



SERIAL NUMBER: N-257 COOK DATE: 8/29

MOLD SIZE _____ BY _____

ORDER DATE 26 AUG 18 SHIP DATE: 31 AUG 18 PO 594930

SIZE 2.25 TYPE MDX FOR SLB

THREAD 1 1/2 MT OTHER _____

NOTES _____

MATRIX (H) 2018 WEIGHT _____

MATRIX (S) 2022 WEIGHT _____

BINDER 23679 WEIGHT _____

BLANK NF14/00519 TJ 173718

BILLET _____ TUBE _____

WELD BY AH MPI BY JM MPI PIC JM

THREAD GAGE 46986 STAND OFF .380

FINAL DIAMOND GRIND SIZE 2.250

LENGTH TO WELD _____

FINISHED PIC TAKEN BY JM SHIPPED BY JM DATE: 8-31-2018

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



Certificate of Conformance

Serial Number	Size	Type	Steel or Matrix	Shank Diameter	Bore
N-256, N-257	2.25	MDX	Matrix		
Component		Material	Vender	Lot or Heat Number	
Blank		8620 Steel	RHW	NF14100519	
Hard Powder		WC	HWP	2018	
Soft Capping Powder		W2	HWP	2022	
Tool Joint		4130 Steel	Mercer	173718	
MIG Weld					
WP Tube					
Inspection					
Diamond Grinding To Size					
Weld MPI					
Thread Gaging			1 1/2 MT		
Signed By: <i>P. Beggs</i>			date: <i>8-31-2018</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 07-06-18
ITEM ID:	PWMP010
ITEM DESCRIPTION	MATRIX POWDER H
ITEM LOT #	MPW2018
DATE	7/11/18
WEIGHT	100.0 LB.

CHEMICAL COMPOSITION (Weight Percent)			
Element	Minimum	Maximum	RESULT
Total Carbon (Tc)	5.4	5.90	5.68
Free Carbon (Fc)	-	0.04	0.03
Iron (Fe)	-	1.00	0.02
Nickel (Ni)	1.5	2.50	2.02
Tungsten (T)			Balance

PRODUCT SIZING (Weight Percent)			
Sieve	Minimum	Maximum	RESULT
(U.S. Standard Mesh per ASTM B214)			
+80	4.0	8.0	6.6
-80 + 120	13.0	17.0	15.1
-120+ 170	13.0	17.0	15.5
-170 + 230	13.0	17.0	15.1
-230 + 325	13.0	17.0	14.9
-325	29.00	37.00	32.7

PHYSICAL PROPERTIES			
Testing Procedure	Minimum	Maximum	RESULT
Apparent Density ASTM B212 (g/cc)	7.2	8.1	7.5
Tap Density ASTM B527 (g/cc)	9.2	10.4	10.1
Hall Flow Rate ASTM B213 (sec/50g)		Must Flow	12.9
			-
			-

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CUSTOMER:	SHORT BITS
CUSTOMER PO#:	6000959
ITEM ID:	PWCTPM002
ITEM DESCRIPTION	CTPM CRYSTALLINE W 80 X 325 MESH
ITEM LOT #	MPW2022
DATE	7/13/18
WEIGHT	100.0 LB.

**CHEMICAL COMPOSITION
(Weight Percent)**

Element	Minimum	Maximum	RESULT
Tungsten (T)			99.90

**PRODUCT SIZING
(Weight Percent)**

Sieve	Minimum	Maximum	RESULT
(U.S. Standard Mesh per ASTM B214)			
+80	-	5.0	0.9
-80 + 325	-	-	98.4
-325	-	10.00	0.6

PHYSICAL PROPERTIES

Testing Procedure	Minimum	Maximum	RESULT
Apparent Density ASTM B212 (g/cc)	7.2	8.1	7.7
Tap Density ASTM B527 (g/cc)	9.2	10.4	10.4
Hall Flow Rate ASTM B213 (sec/50g)		Must Flow	11.5
			-
			-



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

Certificate of Analysis

July 27, 2018

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

Customer Order No: Phone/Vicki

Customer ID: SHORTC

Sales Order No: 31363

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-LMP INC

Sold To: R H W METALS
PO BOX 3489
39 FRJ DR
LONGVIEW, TX 75606-0000
(903) 758-5450
Fax: (903) 758-5677

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

Customer P.O.	14768	Sales Order	530129.1
Product Group	Cold Finish Bar	Part Number	333285
Grade	1018 ASTM A108	Lot #	L1152012
Size	Round 2.5000 (.0030)	Heat #	NF14100519
Product	RD 2.5000" 1018 20-0 CD	B.L. Number	L1-418804
Description	CF Grade 1018	Load Number	L1-118973
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: 5,024 Qty Shipped Pcs: 15

