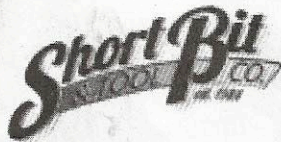


PB



BUILD SHEET: N-182 DATE 11-30-17
 MOLD CHECK 2.517 LOOKED
 ORDER DATE 7/16/18 SHIP BY DATE: 7/19/18
 FOR SLB-France PO NO 592386
 SIZE 2.5 TYPE MDK
 THREAD 1 1/2 MT OTHER _____
 MATRIX (H) 1679 WEIGHT .88
 MATRIX (S) 1682 WEIGHT .64
 BINDER 23679 WEIGHT 2.15
 BLANK GE58026542 TJ 173218
 CUTTER _____
 BILLET _____ TUBE _____
 WELD BY _____ MPI BY VJ / finished per VJ
 THREAD GAGE Allan STAND OFF _____
 FINAL DIAMOND GRIND SIZE _____
 SHIPPED BY JM DATE 7-16-18

SHORT BIT & TOOL CO
 225 GOLD STREET
 GARLAND TX 75042
 972-205-1011
 main@shortbits.com

011810



Certificate of Conformance

Serial Number	Size	Type	Steel or Matrix	Shank Diameter	Bore
N-182, N-183	2.50	MDX	Matrix		
Component					
	Material	Vender	Lot or Heat Number		
Blank	8620 Steel	RHW	GE58026542		
Hard Powder	WC	HMP	1679		
Soft Capping Powder	W2	HMP	1662		
Tool Joint	4130 Steel	MERCER	173718		
MIG Weld					
WP Tube					
Inspection					
Diamond Grinding To Size					
Weld MPI					
Thread Gaging			1 1/2MT		
Signed By: <i>P. Bege</i> date: <i>7/18/2018</i>					

Document Number:	F-Q-018
Revision:	Orig.
Date of Origin:	8/12/2012
Manual:	P-Q-001
Page:	PAGE 1 OF 1
Title:	MATERIAL PROPERTIES CERTIFICATION



CUSTOMER:	Short Bits
CUSTOMER PO#:	VICKIE E MAIL 10-05-17
ITEM ID:	PWMP010
ITEM DESCRIPTION	MP MATRIX POWDER H
ITEM LOT #	MPW1679
DATE	10/9/2017
WEIGHT	100 lb.

CHEMICAL COMPOSITION (Weight Percent)			
Element	Minimum	Maximum	RESULT
Total Carbon (Tc)	5.4	5.90	5.63
Free Carbon (Fc)	-	0.04	0.03
Iron (Fe)	-	1.00	0.02
Nickel (Ni)	1.5	2.50	2.01
Tungsten (T)			Balance

PRODUCT SIZING (Weight Percent)			
Sieve	Minimum	Maximum	RESULT
(U.S. Standard Mesh per ASTM B214)			
+80	4.0	8.0	6.4
-80 + 120	13.0	17.0	15.5
-120+ 170	13.0	17.0	14.8
-170 + 230	13.0	17.0	14.8
-230 + 325	13.0	17.0	16.0
-325	29.00	37.00	32.5

PHYSICAL PROPERTIES			
Testing Procedure	Minimum	Maximum	RESULT
Apparent Density ASTM B212 (g/cc)	7.2	8.1	7.3
Tap Density ASTM B527 (g/cc)	9.2	10.4	10.2
Hall Flow Rate ASTM B213 (sec/50g)		Must Flow	12.6

Document Number:	F-Q-018
Revision:	Orig.
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Manual:	P-Q-001
Page:	PAGE 1 OF 1
Title:	MATERIAL PROPERTIES CERTIFICATION



CUSTOMER:	Short Bits
CUSTOMER PO#:	VICKIE E MAIL 09-18-17
ITEM ID:	PWCTPM002
ITEM DESCRIPTION	CTPM CRYSTALLINE W 80 X 325 MESH
ITEM LOT #	MPW1662
DATE	9/19/2017
WEIGHT	100 lb.

