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

CERTIFICATE OF CONFORMANCE

(APPLIES ONLY TO U.S. PRODUCTS)

LINCOLN ELECTRIC
THE WELDING EXPERTS®

[1Year]

Product: **Excalibur® 7018 MR**
Classification: **E7018H4R**
Specification: **AWS A5.1:2012, ASME SFA-5.1**
Date **August 22, 2013**

This is to certify that the product named above and supplied on the referenced order number is of the same classification, manufacturing process, and material requirements as the material which was used for the test that was concluded on the date shown, the results of which are shown below. All tests required by the specifications shown for classification were performed at that time and the material tested met all requirements. It was manufactured and supplied according to the Quality System Program of the Lincoln Electric Company, Cleveland, Ohio, U.S.A., which meets the requirements of ISO9001, NCA3800, AWS A5.01, and other specification and Military requirements, as applicable. The Quality System Program has been approved by ASME, ABS, and VdTUV.

Operating Settings	**E7018H4R Requirements**	**RESULTS**			
Electrode Size		3/32 inch	3/32 inch	1/8 inch	1/8 inch
Polarity		AC	DC+	AC	DC+
Plate Thickness, mm (in)		13 (1/2)	13 (1/2)	13 (1/2)	13 (1/2)
Current, A		110	100	150	135
Pass/Layers		12/6	12/6	12/6	12/9
Preheat Temperature, °C (°F)	(225 min.)	120 (250)	120 (250)	120 (250)	120 (250)
Interpass Temperature, °C (°F)	(225 - 350)	165 (325)	165 (325)	150 (300)	150 (300)
Postweld Heat Treatment	As-welded	As-welded	As-welded	As-welded	As-welded

Mechanical properties of weld deposits

Tensile Strength, MPa (ksi)	(70 min.)	600 (87)	570 (82)	550 (80)	540 (78)
Yield Strength, 0.2% Offset, MPa (ksi)	(58 min.)	490 (71)	460 (67)	450 (65)	430 (62)
Elongation %	22 min.	27	34	32	31
Average Impact Energy Joules @ -29 °C (ft-lbs @ -20 °F)	(20 min.)	167 (123) 159,165,178 (117,122,131)	205 (151) 178,213,225 (131,157,166)	278 (205) 202,305,328 (149,225,242)	298 (220) 274,301,320 (202,222,236)
Average Hardness, HRB	Not Required	91	89	87	86

Chemical composition of weld deposits (weight %)

C	0.15 max.	0.05	0.04	0.05	0.04
Mn	1.60 max.	1.42	1.35	1.24	1.31
Si	0.75 max.	0.66	0.59	0.49	0.53
S	0.035 max.	0.010	0.009	0.007	0.008
P	0.035 max.	0.012	0.013	0.014	0.015
Cr	0.20 max.	0.03	0.03	0.04	0.04
Ni	0.30 max.	0.02	0.02	0.02	0.02
Mo	0.30 max.	0.01	0.01	0.01	0.01
V	0.08 max.	0.01	0.01	0.01	0.01
B	Not Required	0.000	0.000	0.000	0.000
Mn+Ni+Cr+Mo+V	1.75 max.	1.49	1.42	1.31	1.38

Diffusible Hydrogen (per AWS A4.3)	**E7018H4R Requirements**	**RESULTS**			
Electrode Size		3/32 inch	3/32 inch	1/4 inch	1/4 inch
Polarity		AC	DC+	AC	DC+
Diffusible Hydrogen, mL/100g	4 max.	2	2	4	3
Absolute Humidity (grains moisture/lb dry air)		66	66	43	43

Moisture	**E7018H4R Requirements**	**RESULTS**		
Electrode Size		3/32 inch	5/32 inch	1/4 inch
Coating moisture - As received	0.3 max.	0.1	0.1	0.1
Coating moisture - Humidified	0.4 max.	0.3	Not Required	0.4

