

GS GERDAU

MILL TEST CERTIFICATE

Basauri Plant

ISO 9001 - ISO/TS 16949



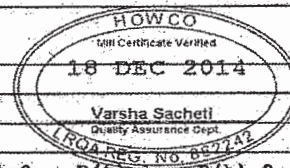
Product Made in Spain

| | |
|-------------------------------------------|--------------------------|
| CUSTOMER: HOWCO METALS MANAGEMENT PTE LTD | WORKS REFERENCE: 1740628 |
| REFERENCE: HOU-111769 | SALES ORDER: 273719-7 |
| PRODUCT NR: | HEAT NUMBER: 629109 |
| MASTER REFERENCE: 192526 | ROLLED: 03.07.2014 |

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|--------------------------------------------------------------------------------|----------------------|--------------------|------------|
| REQUIRED PRODUCT | | | |
| 9%Cr 1%Mo ROUND BARS TURNED Q+T+STRESS RELIEVED 1.5" SPECIFICATION'S TOLERANCE | | | |
| 3.000/8.000 mm RANDOM | | | |
| EXPEDITION | DELIVERY: 0080480201 | WEIGHT (KG): 5.392 | BUNDLES: 2 |
| | | | UNITS: 81 |

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| MADE ACCORDING TO | | | |
| SAE-AMS 2301 K 08.2010 ; HOWCO HG001 2.20.02.2014 ; HOWCO HG 9CR BAR 3.18.06.2012 | | | |
| EN ISO 9001 2008/AC:2009 29.07.2009 ; NACE MR0175/ISO 15156-2 2ª EDICION 15.10.2009 | | | |
| NACE MR0175/ISO 15156-1 2ª EDICION 15.10.2009 ; EN 10204 :2004 OCT. 2004 3.1 | | | |

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|---------------------------|--------|-------|-------|-------|-------|--------|-------|-------|-------|--------------------------|--------|
| CHEMICAL ANALYSIS OF HEAT | | | | | | | | | | U: % HEAT NUMBER: 629109 | |
| | C | Mn | Si | P | S | Cr | Ni | Mo | Cu | Ti | B |
| 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 | 0,250 | | |
| Cer. | 0,100 | 0,421 | 0,629 | 0,010 | 0,001 | 8,559 | 0,175 | 0,971 | 0,108 | 0,0010 | 0,0013 |
| Nb | | | | | | | | | | | |
| Min. | | | | | | | | | | | |
| Max. | | | | | | | | | | | |
| Cer. | 0,0010 | | | | | | | | | | |



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| INCLUSIONS (MICROINCLUSIONS) | | | | | | | | | | | |
| Standard (ASTM E452013. . . 2013) ; Type/method (D Tabla I-r) ; A(t):0,5 ; A(h):0 ; B(t):1 ; B(h):0 | | | | | | | | | | | |
| C(t):0 ; C(h):0 ; D(t):0,5 ; D(h):0 | | | | | | | | | | | |
| INCLUSIONS (MACROINCLUSIONS) | | | | | | | | | | | |
| Standard (SAE-AMS 2301K08.2010) ; Severity(1):Mean value 0 ; Severity(2):Individual value 0,1 | | | | | | | | | | | |
| Frequency(1):Mean value 0 ; Frequency(2):Individual value 0,1 | | | | | | | | | | | |

