



MILL TEST CERTIFICATE

Azkoitia Plant

ISO 9001 - ISO/TS 16949



Product Made in Spain

CUSTOMER: ENERGY ALLOYS HOUSTON	WORKS REFERENCE: 1734832
REFERENCE: 1037872 OP	SALES ORDER: 270506-1
PRODUCT NR: 2444	HEAT NUMBER: 628324
	ROLLED: 21.07.2014
	MASTER REFERENCE: 185458

REQUIRED PRODUCT			
9%Cr 1%Mo ROUND BARS AS-ROLLED Q+T+STRESS RELIEVED 3.75" ASTM A-29 (")			
3.000/8.000 mm RANDOM			
EXPEDITION	DELIVERY: 0080475641	WEIGHT (KG): 2.125	BUNDLES: 1
			UNITS: 6

MADE ACCORDING TO			
ASTM A370-2012A 15.10.2012 ; 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 15156-2 2*EDICION 15.10.2009			
NACE MR0175/ISO 15156-1 2*EDICION 15.10.2009 ; EN 10204 :2004 OCT. 2004 3.1			

CHEMICAL ANALYSIS OF HEAT								
								U: % HEAT NUMBER: 628324
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
Car. 0,090	0,418	0,647	0,010	0,003	8,612	0,230	0,967	0,141

MECHANICAL PROPERTIES AS SUPPLIED (CONDITIONS)			
Specimen Test location: At 1/2 radius ; Temperature of: (1): Austenitizing 1.652 °F ; Time: (1): 168 Minutes			
Cooling: (1): Oil 91 °F ; Temperature of: (2): Tempering 1.292 °F ; Time: (2): 224 Minutes			
Cooling: (2): Air ; Temperature of: (3): STRESS RELIEVED 1.192 °F ; Time: (3): 300 Minutes			
MECHANICAL PROPERTIES AS SUPPLIED (TEST)			
Standard (ASTM A370-15.10.2012) ; Tensile Strength (>= 100 KSI): 106 KSI			
Yield Strength(1) (Rp(0,2%) 80/95 KSI): Rp(0,2%): 85 KSI			
Yield Strength(2) ((0,5%) 80/95 KSI): (0,5%): 88 KSI ; Elongation (2." >= 20 %): 2 * 25,5 %			
Reduction of Area (>= 40 %): 72,4 % ; 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): 98 Ft.Lb ; K(2): 103 Ft.Lb ; K(3): 110 Ft.Lb ; K (average) (>= 40 Ft.Lb): 103,67 Ft.Lb			
Lateral expansion: 0,63-0,66-0,68 mm ; Shear value: 23-25-26 %			
Standard (API SPEC.5CT9ED.+ERR. SEPT 2012...09.2012) ; Surface hardness (HB): 218/231 HB			
Hardness at 1/2 radius(1) (16/22 HRC): 18/20 HRC ; Hardness at 1/2 radius(2) (207/235 HB): 217/227 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): 94 Ft.Lb ; K(2): 95 Ft.Lb ; K(3): 101 Ft.Lb ; K (average) (>= 29 Ft.Lb): 96,67 Ft.Lb			
Lateral expansion: 0,61-0,62-0,65 mm ; Shear value: 21-21-22 %			

ADDITIONAL TESTS			
Standard (ASTM E112 . . . 2010) ; Grain size: Austenitic 7			

NON DESTRUCTIVE TESTS			
Internal defects standard(1) (ASTM A388-A389M-...2011)			
Internal defects standard(2) (API SPEC 6A20*ED.+ER1&2+AD12.3 . . 03.2013)			
Internal defects type/method (PSL3) ; CRACKS CONTROL 100%: OK ; ULTRASONIC INSPECTION 100% : O.K. . .			

ADDITIONAL INFORMATION			
Reduction ratio: 30,4 ; MADE IN ELECTRIC FURNACE AND VACUUM DEGASSED. ; Energy Alloys EAGL-600 REV 5			
TREATMENT OF THE MATERIAL IN CONVENTIONAL FURNACE ; "Cold rotary straightening"			

TECHNOLOGY & QUALITY CERTIFIES THAT THE PRODUCT FULL FILLS THE ORDER'S SPECIFICATION			
APPROVED BY: ISABEL UZKIANO INURRATEGI	SIGN:		
DATE: 28.08.2014	Page 1 of 2		
REF.: 2000778670000	Analyst of Quality certificates		

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FURNACE CALIBRATION ACCORDING TO AMS-MIL-H-6875, AMS-2750 ; MATERIAL IS FREE OF MERCURY CONTAMINATION
NO WELD REPAIR PERFORMED ; "COUNTRY OF MELT AND MANUFACTURE: SPAIN"

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