
Joules @ 0 °C (ft-lbs @ 32 °F)		121,123,133 (89,91,98)	92,115,116 (68,85,86)

1. This product satisfies the requirements of AWS D1.8:2009, Annex E, after exposure for 2 weeks at 80°F / 80% relative humidity.
2. The Charpy V-notch impact values reported at 0 °C (32 °F) are required when the Lowest Anticipated Service Temperature (LAST) is -11 °C (12 °F).
3. The Charpy V-notch impact values reported at 21 °C (70 °F) are required when the Lowest Anticipated Service Temperature (LAST) is 10 °C (50 °F).
4. The strength and elongation properties reported here were obtained from tensile specimens artificially aged at 105°C (220°F) for 48 hours.
5. Strength values in SI units are reported to the nearest 10 MPa converted from actual data. Preheat and interpass temperature values in SI units are reported to the nearest 5 degrees.

Toronto Cunningham December 23, 2016
Toronto Cunningham, Certification Supervisor Date

Jonathan S. Ogborn December 23, 2016
Jon Ogborn, Manager, Consumable Compliance Date

Cert. No. 23115