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

C	Mn	P	S	Si	Cu	Cr	Ni	Mo	Sn	V	Cb
0.17%	0.82%	0.014%	0.031%	0.29%	0.26%	0.13%	0.12%	0.030%	0.010%	0.0040%	0.002%
Al	Pb										
0.003%	0.000%										

Melting Mill: Nucor Bar NE Country of Melting: USA

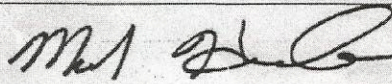
Reduction Ratio 8.0 :1 Country of Rolling: USA Rolling Mill: Nucor Bar NE

Yield Strength: 80757 PSI Tensile Strength: 92747 PSI Elongation: 18.0 % in 2" (% in 50.8mm)

Reduction in Area: 53.7 % Rockwell B Surface: 90.0 HRB

Specification Comments:

1. This material is free of mercury contamination.
2. No welding or weld repair was performed on this material.
3. ISO 9001:2008 certified. Certificate NO: 010424, Expires October 11, 2014.



Mark Herndon
DIVISION METALLURGIST



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 3* EDICION+ERR.11/04 06.2004	
API SPEC 16C 1* EDICION (R 2001) 29.01.1993	
API SPEC 6A 20*ED.+ER1&2+AD12.3 . .03.2013	
NACE MR0175/ISO 15156-2 2*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

DATE: 23.05.2014

REF.: 1002044920000

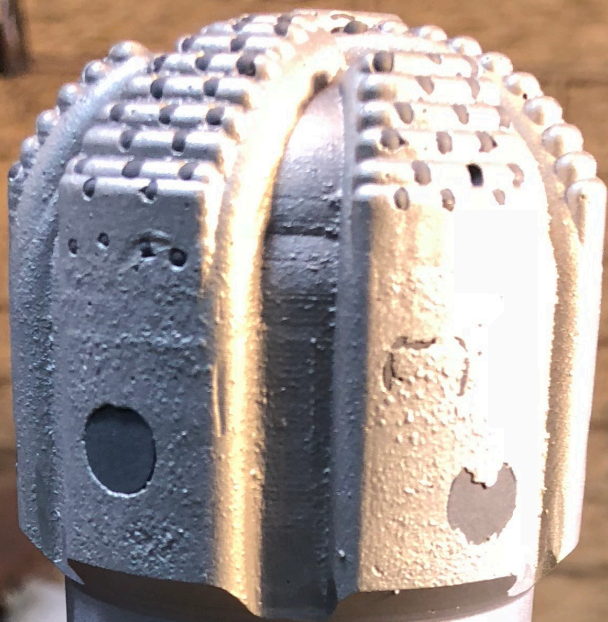
Page 1 of 2

SIGN:

Analyst of Quality certificates

97/14
 523068
 173718
 R455790
 @





N 257

2.250 MDX

MADE IN USA





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

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 ; radiactivity: FREE

NON DESTRUCTIVE TESTS
Surface defects standard (ASTM E709-2008)
Internal defects standard(1) (API SPEC 6A20*ED.+BRI&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)
ANTI MIXING 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

DATE: 23.05.2014

Page 2 of 2

SIGN:

REF.: 1002044920000

Analyst of Quality certificates



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.
6113 NORTH FREEWAY
FORT WORTH, TEXAS 76106
(972) 263-9755 Phone
(512) 238-0408 Fax

CERTIFICATION

Order No.: 303093

Date: 04/04/2017

Page: 2 of 2

To: SHORT BIT & TOOL CO.
225 GOLD STREET

GARLAND TX 75042

Purchase Order No.: THT-173718

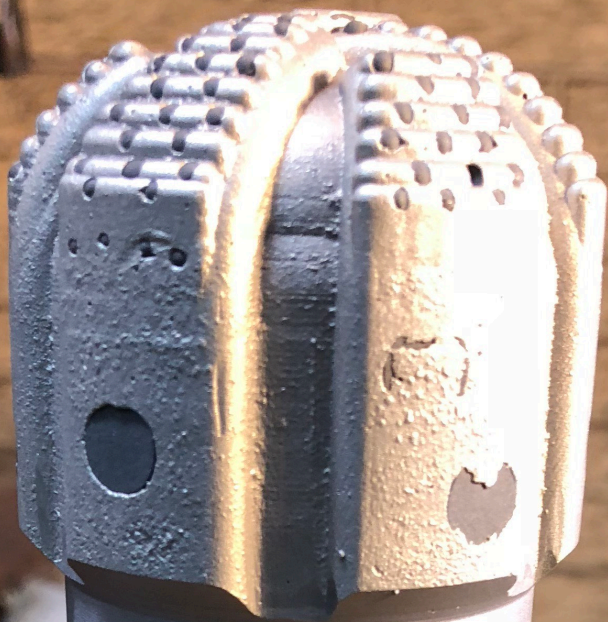
Material: 4130

Customer Spec

HRC 32-35, Per P.O.

William Weed
Quality Representative
Texas Heat Treating





N 257

2.250 MDX

MADE IN USA

