



Azkoitia Plant

MILL TEST CERTIFICATE

ISO 9001 - ISO/TS 16949

2 1/4" 9 Cr 1 Mo



Product Made in Spain

CUSTOMER:ENERGY ALLOYS HOUSTON	WORKS REFERENCE:1776277
REFERENCE:1062308 OP	SALES ORDER:278452-3
PRODUCT NR:959	HEAT NUMBER:629228
	ROLLED:12.12.2014
	MASTER REFERENCE:186858

REQUIRED PRODUCT			
9%Cr 1%Mo ROUND BARS AS ROLLED Q+T+STRESS RELIEVED 2.25" ASTM A-29 (")			
3.000/8.000 mm RANDOM			
EXPEDITION	DELIVERY:0080498773	WEIGHT (KG):1.882	BUNDLES:1
			UNITS:14

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&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:629228							
	C	Mn	Si	P	S	Cr	Ni	Mo
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
Cer.	0,098	0,416	0,641	0,012	0,002	8,571	0,125	0,969

MECHANICAL PROPERTIES AS SUPPLIED (CONDITIONS)			
Temperature of: (1):Austenitizing 1.652 °F ; Time: (1):103 Minutes ; Cooling: (1):Oil 86			
Temperature of: (2):Tempering 1.310 °F ; Time: (2):137 Minutes ; Cooling: (2):Air Air			
Temperature of: (3):Stress Relieved 1.210 °F ; Time: (3):180 Minutes			
MECHANICAL PROPERTIES AS SUPPLIED (TEST)			
Specimen Test location:At 1/2 radius ; Standard (ASTM A370201415.05.2014)			
Ts (>= 100 KSI):107 KSI			
Ys(1) (Rp(0,2%) 80/95 KSI):Rp(0,2%) 84 KSI ; Ys(2) ((0,5%) 80/95 KSI):(0,5%) 86 KSI			
El. (2 " >= 20 %) :2 " 26 % ; Z (>= 40 %) :75,1 % ; Observations: ; Standard (ASTM E23-01AE12007)			
Notch impact sample direction (Longitudinal):Longitudinal			
Notch Impact sample type (CHARPY-V):CHARPY-V ; Notch Impact test Temperature (75 °F):75 °F			
K(1):117 Ft.Lb ; K(2):121 Ft.Lb ; K(3):130 Ft.Lb ; K (average) (>= 40 Ft.Lb):122,67 Ft.Lb			
Lateral expansion:0,80-0,82-0,85 mm ; Shear value:73-75-79 % ; Hardness Standard (ASTM E18-2008B)			
Surface hardness (HB):20/21,5 HB ; Hardness at 1/2 radius(1) (16/22 HRC):19/21 HRC			
Hardness at 1/2 radius(2) (207/235 HB):220/227 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):100 Ft.Lb ; K(2):101 Ft.Lb ; K(3):105 Ft.Lb ; K (average) (>= 29 Ft.Lb):102 Ft.Lb			
Lateral expansion:0,75-0,75-0,79 mm ; Shear value:68-68-69 %			

ADDITIONAL TESTS			
Standard (ASTM E112-01.10.2013) ; Grain size:Austenitic 7			

NON DESTRUCTIVE TESTS			
Internal defects standard(1) (ASTM A388-A388M-...2011) ; Internal defects type/method (PSL3)			
Internal defects standard(2) (API SPEC 6A20*ED.+ER1&2+AD12.3. .03.2013)			
ULTRASONIC INSPECTION 100% : O.K.			

ADDITIONAL INFORMATION			
Reduction ratio:82,9 ; 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 & QUALITY CERTIFIES THAT THE PRODUCT FULL FILLS THE ORDER'S SPECIFICATION			
APPROVED BY: ISABEL UZKIANO INURRATEGI	SIGN:		
DATE: 18.02.2015	Page 1 of 2		
REF.: 2000836320000	Analyst of Quality certificates		

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PRODUCT NR: 959	MASTER REFERENCE: 186858	ROLLED: 12.12.2014

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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