



Azkoitia Plant

## MILL TEST CERTIFICATE EA-TIDE

ISO 9001 - ISO/TS 16949

QC1



Product Made in Spain

CUSTOMER: ENERGY ALLOYS HOUSTON	WORKS REFERENCE: 1774693
REFERENCE: 1062308 OP	SALES ORDER: 278452-1
PRODUCT NR: 2677576	HEAT NUMBER: 630343
	MASTER REFERENCE: 195242
	ROLLED: 27.01.2015

## REQUIRED PRODUCT

9%Cr 1%Mo ROUND BARS AS ROLLED Q+T+STRESS RELIEVED 1.875" ASTM A-29 (")

&lt;= 10.000 mm RANDOM

EXPEDITION DELIVERY: 0080495283 WEIGHT (KG): 2.116 BUNDLES: 1 UNITS: 22

## MADE ACCORDING TO

ASTM A370 2014 15.05.2014 ; ASTM A29-A29M E1 . . . 2012

ENERGY ALLOYS EAGL-600 05 06.04.2013 ; API SPEC 6A 20\*ED.+ER1&amp;2+AD12.3 . . 03.2013

NACE MR0175/ISO 15156-1 2\*EDICION 15.10.2009

NACE MR0175/ISO 15156-2 2\*EDICION 15.10.2009 ; EN 10204 :2004 OCT. 2004 3.1

## CHEMICAL ANALYSIS OF HEAT

U: % HEAT NUMBER: 630343

	C	Mn	Si	P	S	Cr	Ni	Mo	Cu
Min.	0,090	0,300	0,250			8,000		0,900	
Max.	0,150	0,600	1,000	0,020	0,010	10,000	0,500	1,100	0,300
cer.	0,112	0,423	0,690	0,012	0,005	8,613	0,181	0,951	0,118

## MECHANICAL PROPERTIES AS SUPPLIED (CONDITIONS)

Temperature of: (1): Austenitizing 1.616 °F ; Time: (1): 85 Minutes ; Cooling: (1): Oil 84 °F

Temperature of: (2): Tempering 1.310 °F ; Time: (2): 103 Minutes ; Cooling: (2): Air

Temperature of: (3): Stress Relieved 1.210 °F ; Time: (3): 120 Minutes

## MECHANICAL PROPERTIES AS SUPPLIED (TEST)

Specimen Test location: At 1/2 radius ; Standard (ASTM A370 2014 15.05.2014)

Ts (&gt;= 100 KSI): 109 KSI

Ys(1) (Rp(0,2%) 80/95 KSI): Rp(0,2%) 85 KSI ; Ys(2) ((0,5%) 80/95 KSI): (0,5%) 88 KSI

El. (2 " &gt;= 20 %) : 2 " 26 % ; Z (&gt;= 40 %) : 71,3 % ; Observations: . ; Standard (ASTM E23-01A E12007)

Notch impact sample direction (Longitudinal): Longitudinal

Notch Impact sample type (CHARPY-V): CHARPY-V ; Notch Impact test Temperature (75 °F): 75 °F

K(1): 99 Ft.Lb ; K(2): 101 Ft.Lb ; K(3): 102 Ft.Lb ; K (average) (&gt;= 40 Ft.Lb): 100,67 Ft.Lb

Lateral expansion: 0,81-0,83-0,84 mm ; Shear value: 79-80-82 % ; Standard (ASTM E18-2008B)

Surface hardness (HB): 226/233 HB ; Hardness at 1/2 radius (1) (15/22 HRC): 20/22 HRC

Hardness at 1/2 radius (2) (207/235 HB): 223/229 HB

Notch impact sample direction (Longitudinal): Longitudinal

Notch Impact sample type (CHARPY-V): CHARPY-V ; Notch Impact test Temperature (14 °F): 14 °F

K(1): 94 Ft.Lb ; K(2): 95 Ft.Lb ; K(3): 95 Ft.Lb ; K (average) (&gt;= 29 Ft.Lb): 94,67 Ft.Lb

Lateral expansion: 0,76-0,76-0,77 mm ; Shear value: 72-72-72 %

## ADDITIONAL TESTS

Standard (ASTM E112 2013 01.10.2013) ; Grain size: Austenitic 6

## NON DESTRUCTIVE TESTS

Internal defects standard (1) (ASTM A388-A388M...2011) ; Internal defects type/method (PSL3)

Internal defects standard (2) (API SPEC 6A 20\*ED.+ER1&amp;2+AD12.3 . . 03.2013)

ULTRASONIC INSPECTION 100% : O.K.

## ADDITIONAL INFORMATION

Reduction ratio: 121,5 ; MADE IN ELECTRIC FURNACE AND VACUUM DEGASSED. ; Energy Alloys EAGL-600 REV5

"Cold rotary straightening" ; FURNACE CALIBRATION ACCORDING TO AMS-MIL-H-6875, AMS-2750

TECHNOLOGY &amp; QUALITY CERTIFIES THAT THE PRODUCT FULL FILLS THE ORDER'S SPECIFICATION

APPROVED BY: ISABEL UZKIANO INURRATEGI

DATE: 20.02.2015

REF.: 2000841570000

SIGN:

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Analyst of Quality certificates





# MILL TEST CERTIFICATE

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TREATMENT OF THE MATERIAL IN CONVENTIONAL FURNACE

Material melted and manufactured 100% in Spain through the Electric Arc Furnace and Vacuum Degassing route.  
Steel not exposed to Mercury, or to any other metal alloy that is liquid, at ambient temperatures during processing or while in Gerdau's possession.  
Steel is free from Uranium or any other harmful radioactive contamination.  
Steel products were not repaired by welding.  
100% anti mix test performed by spectrometry.

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