CHEMICAL COMPOSITION (Weight Percent)			
Element	Minimum	Maximum	RESULT
Tungsten (W)	99.5	-	99.99
-	-	-	-

PRODUCT SIZING (Weight Percent)			
Sieve	Minimum	Maximum	RESULT
(U.S. Standard Mesh per ASTM B214)			
+80	-	5.0	2.0
-80 + 325	-	-	94.7
-325	-	10.00	3.3
-	-	-	-

PHYSICAL PROPERTIES			
Testing Procedure	Minimum	Maximum	RESULT
Apparent Density ASTM B212 (g/cc)	7.2	9.2	7.5
Tap Density ASTM B527 (g/cc)	9.0	10.5	10.4
Hall Flow Rate ASTM B213 (sec/50g)		Must Flow	10.7
-	-	-	-



330 Belmont Avenue, Brooklyn, NY 11207-4000 U.S.A
tel: +1.718.342.4900 fax: +1.718.342.0175

Certificate of Analysis

September 06, 2017

To: **Short Bits & Tool**
225 Gold Street
Garland, TX 750426648 USA

Customer Order No: **Verbal/Vicki**

Customer ID: **SHORTC**

Sales Order No: **28918**

Material: **4483D**

BELMONT *Virgin Grade Binder Alloy*

Shape: 1/2" x 1/2" x 3/4" *Tumbled Sheared Pcs.*

Packaging: 250 Lb. *Drums*

Lot:	23679
Copper (Cu)	47.68
Manganese (Mn)	23.60
Nickel (Ni)	20.06
Zinc (Zn)	8.18
Boron (B)	0.19
Iron (Fe)	0.07
Silicon (Si)	0.17
Lead (Pb)	< 0.05
Tin (Sn)	< 0.05

BELMONT METALS, INC.

Nasir Naseer

QC Administrat

BELMONT



METALS

NUCOR

Mill Certification
8/24/2016

MTR #: L1-132503
2000 East First Street
MARYVILLE, MO 64468
(660) 582-3127
Fax: (660) 582-7730

NUCOR-LMP INC

Sold To: R H W METALS
PO BOX 3507
LONGVIEW, TX 75606
(903) 758-5460
Fax: (903) 758-5677

Ship To: R H W METALS
1551 LAREDO DR
ODESSA, TX 79761

Customer P.O.	17160	Sales Order	549400.2
Product Group	Cold Finish Bar	Part Number	333285
Grade	1018 ASTM A108	Lot #	L1186908
Size	Round 2.5000 (.0030)	Heat #	GE58026542
Product	RD 2.5000" 1018 20-0 CD	B.L. Number	L1-432430
Description	CF Grade 1018	Load Number	L1-132503
Customer Spec		Customer Part #	

I hereby certify that the material described herein has been manufactured in accordance with the specifications and standards listed above and that it satisfies those requirements.

Qty Shipped LBS: 2,002 Qty Shipped Pcs: 6

Part Detail: RD 2.5000" 1018 20-0 Cold Drawn
Process: Cold Drawn

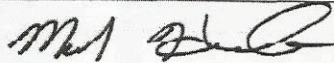
C	Mn	P	S	Si	Cu	Cr	Ni	Mo	Sn	V	Al
0.15%	0.70%	0.011%	0.030%	0.26%	0.25%	0.11%	0.10%	0.023%	0.006%	0.0020%	0.004%

Melting Mill: GERDAU Country of Melting: USA

Reduction Ratio 8 :1 Country of Rolling: USA

Specification Comments:

