



Azkoitia Plant

MILL TEST CERTIFICATE

ISO 9001 - ISO/TS 16949



Product Made in Spain

CUSTOMER:ENERGY ALLOYS HOUSTON	WORKS REFERENCE:1716003
REFERENCE:1037876 OP	SALES ORDER:270719-1
PRODUCT NR:2145	HEAT NUMBER:628055
MASTER REFERENCE:185508	ROLLED:09.03.2014

REQUIRED PRODUCT			
9%Cr 1%Mo ROUND BARS AS ROLLED Q+T+STRESS RELIEVED 3.5" ASTM A-29 (")			
3.000/8.000 mm RANDOM			
EXPEDITION	DELIVERY:0080459367	WEIGHT (KG):1.785	BUNDLES:1
			UNITS:6

MADE ACCORDING TO			
ASTM A29-A29M - ...2011 ; ASTM A370 11A 15.11.2011			
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:628055
	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	0,454	0,667	0,011	0,005	8,595	0,247	0,975

MECHANICAL PROPERTIES AS SUPPLIED (CONDITIONS)	
Specimen Test location:At 1/2 radius ; Temperature of: (1):Austenitizing 1.652 °F ; Time: (1):158 Minutes	
Cooling: (1):Oil 84 °F ; Temperature of: (2):Tempering 1.292 °F ; Time: (2):210 Minutes	
Cooling: (2):Air ; Temperature of: (3):STRESS RELIEVED 1.192 °F ; Time: (3):300 Minutes	
MECHANICAL PROPERTIES AS SUPPLIED (TEST)	
Standard (ASTM A37011A15.11.2011) ; Tensile Strength (>= 100 KSI):107 KSI	
Yield Strength(1) (Rp(0,2%) 80/95 KSI):Rp(0,2%) 86 KSI	
Yield Strength(2) ((0,5%) 80/95 KSI):(0,5%) 88 KSI ; Elongation (2 " >= 20 %) :2 " 23,96 %	
Reduction of Area (>= 40 %) :70,7 % ; 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):105 Ft.Lb ; K(2):106 Ft.Lb ; K(3):111 Ft.Lb ; K (average) (>= 40 Ft.Lb):107,33 Ft.Lb	
lateral expansion:0,58-0,58-0,62 mm ; Brittle fracture:20-20-22 %	
Standard (API SPEC.5CT9ED.+ERR. SEPT 2012...09.2012) ; Surface hardness (HB):220/228 HB	
Hardness at 1/2 radius(1) (16/22 HRC):18/20 HRC ; Hardness at 1/2 radius(2) (207/235 HB):216/225 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):91 Ft.Lb ; K(2):95 Ft.Lb ; K(3):99 Ft.Lb ; K (average) (>= 29 Ft.Lb):95 Ft.Lb	
lateral expansion:0,56-0,58-0,59 mm ; Brittle fracture:19-19-20 %	

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

NON DESTRUCTIVE TESTS	
Internal defects standard(1) (ASTM A388-A388M-...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:34,6 ; MADE IN ELECTRIC FURNACE AND VACUUM DEGASSED. ; Energy Alloys EAGL-600 REV 5	
TREATMENT OF THE MATERIAL IN CONVENTIONAL FOURNACE ; "Cold rotary straightening"	

TECHNOLOGY & QUALITY CERTIFIES THAT THE PRODUCT FULL FILLS THE ORDER'S SPECIFICATION	
APPROVED BY:ISABEL UZKIANO INURRATEGI	SIGN:
DATE:09.04.2014	Page 1 of 2
REF.:2000716400000	Analyst of Quality certificates



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REFERENCE: 1037876 OP	SALES ORDER: 270719-1	HEAT NUMBER: 628055
PRODUCT NR: 2145	MASTER REFERENCE: 185508	ROLLED: 09.03.2014

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"
 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

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