

MATERIAL CERTIFICATION REPORT and
CERTIFICATION OF QUALITY PERFORMANCE



ELECTRALLOY
G. O. CARLSON PLATE



175 Main Street
Og City PA 16301
1 (800) 458-7273

50413 (15.16")

| | |
|------------------|-------------|
| Print Date Time | Ship Note |
| 21-Apr-2011 8:40 | 110491 |
| Certification ID | |
| 110777-3 | |
| Customer Order | Sales Order |
| P01200 | 109137 |

C030642

1/2

Grade: 316L

Specification: Type 316/316L (UNS S31600/S31603) - ASTM A182/A182M-08a (F316/F316L) AMS 5648K, AMS 5653P ASTM A193/A193M-08b (316), ASTM A479/A479M-10a, ASTM A276-08a, NACE Std-MR0175/ISO 15156-3 QQ-S-763F, ASME SA-182/SA-182M, SA-479/SA-479M, ASTM A484/A484M-08, ASME SA-193/SA-193M, ASTM A262 practice E (A allowed), Energy Steel SS1 rev 4 and any additional specifications which may be listed below.

Condition: HOT ROLLED / HOT FORGED, ANNEALED

Finish: ROUGH TURNED

| Sales Order | Quantity | Heat | Lot ID | Weight | Size | Customer Mark |
|-------------|----------|-------|----------|----------|---------------------------------------|---------------|
| 109137-3 | 1 | 50413 | 50413-1A | 6,340 LB | Diam: 15.1600 in; Length: 122.7500 in | |

| Lot | Test | Result | Low Limit | High Limit |
|--|------------|--------|-----------|------------|
| SPECIFICATION RESULTS | | | | |
| FINAL LADLE CHEMISTRY FOR AIRMELT | | | | |
| 50413 | C | 0.019 | 0.000 | 0.030 |
| 50413 | Mn | 1.78 | 1.25 | 2.00 |
| 50413 | P | 0.030 | 0.000 | 0.040 |
| 50413 | S | 0.024 | 0.020 | 0.025 |
| 50413 | Si | 0.47 | 0.00 | 1.00 |
| 50413 | Cr | 16.39 | 16.00 | 18.00 |
| 50413 | Ni | 10.19 | 10.00 | 14.00 |
| 50413 | Mo | 2.12 | 2.00 | 3.00 |
| 50413 | Cu | 0.38 | 0.00 | 0.50 |
| 50413 | N | 0.078 | 0.000 | 0.100 |
| 50413 | Co | 0.16 | 0.00 | 0.20 |
| PASS / FAIL TESTS | | | | |
| 50413-1A | Carb Net | PASS | | |
| 50413-1A | Carb Net | PASS | | |
| 50413-1A | Macro Etch | PASS | | |
| 50413-1A | Macro Etch | PASS | | |
| REDUCTION AREA | | | | |
| 50413-1A | LT (%) | 77 | 50 | 999 |
| 50413-1A | LT (%) | 77 | 50 | 999 |
| TENSILE | | | | |
| 50413-1A | LT (PSI) | 82200 | 75000 | 400000 |
| 50413-1A | LT (PSI) | 82200 | 75000 | 400000 |
| .24 YIELD | | | | |
| 50413-1A | LT (PSI) | 37300 | 30000 | 400000 |

| | | | | |
|-----------------------------------|---------------------|-------|-------|--------|
| 50413-1A | LT (PSI) | 37300 | 30000 | 400000 |
| ELONGATION 4D | | | | |
| 50413-1A | LT (%) | 64 | 45 | 999 |
| 50413-1A | LT (%) | 64 | 45 | 999 |
| BRINELL | | | | |
| 50413-1A | (BHN) | 146 | 140 | 200 |
| 50413-1A | (BHN) | 146 | 140 | 200 |
| GRAIN SIZE | | | | |
| 50413-1A | Grain Size TT (GRS) | 1.5 | 0 | 9999 |
| 50413-1A | Grain Size TT (GRS) | 0.5 | 0 | 9999 |
| ASTM PRACTICES - ASTM A262 | | | | |
| 50413-1A | Prac E LT | PASS | | |
| 50413-1A | Prac E LT | PASS | | |



The recording of false, fictitious, or fraudulent statements or omissions on this document may be punishable as a felony under Federal Statute.
The above are true and correct results of tests on samples of the material. Results conform to the specification(s) listed above and are on record.

LM# 1

SC# S037140

Heat# 50413

Qty 2516

LINE 1

SCR: 5037140

PLANT: 50413

C030642
2/2

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| PS1200 | 109137 |

Quality Statements:

ASTM E1019-03, ASTM E572-02a, and ASTM E1086-94 are the methods used to determine the chemical analysis for Fe base (High Alloy), Ni base and Cu base alloys.
 At time of shipment, items and/or material produced under this order have not come in contact with Mercury or its compounds.
 Material represented was not weld repaired.
 The mechanical tests have been performed at Modern Industries, Materials Research Division located at 613 West 11th Street Erie, PA 16512-0399
 Material Certification conforms to Certificate 3.1 as in EN 10204:2004
 Material represented was melted and manufactured in the USA
 The reported results represent the actual attributes of the material furnished and indicate full compliance with all applicable specification and contract requirements.
 Material represented was produced in accordance with the Electralloy Quality Control Program dated 08/23/2010, which meets the requirements of ISO9001(2008), MIL-1-45203A and ASME Code Section 3, Subsection NCA 3800.
 Material represented was solution annealed at 1925 degrees F +/-25 degrees F, held 30 minutes per inch of thickness and water quenched.
 Material represented was ultrasonically inspected in accordance with ASTM A388 and found acceptable using a 1/8" flat bottom hole as the acceptance criteria.
 Stainless Steel Bar, electric arc furnace melted, A.O.D. refined.
 HWRR: 9.3:1.

Meets EU Electrical "RoHS". Contains NO "WEEE" relevant substances. Complies with DFARS-225.1-Buy American Act-Supplies. HWRR = Minimum Hot Working Reduction Ratio. Electralloy only accepts residual and trace elements to the limits invoked by the specification and or customer. This document shall not be reproduced, except in full, without the written approval of Electralloy / GOC Plate.

We hereby affirm that the reported results on this certification are correct and accurate. All tests and results and operations performed by (Electralloy/G.O. Carlson Plate) or its subcontractors are in compliance with the applicable material/customer specification(s).

Name: William A. Deets
 Title: QC Technician/Works Inspector

By:

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 The above are true and correct results of tests on samples of the material. Results conform to the specification(s) listed above and are on record.