SERIAL NUMBER: N-153 COOK DATE: 7-2-18

MOLD SIZE 6.132 BY UG

ORDER DATE 28Jun18 SHIP DATE: 04July18 PO _____

SIZE 6.10" TYPE MX8S FOR SLB

STAB

THREAD 2 3/8 PAC OTHER 8" F/N

MATRIX (H) 1874 WEIGHT _____

MATRIX (S) 1876 WEIGHT _____

BINDER 23679 WEIGHT 13 LBS

BLANK MM16103148 TJ D7127I7

BILLET _____ TUBE [redacted]

WELD AH MPI AH MPI PIC UG BRAZE R-B

THREAD GAGE 4846C STAND OFF .625

FINAL DIAMOND GRIND SIZE 6.100

LENGTH TO WELD — / —

FINISHED PIC TAKEN BY AH SHIPPED BY JM DATE: 7-5-18

DIMS L_____ X W_____ X H_____ WEIGHT_____

IF MULTIPLES IN ONE BOX ONLY NEED DIMS ON ONE SHEET

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

Certificate of Conformance

Serial Number	Size	Type	Steel or Matrix	Shank Diameter	Bore
N-153	6.10"	MX-8S	Matrix		

Component	Material	Vender	Lot or Heat Number
Blank	8620 Steel	RHW	MM16103148
Hard Powder	WC	HMP	1874
Soft Capping Powder	W2	HWP	1876
Tool Joint	4140	HALFORD	D1712717
MIG Weld			
WP Tube			
Inspection			
Diamond Grinding To Size			
Weld MPI	Alan		
Thread Gaging	#48466 .625" stand-off	2 3/8 PAC	

Signed By: PBegg date: 7/6/2018

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

MATRIX POWDER WORKS

CUSTOMER:	Short Bits
CUSTOMER PO#:	VICKIE E MAIL 04-12-18
ITEM ID:	PWMP010
ITEM DESCRIPTION	MP MATRIX POWDER H
ITEM LOT #	MPW1874
DATE	4/16/2018
WEIGHT	100 lb.

CHEMICAL COMPOSITION (Weight Percent)

Element	Minimum	Maximum	RESULT
Total Carbon (Tc)	5.4	5.90	5.65
Free Carbon (Fc)	-	0.04	0.03
Iron (Fe)	-	1.00	0.02
Nickel (Ni)	1.5	2.50	1.70
Tungsten (T)			Balance

PRODUCT SIZING (Weight Percent)

Sieve	Minimumm	Maximum	RESULT
(U.S. Standard Mesh per ASTM B214)			
+80	4.0	8.0	6.7
-80 + 120	13.0	17.0	15.5
-120+ 170	13.0	17.0	15.6
-170 + 230	13.0	17.0	15.4
-230 + 325	13.0	17.0	14.5
-325	29.00	37.00	32.1

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	13.4

Document Number:	F-Q-018
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Page:	PAGE 1 OF 1
Title:	MATERIAL PROPERTIES CERTIFICATION

MATRIX POWDER WORKS

CUSTOMER:	Short Bits
CUSTOMER PO#:	VICKIE E MAIL 04-12-18
ITEM ID:	PWCTPM002
ITEM DESCRIPTION	CTPM CRYSTALLINE W 80 X 325 MESH
ITEM LOT #	MPW1876
DATE	4/16/2018
WEIGHT	100 lb.

CHEMICAL COMPOSITION (Weight Percent)

Element	Minimum	Maximum	RESULT
Tungsten (W)	99.5	-	99.99

PRODUCT SIZING (Weight Percent)

Sieve	Minimumm	Maximum	RESULT
(U.S. Standard Mesh per ASTM B214)			
+80	-	5.0	0.2
-80 + 325	-	-	90.8
-325	-	10.00	9.0

PHYSICAL PROPERTIES

Testing Procedure	Minimum	Maximum	RESULT
Apparent Density ASTM B212 (g/cc)	7.2	9.2	7.7
Tap Density ASTM B527 (g/cc)	9.0	10.5	10.4
Hall Flow Rate ASTM B213 (sec/50g)		Must Flow	10.6

Belmont METALS INC
THE NON FERROUS SPECIALISTS SINCE 1896
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 Administraot

BELMONT METALS

NUCOR
NUCOR STEEL MEMPHIS, INC.