1. This material is free of mercury contamination.
2. No welding or weld repair was performed on this material.



Mark Herndon
QA SUPERVISOR



Basauri Plant

MILL TEST CERTIFICATE

ISO 9001 - ISO/TS 16949



Product Made in Spain

CUSTOMER: MAGELLAN CORPORATION		WORKS REFERENCE: 1720543	
REFERENCE: 209657	SALES ORDER: 270958-6	HEAT NUMBER: 173718	
PRODUCT NR:	MASTER REFERENCE: 180504	ROLLED: 11.04.2014	

REQUIRED PRODUCT			
AISI4130 ROUND BARS AS ROLLED NORM. QUENCH, TEMP 2.5" ASTM A-29 (") 20-23' RANDOM			
EXPEDITION	DELIVERY: 0080464270	WEIGHT (KG): 27.960	BUNDLES: 13 UNITS: 161

MADE ACCORDING TO	
ASTM E709 - 2008 ; ASTM E45 - 2010E1 ; ASTM A322 07 2007 ; ASTM A304 - 2005E2 ASTM A751-01 - 2001 ; ASTM E381 2001 R2006 ; ASTM E10 .07A .2007 ASTM A255 - . . . 2010 ; ASTM E112 - . . . 2010 ; ASTM A29-A29M - . . . 2011 ASTM A370 11A 15.11.2011 ; ASTM A388-A388M - . . . 2011 ; SAE-AMS-H 6875A - 01.12.1998 MAGELLAN MIC2016 1 30.01.2012 ; MAGELLAN MIC2016 AD.12 - 20.01.2010 API SPEC. 16A 3ª EDICION+ERR.11/04 06.2004 API SPEC 16C 1ª EDICION (R 2001) 29.01.1993 API SPEC 6A 20ª ED.+ER1&2+AD12.3 . . . 03.2013 NACE MR0175/ISO 15156-2 2ª EDICION 15.10.2009 ; EN 10204:2004 3.1	

CHEMICAL ANALYSIS OF HEAT											U:% HEAT NUMBER: 173718	
	C	Mn	Si	P	S	Cr	Ni	Mo	V	Cu	Al	
Min.	0,280	0,400	0,200			0,800		0,150			0,015	
Max.	0,330	0,600	0,300	0,025	0,025	1,100	0,250	0,250	0,030	0,350	0,045	
cer.	0,300	0,570	0,270	0,006	0,003	1,090	0,140	0,232	0,015	0,110	0,029	
	Ca	Nb	H									
Min.												
Max.	0,0350	0,00020										
cer.	0,0004	0,0020	0,00013									
P+S<=0,040:0,009 3,200<=D.I.ASTM A255 ("):3,572												

JOMINY HARDENABILITY												
HARDNESS U.: HRC NORM. TEMP.: 1.650 °F QUENCHING TEMP.: 1.600 °F												
	1/16"	2/16"	3/16"	4/16"	5/16"	6/16"	8/16"	10/16"	12/16"	14/16"	16/16"	
Min.	49,0	46,0	42,0	38,0	34,0	31,0	27,0	26,0	25,0	24,0	23,0	
Max.	56,0	55,0	53,0	51,0	49,0	47,0	42,0	38,0	35,0	34,0	33,0	
cer.	50,5	50,5	50,5	48,0	46,5	43,5	39,5	37,0	34,0	32,0	30,0	
	20/16"	24/16"	28/16"	32/16"								
Min.	21,0											
Max.	32,0	31,0	30,0	29,0								
cer.	28,0	26,5	25,0	24,0								
JOMINY Standard (ASTM A255-... 2010)												

INCLUSIONS (MICROINCLUSIONS)	
Standard (ASTM E45-2010E1) ; Type/method (A) ; A(t):1 ; A(h):0 ; B(t):1,5 ; B(h):1 ; C(t):0 ; C(h):0 ; D(t):1 ; D(h):0,5	

