

HEAT E150236 ORDER 662216/ 04 BOL 0233571 * CERTIFICATION * 10/02/15

SHIP TO:
COPPER & BRASS
9451 45 AVE NW

EDMONTON, AB T6E 6B 000000000

----- YOUR ORDER & DATE -----
5400277254 9/29/15 CUST# 0316001 CUST TAG#SSRD01246

----- ITEM DESCRIPTION -----
GRADE 316L/316 Ship Condition CONDA
Size 316L RND HRART CONDA 15.0000 x 144.000 RL
Country of Melt: UNITED KINGDOM Country of Mfg.: UNITED KINGDOM
NAFTA Country of Origin is Country of Melt

No weld repair
Free of mercury contamination, Free of radiation contamination
No WEEE relevant substances; Meets EU electrical ROHS

Total Bundles 1 Total Weight 9012 Approx. Hot Red. Ratio 3:1

WO 2059499 Bundles: 1B

----- SPECIFICATIONS -----

| | |
|----------------------------|------------------------------|
| AMS 5648L, 5653H | SAE AMS-QQ-S-763D |
| ASME SA479 2007-2013 Ed. | ASTM A182 15 |
| ASTM A262 15 Practice A/E | ASTM A276-15 |
| ASTM A479/A479M 15 | ASTM A484 15 |
| ASTM E112 96 | ASTM A320 11 B8M Class 1 |
| ASTM A193 15 B8M | DIN 50049/EN 10204 Type 3.1 |
| DFARS 252.225.7009 10/4/11 | Federal Spec QQ-S-763F |
| Copper & Brass 316L MAXX | NACE MR0175-09, mid-rad hard |
| NACE MR0103-10 | |

----- MECHANICAL & OTHER TESTS -----

| | | | |
|-------------------------------|--------------------------------|------|--------|
| Hardness as shipped (140 HB) | | | |
| Hardness as shipped 75 HRB | | | |
| Grain size 2.5 | Tensile strength, KSI (MPa) | 80.0 | (552) |
| Micro OK | 0.2% Yield Strength, KSI (MPa) | 37.3 | (257) |
| Intergranular corrosion OK | | | |
| | Elongation % in 4D | 60.0 | |
| | Reduction of area % | 76.0 | |

----- CHEMICAL COMPOSITION -----

| | | | |
|--------------------------------|---------|----------------|--------|
| Carbon (C) | .011 | Manganese (Mn) | 1.590 |
| Phosphorus (P) | .032 | Sulphur (S) | .027 |
| Silicon (Si) | .360 | Chromium (Cr) | 16.710 |
| Nickel (Ni) | 10.110 | Cobalt (Co) | .320 |
| Copper (Cu) | .370 | Moly (Mo) | 2.050 |
| Nitrogen (N) | .082 | Columbium (Cb) | .032 |
| Titanium (Ti) | .003 | Aluminum (Al) | .005 |
| Tin (Sn) | .010 | Tantalum (Ta) | .002 |
| Vanadium (V) | .050 | Tungsten (W) | .091 |
| Columbium/ Tantalum (Cb+Ta) | .034 | | |
| Iron (Fe) | Balance | | |
| Melt Practice | EAF | | |
| Refining Practice | AOD | | |
| De-long Ferrite | 1.4 | | |

Knowingly & willfully falsifying or concealing a material act on this form, or making false, fictitious or fraudulent statements or representations herein could constitute a felony punishable under federal statutes. We hereby certify that the test results shown in this report are correct and accurate as contained in the records of the company and are in compliance with the specifications, codes, and standards listed above.

M.F. Marcanio, Quality Manager

Outokumpu Stainless Bar, LLC
3043 Crenshaw Pkwy
Richburg, SC 29729

M.F. Marcanio

From: TK Materials CA, Ltd.

Cust. M2M MACHINING

Del.: 2404291277

CstAr

CstOr 2012-609

Wgt.: 1,020 LB

Date 01/08/2016

Thomas Sanchez