Mill Certification
5/9/2017

MTR #: G1-169511
3601 Paul R Lowry Rd
MEMPHIS, TN 38109
(901) 786-5900
Fax: (901) 786-5901

Sold To:

Ship To:

Customer P.O.	31360	Sales Order	154101.1
Product Group	Special Bar Quality	Part Number	30006250267NTG0
Grade	AISI 8620/8622H (S .020-.030%; DI 2.0-2.3) MAC, MEC, MIC	Lot #	MM1610314802
Size	6-1/4" (6.2500) Round	Heat #	MM16103148
Product	6-1/4" (6.2500) Round 22' 3" 8620-C1Q2	B.L. Number	G1-310658
Description	8620-C1Q2	Load Number	G1-169511
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.

Roll Date: 8/5/2016 **Melt Date: 6/30/2016** **Qty Shipped LBS: 7,245** **Qty Shipped Pcs: 3**

C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Al	B
0.21%	0.81%	0.007%	0.020%	0.25%	0.28%	0.46%	0.47%	0.21%	0.002%	0.025%	0.0002%
Sn	**Ti**	**Cb**	**Co**	**Ca**	**Pb**	**As**	**Sb**	**Zr**	**Zn**	**N**	**H**
0.006%	0.0018%	0.004%	0.0096%	0.0009%	0.0000%	0.004%	0.0016%	0.002%	0.013%	0.0079%	1.8 ppm

Austenitic fine grain by chemical analysis per the latest revision of ASTM A29

DI value: 2.10

Simulated Hardenability Band

J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12	J13	J14	J15	J16	J18	J20	J22	J24	J26	J28	J30	J32
45	45	42	36	30	26	25	24	23	22		20		19		18	18		17	16		15		14

E381 Mid Radius (Back) 1

Silicate Cleanliness; SAE J422 0.0

Brinell: 170bhn

Reduction Ratio 10.4 :1

E381 Surface (Back) 1

Oxide Cleanliness; SAE J422 0.0

Brinell Converted Mid-Radius: 174.0bhn

E381 Center (Back) 1

Total Oxygen per ASTM E1019 = 15.0000ppm

Brinell Converted Surface: 170.0bhn

ASTM E381
Surface: 1 Mid Radius: 1 Center: 1

1. All manufacturing processes, including melting have been performed in the U.S.A.
2. No mercury, mercury compounds or mercury containing devices came into contact with this product.
3. Welding or weld repair was not perfomed on this material.
4. This material conforms to the specifications described on this document and may not be reproduced except in full, without written approval of Nucor Corporation.
5. This product is NAFTA certified under Paragraph "B" of the NAFTA rule of origin.
6. Material is Free of Radioactive Contamination.
7. This document is in compliance with EN 10204 "type 3.1"
8. Test procedures followed with asterisk(*) are outside of NSMEM - ISO17025 Accreditation scope
9. Results reported for ASTM E45 (Inclusion content) and ASTM E112 (Grain size) are provided as interpretation of ASTM procedures.
10. Test procedures performed in compliance with the following ASTM standards: Chemical Analysis: E415, Total Oxygen: E1019, Grain Size: E112, Macroetch: E381, Tensile and Hardness Testing: A370, Charpy Impact: E23, Decarburization Depth: E1077. Microcleanliness: E45.
11. ASTM E23 tests conducted with 8mm striker radius upon 10mm x 10mm V notch specimen.
12. Export Country: USA email Memphis.Sales@nsmem.nucor.com

Steven Gage
Division Metallurgist

NUCOR
NUCOR STEEL MEMPHIS, INC.

Mill Certification
5/9/2017

MTR #: G1-169511
3601 Paul R Lowry Rd
MEMPHIS, TN 38109
(901) 786-5900
Fax: (901) 786-5901

Sold To:

Ship To:

Customer P.O.	31360	Sales Order	154101.1
Product Group	Special Bar Quality	Part Number	30006250267NTG0
Grade	AISI 8620/8622H (S .020-.030%; DI 2.0-2.3) MAC, MEC, MIC	Lot #	MM1610314802
Size	6-1/4" (6.2500) Round	Heat #	MM16103148
Product	6-1/4" (6.2500) Round 22' 3" 8620-C1Q2	B.L. Number	G1-310658
Description	8620-C1Q2	Load Number	G1-169511
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.