MECHANICAL PROPERTIES AS SUPPLIED (CONDITIONS)	
Specimen Test location: At 1/2 radius ; Temperature of: (1): Normalising 1.652 °F ; Time: (1): 360 Minutes	
Cooling: (1): Air ; Temperature of: (2): Austenitizing 1.616 °F ; Time: (2): 180 Minutes	
Cooling: (2): Water 76/87 °F ; Temperature of: (3): Tempering 1.292 °F ; Time: (3): 3 hours	
MECHANICAL PROPERTIES AS SUPPLIED (TEST)	
Standard (ASTM A37011A15.11.2011) ; Tensile test specimen direction (Longitudinal): Longitudinal	
Tensile Strength (>= 100.000 PSI): 113.802 PSI	

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

APPROVED BY: MARCELINO GARCIA ZAYAS SIGN:

DATE: 23.05.2014 Page 1 of 2

REF.: 1002044920000 Analyst of Quality certificates

97/14
 523068
 173718
 R455790 @



Basauri Plant

MILL TEST CERTIFICATE

ISO 9001 - ISO/TS 16949



Product Made in Spain


CUSTOMER: MAGELLAN CORPORATION	WORKS REFERENCE: 1720543
REFERENCE: 209657	SALES ORDER: 270958-6
PRODUCT NR:	HEAT NUMBER: 173718
	MASTER REFERENCE: 180504
	ROLLED: 11.04.2014

Yield Strength(1) (Rp(0,2%) >= 80.000 PSI): Rp(0,2%) 87.715 PSI
Yield Strength(2) ((0,02%) PSI): (0,02%) 83.478 PSI ; Elongation (2 " >= 18 %): 2 " 24,8 %
Reduction of Area (>= 40 %): 74,8 % ; Notch impact sample direction (Longitudinal): Longitudinal
Notch Impact sample type (CHARPY-V): CHARPY-V ; Notch Impact test Temperature (-75 °F): -75 °F
K(1): 131 Ft.Lb ; K(2): 132 Ft.Lb ; K(3): 128 Ft.Lb ; K (average) (>= 25 Ft.Lb): 130 Ft.Lb
K (single) (>= 15 Ft.Lb): 128 Ft.Lb ; lateral expansion: 1.89-1.90-1.86 mm
Brittle fracture: 90-90-90 % ; Standard (ASTM E10..07A..2007)
Surface hardness(1) (207/235 HB): 228-230 HB ; Surface hardness(2) (<= 22 HRC): 20,5-20,5 HRC
Hardness at 1/2 radius (HB): 221-224 HB
Notch impact sample direction (Transverse): Transverse ; Notch Impact sample type (CHARPY-V): CHARPY-V
Notch Impact test Temperature (-75 °F): -75 °F ; K(1): 30 Ft.Lb ; K(2): 29 Ft.Lb ; K(3): 29 Ft.Lb
K (average) (>= 15 Ft.Lb): 29 Ft.Lb ; K (single) (>= 12 Ft.Lb): 29 Ft.Lb
lateral expansion: 0.52-0.53-0.56 mm ; Brittle fracture: 50-50-50 %

ADDITIONAL TESTS
Standard (ASTM E112-. . .2010) ; Grain size: Austenitic 7 ; Standard (ASTM E3812001R2006)
macroetching(1): S 1 ; macroetching(2): R 1 ; macroetching(3): C 1 ; radioactivity: FREE

NON DESTRUCTIVE TESTS
Surface defects standard (ASTM E709-2008)
Internal defects standard(1) (API SPEC 6A20*ED.+BR1&2+AD12.3. .03.2013)
Internal defects standard(2) (ASTM A388-A388M...2011) ; ULTRASONIC INSPECTION 100% : O.K. (1)
ULTRASONIC INSPECTION 100% : O.K. (2) ; API 6A point 7.4.2.3.15 (1)
ANTIMIXING TEST SPECTROSCOPY 100%: OK ; CRACKS CONTROL 100% : O.K.

