



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 (\geq 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." \geq 20 %): 2 * 25,5 %
Reduction of Area (\geq 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) (\geq 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) (\geq 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-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: 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

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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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