ASTM E45 Method A (Worst)
Sulfides: T: 1.5 H: 1.5 Alumina: T: 0.0 H: 0.0 Silicates: T: 0.0 H: 0.0 Globular: T: 0.5 H: 0.5

Specification Comments:

1. All manufacturing processes, including melting have been performed in the U.S.A.
2. No mercury, mercury compounds or mercury containing devices came into contact with this product.
3. Welding or weld repair was not perfomed on this material.
4. This material conforms to the specifications described on this document and may not be reproduced except in full, without written approval of Nucor Corporation.
5. This product is NAFTA certified under Paragraph "B" of the NAFTA rule of origin.
6. Material is Free of Radioactive Contamination.
7. This document is in compliance with EN 10204 "type 3.1"
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9. Results reported for ASTM E45 (Inclusion content) and ASTM E112 (Grain size) are provided as interpretation of ASTM procedures.
10. Test procedures performed in compliance with the following ASTM standards: Chemical Analysis: E415, Total Oxygen: E1019, Grain Size: E112, Macroetch: E381, Tensile and Hardness Testing: A370, Charpy Impact: E23, Decarburization Depth: E1077. Microcleanliness: E45.
11. ASTM E23 tests conducted with 8mm striker radius upon 10mm x 10mm V notch specimen.
12. Export Country: USA email Memphis.Sales@nsmem.nucor.com

Steven Gage
Division Metallurgist

8" 4140 D1712717

ASIL ÇELIK SANAYİ ve TİCARET A.Ş.

www.asilcelik.com.tr

KALİTE BELGESİ

QUALITY CERTIFICATE /MILL TEST CERTIFICATE

Customer	SEBA TUBULAR LTD.	Date	01.08.2017
Heat no	D1712717	Quality	SAE 4140 QT+SR
Dimension	RD. 6,00 inch	Weight	24.989 LB / 11.335 KG
Your Order No	40230-17-259/B	Number of bars	15
Our Order No	1200003192 / 000010	Doc. Norm / Number	EN 10204/3.1 - 1707591
Casting type	Ingot Cast.	Reduction Ratio	12.8 /1

Product

PRIME NEWLY PRODUCED ROUND STEEL BARS

HOT ROLLED QUENCHED & TEMPERENED AND STRESS RELIEVED

ACC. TO RHW SPEC. 4140 HT REV:05 (JAN 2016) AND YPK 17-/032

LATEST EDITIONS OF ASTM A29, A304, A322, A370, A388, A751, E45,E112, E709, AMS 2750, API 6A PSL 3. ,

WE CERTIFY THAT THE MATERIAL IS AN ALLOY STEEL / ORDER NO : 40230

Electric Arc Furnace/EAF, Ladle Furnace/LF, Vacuum Degassing/VD

Ladle Chemical Composition (%)

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Cu	Sn	V	Nb	O	H
Min	0,38	0,15	0,75			0,80	0,15								
Max	0,43	0,35	1,00	0,025	0,025	1,10	0,25	0,25				0,030	0,035	0,0030	0,00022
Sample	0,42	0,31	1,02	0,013	0,013	1,07	0,24	0,20	0,024	0,22	0,014	0,026	0,030	0,0021	0,00007

Product Chemical Composition (%)

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Cu	Sn	V	Nb	O	H
Sample-1	0,42	0,31	1,00	0,013	0,009	1,07	0,24	0,19	0,021	0,22	0,014	0,025	0,029	0,0020	0,00008
Sample-2	0,42	0,30	1,01	0,009	0,010	1,08	0,25	0,19	0,025	0,21	0,014	0,022	0,031	0,0020	0,00008

Jominy - inch

	1,0 inch	4,0 inch	8,0 inch	16,0 inch	28,0 inch
Min	57	56	54	48	44
Max	63	62	61	58	57
Result-1	59,9	58,9	57,9	57,5	57

Hardness

Customer Req.		Asil Çelik Result			
Min	Max	Hardness		Unit	Test Loc.
285	341	321		HB	SURFACE
28	37	32		HRC	SURFACE

Mechanical Properties (Required)