ADDITIONAL INFORMATION
Reduction ratio: 10,7 ; NO WELD REPAIR PERFORMED ; CONTINUOUS CASTING 185 X 185 mm
MATERIAL IS FREE OF MERCURY CONTAMINATION ; MADE IN ELECTRIC FURNACE AND VACUUM DEGASSED.
" MATERIAL ACCORDING TO : API 6A, API 16A, API 16C, " PSL" 1-4 " ; & API Material designation 75K
& SAE-AMS-H6875A ; & NACE MR0175-02 ; Mechanical Properties obtained from test bar AS SUPPLIED
TEMPERATURE CONTROL METHOD: ATMOSPHERIC THERMOCOUPLE ; Molten steel in the factory of: BASAURI
Surface and volumetric NDE results are satisfactory
Ultrasonic Inspection Results ("Satisfactory per ASTM A388")
"Steel is free from harmful radioactive contamination" ; "COUNTRY OF MELT AND MANUFACTURE: SPAIN"
heat treated in accordance to SAE-AMS-H6875A requirements ; , , .

TECHNOLOGY & QUALITY CERTIFIES THAT THE PRODUCT FULL FILLS THE ORDER'S SPECIFICATION	
APPROVED BY: MARCELINO GARCIA ZAYAS	SIGN: 
DATE: 23.05.2014	Analyst of Quality certificates
REF.: 1002044920000	



CERTIFICATION

To: SHORT BIT & TOOL CO.
 225 GOLD STREET

GARLAND TX 75042

Purchase Order No.: THT-173718

Material: 4130

Customer Spec

HRC 32-35, Per P.O.

Quantity	Part Number / Part Name / Part Description	Container	Pounds
66	1 1/2 MT 2 1/2" dia, 4130 w/ machined end	Metal Pan 2 Skid 1	560

[1] Harden at 1,575°F for 2 hours. Oil quench.
 [2] Temper at 1,000°F for 3 hours 2 minutes. Air cool.

Insp. Type	Scale	Minimum	Maximum	Insp. Type	Scale	Minimum	Maximum	Value
Customer Requirements:				Results:				
Surface	HRC	.0	.0	Surface	HRC	34.6	35.0	
Method: E18				5 Pieces Inspected, Date Tested: 04-02-2017				
Tensile Strength	KSI			Tensile Strength	KSI			155.8
Method: E8/8M				Date Tested: 04-03-2017				
Yield Strength	KSI			Yield Strength	KSI			138.4
Report Values				0.2% Offset				
% Elongation	%			% Elongation	%			20.0
Report Values				1" Initial Gauge				
% Reduction in	%			% Reduction in Area	%			65.4
Report Values				0.255" Initial Diameter				

* 1 part scrapped for mechanical testing

IMPORTANT STATEMENT:

All test specimens and testing conforms to applicable ASTM Standards, unless otherwise specified per written customer requirement. Reported values apply to the sample(s) tested and/or inspected and are not necessarily indicative of the quality of apparently identical or similar products and do not extend to the lot or batch from which the tested components were drawn. The information in this metallurgical report is intended for the use of Texas Heat Treating's client and may not be published or reproduced except in full without Texas Heat Treating's expressed consent. Texas Heat Treating accepts no responsibility or liability for results due to non-representative test items, improper sampling, insufficient testing or misinformation. Material submitted to metallurgical lab will be discarded after 30 days, except by prior written agreement.



TEXAS HEAT TREATING, INC.
5113 NORTH FREEWAY
FORT WORTH, TEXAS 76106
(972) 263-9755 Phone
(612) 238-0408 Fax

Order No.: 303093

Date: 04/04/2017

Page: 2 of 2

CERTIFICATION

To: SHORT BIT & TOOL CO.
225 GOLD STREET

GARLAND TX 75042

Purchase Order No.: THT-173718

Material: 4130

Customer Spec

HRC 32-35, Per P.O.

William Weed
Quality Representative
Texas Heat Treating