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Operating Settings	**E7018H4R Requirements**	**RESULTS**			
Electrode Size		5/32 inch	5/32 inch	3/16 inch	3/16 inch
Polarity		AC	DC+	AC	DC+
Plate Thickness, mm (in)		19 (3/4)	19 (3/4)	19 (3/4)	19 (3/4)
Current, A		180	165	240	220
Pass/Layers		16/8	16/8	14/7	16/8
Preheat Temperature, °C (°F)	(225 min.)	120 (250)	120 (250)	120 (250)	120 (250)
Interpass Temperature, °C (°F)	(225 - 350)	165 (325)	165 (325)	165 (325)	165 (325)
Postweld Heat Treatment	As-welded	As-welded	As-welded	As-welded	As-welded
Mechanical properties of weld deposits					
Tensile Strength, MPa (ksi)	(70 min.)	540 (79)	530 (77)	570 (83)	570 (82)
Yield Strength, 0.2% Offset, MPa (ksi)	(58 min.)	450 (65)	430 (62)	470 (68)	470 (68)
Elongation %	22 min.	31	33	31	31
Average Impact Energy	(20 min.)	170 (126)	215 (159)	126 (93)	148 (109)
Joules @ -29 °C (ft-lbs @ -20 °F)		156,176,179 (115,130,132)	168,210,267 (124,155,197)	118,130,130 (87,96,96)	137,152,156 (101,112,115)
Average Hardness, HRB	Not Required	87	83	88	86
Chemical composition of weld deposits (weight %)					
C	0.15 max.	0.05	0.04	0.06	0.05
Mn	1.60 max.	1.20	1.18	1.13	1.15
Si	0.75 max.	0.47	0.45	0.54	0.57
S	0.035 max.	0.008	0.007	0.008	0.011
P	0.035 max.	0.013	0.013	0.016	0.016
Cr	0.20 max.	0.04	0.04	0.06	0.06
Ni	0.30 max.	0.03	0.03	0.03	0.03
Mo	0.30 max.	0.04	0.04	0.01	0.01
V	0.08 max.	0.00	0.00	0.01	0.01
B	Not Required	0.000	0.000	0.000	0.000
Mn+Ni+Cr+Mo+V	1.75 max.	1.32	1.30	1.24	1.27

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Date **August 22, 2013**

Operating Settings	E7018H4R Requirements	RESULTS			
Electrode Size		7/32 inch	7/32 inch	1/4 inch	1/4 inch
Polarity		AC	DC+	AC	DC+
Plate Thickness, mm (in)		19 (3/4)	19 (3/4)	25 (1)	25 (1)
Current, A		280	270	350	330
Pass/Layers		12/6	12/6	22/11	20/10
Preheat Temperature, °C (°F)	(225 min.)	120 (250)	120 (250)	120 (250)	120 (250)
Interpass Temperature, °C (°F)	(225 - 350)	165 (325)	165 (325)	165 (325)	165 (325)
Postweld Heat Treatment	As-welded	As-welded	As-welded	As-welded	As-welded
Mechanical properties of weld deposits					
Tensile Strength, MPa (ksi)	(70 min.)	570 (82)	550 (80)	570 (83)	560 (81)
Yield Strength, 0.2% Offset, MPa (ksi)	(58 min.)	470 (68)	450 (65)	480 (70)	470 (68)
Elongation %	22 min.	28	31	29	35
Average Impact Energy Joules @ -29 °C (ft-lbs @ -20 °F)	(20 min.)	142 (105) 102,161,163 (75,119,120)	177 (130) 172,176,182 (127,130,134)	81 (60) 47,69,127 (35,51,94)	132 (98) 127,129,141 (94,95,104)
Average Hardness, HRB	Not Required	89	86	88	87
Chemical composition of weld deposits (weight %)					
C	0.15 max.	0.06	0.05	0.05	0.05
Mn	1.60 max.	1.41	1.34	1.34	1.30
Si	0.75 max.	0.50	0.45	0.44	0.48
S	0.035 max.	0.007	0.007	0.007	0.009
P	0.035 max.	0.014	0.014	0.011	0.011
Cr	0.20 max.	0.03	0.03	0.03	0.03
Ni	0.30 max.	0.02	0.02	0.01	0.01
Mo	0.30 max.	0.00	0.00	0.00	0.00
V	0.08 max.	0.01	0.01	0.01	0.01
B	Not Required	0.000	0.000	0.000	0.000
Mn+Ni+Cr+Mo+V	1.75 max.	1.47	1.40	1.39	1.35

1. This certificate complies with the requirements of EN 10204, Type 2.2.
2. The electrode sizes required to be tested for this classification are 5/32 inch, 3/16 inch and 1/4 inch. All other sizes manufactured will also meet these requirements.
3. Test assembly constructed of ASTM A36 steel.
4. Fillet Weld Test (positions as required): Met requirements.
5. Radiographic Inspection: Grade 1 - Met requirements.
6. Results below the detection limits of the instrument or lower than the precision required by the specification are reported as zero. 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 — August 22, 2013
Toronto Cunningham, Certification Supervisor — Date

David A Fink — August 22, 2013
Dave Fink, Manager, Compliance Engineering, Consumable R&D — Date