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| MECHANICAL PROPERTIES AS SUPPLIED (CONDITIONS) | | | | | | | | | | | |
| Specimen Test location: At 1/2 radius ; Temperature of: (1): Austenitizing 1.796 °F ; Time: (1): 120 Minutes | | | | | | | | | | | |
| Cooling: (1): Oil 78/88 °F ; Temperature of: (2): Tempering 1.328 °F ; Time: (2): 120 Minutes | | | | | | | | | | | |
| Cooling: (2): Air ; Temperature of: (3): Stress Relieved 1.228 °F ; Time: (3): 360 Minutes | | | | | | | | | | | |
| MECHANICAL PROPERTIES AS SUPPLIED (TEST) | | | | | | | | | | | |
| Standard(1) (ASTM A3702012A15.10.2012) ; Standard(2) (ASTM E8/E8M2013A01.07.2013) | | | | | | | | | | | |
| Tensile test specimen direction (Longitudinal): Longitudinal ; Ts (95/120 KSI): 108 KSI | | | | | | | | | | | |
| Ys (Rp(0,2%) 80/95 KSI): Rp(0,2%) 82 KSI ; El. ((4d) >= 20 %) : (4d) 26,8 % ; Z (>= 40 %) : 71,5 % | | | | | | | | | | | |
| Standard (ASTM E23-01AE12007) ; Notch impact sample direction (Longitudinal): Longitudinal | | | | | | | | | | | |
| Notch Impact sample type (CHARPY-V): CHARPY-V ; Notch Impact test Temperature (14 °F): 14 °F | | | | | | | | | | | |
| K(1): 103 Ft.Lb ; K(2): 102 Ft.Lb ; K(3): 100 Ft.Lb ; K (average) (>= 30 Ft.Lb): 102 Ft.Lb | | | | | | | | | | | |
| K (single) (>= 25 Ft.Lb): 100 Ft.Lb ; Lateral expansion: 1.41-1.39-1.36 mm ; Shear value: 70-70-70 % | | | | | | | | | | | |
| Surface hardness (217/237 HBW): 226-230 HBW | | | | | | | | | | | |

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| ADDITIONAL TESTS | | | | | | | | | | | |
| Structure: Ferrite Delta < 5% ; Standard (ASTM E112201301.10.2013) ; Grain size: 6 | | | | | | | | | | | |
| radioactivity: FREE Bq/gr | | | | | | | | | | | |

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| NON DESTRUCTIVE TESTS | | | | | | | | | | | |
| Surface defects standard (API SPEC 6A20*ED. +ER1&2+AD12.3. .03.2013) | | | | | | | | | | | |
| Internal defects standard(1) (ASTM A388-A388M-. . .2011) | | | | | | | | | | | |

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| TECHNOLOGY & QUALITY CERTIFIES THAT THE PRODUCT FULL FILLS THE ORDER'S SPECIFICATION | | | | | | | | | | | |
| APPROVED BY: MARCELINO GARCIA ZAYAS | | | | | | SIGN: | | | | | |
| DATE: 28.10.2014 | | | | | | Analyst of Quality certificates | | | | | |
| REF.: 1002137540000 | | | | | | | | | | | |

| Customer PO# | Sales Order# | Howco Disp Cert# | Date | Authorized by | Page No. | Total Pages |
|--------------|--------------|------------------|-------------|----------------|----------|-------------|
| 203298 | 2063728-1 | 2063728-1 | Jun 06 2017 | Megan McKeever | 1 | 2 |

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ISO 9001 - ISO/TS 16949



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Internal defects standard(2) (API SPEC 6A20*ED.+ER1&2+AD12.3. .03.2013)
Internal defects type/method(1) (FBH) ; Internal defects type/method(2) (PSL3) ; 1/8" (1)
S/API 6A(según cláusulas 7.4.2.3.15 y 7.4.2.4.11) (2) ; ULTRASONIC INSPECTION 100% : O.K. (1)
ULTRASONIC INSPECTION 100% : O.K. (2) ; CRACKS CONTROL 100%:OK

ADDITIONAL INFORMATION

Reduction ratio:163,1 ; MADE IN ELECTRIC ARC FURNACE AND VACUUM DEGASSED.INGOT CAST 464 X 464 MM AVERAGE
TREATMENT TEMPERATURE MEASURED WITH ATMOSPHERIC THERMOCOUPLE
FURNACE CALIBRATION ACCORDING TO "API 6A appendix M" - AMS H-6875, AMS 2750
" NO WELD REPAIR PERFORMED " ; COUNTRY OF ORIGIN : SPAIN ; MATERIAL IS FREE OF MERCURY CONTAMINATION
TREATMENT OF THE MATERIAL IN CONVENTIONAL FURNACE
MECHANICAL PROPERTIES OBTAINED FROM PROLONGATION OF THE BAR AFTER HEAT TREATMENT ; ACC. TO ASTM A370.
.
The mill supply chain controls have taken into account Dodd Frank Act requirements regarding conflict minerals.

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

APPROVED BY:MARCELINO GARCIA ZAYAS

SIGN:

DATE:28.10.2014

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REF.:1002137540000

Analyst of Quality certificates

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