Test	Min	Max	Unit	Test Loc.	Temp.	Direction	Notch Type	Result-1
Yield strength (%0,2)	110000		Psi	1"				137511
Yield strength (%0,2)			Psi	MIDRADIUS				121845
Tensile Strength	135000		Psi	1"				152161
Tensile Strength			Psi	MIDRADIUS				140412
Elongation	15		%	1"				17,80
Elongation			%	MIDRADIUS				18,40
Reduction	45		%	1"				54,00
Reduction			%	MIDRADIUS				51,90
Shear (%)			%	1"	-20 °F	Longitudinal		45
Lateral Expansion (mm)			mm	1"	-20 °F	Longitudinal		0,65
Shear (%)			%	1"	72 °F	Longitudinal		65
Lateral Expansion (mm)			mm	1"	72 °F	Longitudinal		0,82
Impact Strength-1			ft-lbs	1"	-20 °F	Longitudinal	ISO-V	48,68
Impact Strength-2			ft-lbs	1"	-20 °F	Longitudinal	ISO-V	51,63
Impact Strength-3			ft-lbs	1"	-20 °F	Longitudinal	ISO-V	51,63
Impact Strength-Average			ft-lbs	1"	-20 °F	Longitudinal	ISO-V	50,89
Impact Strength-1			ft-lbs	1"	-20 °F	Transversal	ISO-V	23,60
Impact Strength-2			ft-lbs	1"	-20 °F	Transversal	ISO-V	22,13
Impact Strength-3			ft-lbs	1"	-20 °F	Transversal	ISO-V	20,65
Impact Strength-Average			ft-lbs	1"	-20 °F	Transversal	ISO-V	22,13
Impact Strength-1			ft-lbs	1"	72 °F	Longitudinal	ISO-V	67,66
Impact Strength-2			ft-lbs	1"	72 °F	Longitudinal	ISO-V	64,91
Impact Strength-3			ft-lbs	1"	72 °F	Longitudinal	ISO-V	66,38
Impact Strength-Average			ft-lbs	1"	72 °F	Longitudinal	ISO-V	66,38
Impact Strength-1			ft-lbs	1"	72 °F	Transversal	ISO-V	32,45
Impact Strength-2			ft-lbs	1"	72 °F	Transversal	ISO-V	29,50
Impact Strength-3			ft-lbs	1"	72 °F	Transversal	ISO-V	33,93
Impact Strength-Average			ft-lbs	1"	72 °F	Transversal	ISO-V	31,72

Metallography Tests (Required)

Test	Min	Max	Unit	Standard	Result-1
Austenite Grain Size	5			ASTM E112	8

Special Chemical Analysis Requests

Formula	Min	Max	Unit	Value
DI (ASTM A255-10)	5,5	0	IN	7,93

Heat Treatment Parameters

QUENCH TEMPERATURES AT START & FINISH: 100/120 °F

COOLING MEDIA: AIR / QUENCH MEDIA: POLYMER

AUSTENITIZING TEMP. / TIME:	1580	°F	4,50	HOURS
TEMPERING TEMP. / TIME:	1166	°F	8,00	HOURS
STRESS RELIEVE TEMP. / TIME:	932	°F	4,50	HOURS

MECHANICAL PROPERTIES TAKEN FROM PROLONGATION.

LENGTH OF PROLONGATION : 10 cm / TENSILE SPECIMEN : RND. 12,5 mm

GAGE LENGTH (%) : 2 inch / FBH SIZE MAX. 5,2 mm & RESULTS WERE OK

METHOD OF MONITORING TEMPERATURE : FURNACE TYPE THERMOCOUPLE / FURNACE CALIBRATION : AMS 2750

ULTRASONIC TESTING 100 %-ASTM A-388/SA 388-07, AFTER Q&T+SR ACCEPTANCE CRITERIA

API 6A/ISO 10423 PSL 3 & 100 % MIX-UP CONTROLLED & SURFACE CRACK TESTED & RESULTS WERE OK.

"FREE FROM RADIOACTIVITY & FREE FROM MERCURY. NO WELD REPAIR PERFORMED"

"WE HEREBY CERTIFY, MATERIAL DESCRIBED ABOVE HAS BEEN TESTED AND COMPLIES WITH THE TERMS OF ORDER CONTRACT"

Approved by Mert ÜLKER

Santral / Central
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Faks : +90 224 280 62 00
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Vergi Dairesi : Büyük Mükellefler Vergi Dairesi Başkanlığı
Vergi No : 0860052518 / Ticaret Sicil: 18917