



SERIAL NUMBER: N-052  
053 COOK DATE: 2/28/17

MOLD SIZE \_\_\_\_\_ BY \_\_\_\_\_

ORDER DATE 20 FEB 18 SHIP DATE: 05 MAR 18 PO \_\_\_\_\_

FOR LB SIZE 5.875 TYPE MZ-36S

THREAD 2 3/8 DAC OTHER \_\_\_\_\_

MATRIX (H) 1743 WEIGHT 7.12

MATRIX (S) 1786 WEIGHT 3.84

BINDER 23679 WEIGHT 8.9

BLANK 143480 TJ 22165500

BILLET \_\_\_\_\_ Sleeve- 22085862  
TUBE \_\_\_\_\_

WELD BY Allen MPI BY JM MPI PIC jal

THREAD GAGE \_\_\_\_\_ STAND OFF .625

NOTES \_\_\_\_\_

FINAL DIAMOND GRIND SIZE 5.875

LENGTH TO WELD \_\_\_\_\_ / \_\_\_\_\_

FINISHED PIC TAKEN BY ALLEN SHIPPED BY JM DATE: 3-7-18

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

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 12-08-17
ITEM ID:	PWMP010
ITEM DESCRIPTION	MP MATRIX POWDER H
ITEM LOT #	MPW1743
DATE	12/11/2017
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	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	5.8
-80 + 120	13.0	17.0	15.5
-120+ 170	13.0	17.0	14.7
-170 + 230	13.0	17.0	15.1
-230 + 325	13.0	17.0	15.7
-325	29.00	37.00	33.2

PHYSICAL PROPERTIES			
Testing Procedure	Minimum	Maximum	RESULT
Apparent Density ASTM B212 (g/cc)	7.2	8.1	7.2
Tap Density ASTM B527 (g/cc)	9.2	10.4	10.3
Hall Flow Rate ASTM B213 (sec/50g)		Must Flow	12.8

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



CUSTOMER:	Short Bits
CUSTOMER PO#:	VICKIE E MAIL 1-18-18
ITEM ID:	PWCTPM002
ITEM DESCRIPTION	CTPM CRYSTALLINE W 80 X 325 MESH
ITEM LOT #	MPW1786
DATE	1/22/2018
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	0.3
-80 + 325	-	-	92.5
-325	-	10.00	7.2
-	-	-	-

PHYSICAL PROPERTIES			
Testing Procedure	Minimum	Maximum	RESULT
Apparent Density ASTM B212 (g/cc)	7.2	9.2	8.4
Tap Density ASTM B527 (g/cc)	9.0	10.5	9.8
Hall Flow Rate ASTM B213 (sec/50g)		Must Flow	9.2
-	-	-	-



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

ISO 9001  
BUREAU VERITAS  
Certification



**ASIL ÇELİK**  
SANAYİ ve TİCARET A.Ş.  
<http://www.asilcelik.com.tr>

ISO 9001  
BUREAU VERITAS  
Certification



## KALİTE BELGESİ

QUALITY CERTIFICATE / MILL TEST CERTIFICATE



Müşteri / Customer <b>COMMERCIAL METALS COMPANY</b>	Müşteri Sip. No./ Your Order No <b>69421</b>	Sip.No./ Our Order No. <b>1111407974</b>	Beige Norm/Document Norm <b>EN 10204/3.1</b>	Tarih / Date <b>08.10.2014</b>	Sayfa /Page <b>1</b>
Kalite / Quality <b>AISI 8620</b>	Kesit / Dimension <b>Y/Rd 4.50 "</b>	Döküm No./ Heat No. <b>143480</b>	Ağırlık / Weight (Kg) <b>91128 Lbs</b>	Sip. Miktarı / Order (Kg) <b>40000</b>	Adet/Number of pieces <b>87</b>
Malzeme / Product <b>HOT ROLLED ROUND STEEL BARS ACC.TO TD-PUR-430 (3.21.2007) &amp; ASTM A388, A322, A29</b>			Onaylayan / Approved By <b>Subutay SEZGİN</b>		

Çelik Yapım Metodu / Steelmaking Process : Ark Ocağı / EAF, Pota Fırını / LF, Vakumda Gaz Alma / VD

Pota Kimyasal Analizi / Ladle Chemical Composition (%)

C	Si	Mn	P	S	Cr	Mo	Ni	Al	Cu	Sn	V
.21	.26	.79	.009	.020	.51	.20	.54	.025	.20	.011	.011

Sertleşebilirlik / End Quench Test **J1/16 inch (HRC)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30	32
46	45	40	33	29	26	25	24	23	23	22	21	21	21	20	20	19	18	18	18	17	16	16	15

Mekanik Özellikler / Mechanical Properties

Sertlik  
Hardness

197 HB

Tane Büyüklüğü  
Grain Size  
(ASTM E-112)

7--8

Ezme Oranı  
Reduction Ratio

Ingot : 29.1/1

% 100 ULTRASONIC TESTED ACC. TO ASTM A388 AND THE RESULTS WERE OK.  
% 100 MIX-UP CONTROLLED & SURFACE CRACK TESTED.  
FREE FROM RADIOACTIVITY & FREE FROM MERCURY. NO WELD REPAIR PERFORMED.  
COUNTRY OF ORIGIN : TURKEY



YUKARIDA BELİRTİLEN MALZEMELERİN TEST EDİLDİĞİ VE SİPARİŞ ŞARTLARINA UYGUN OLDUĞU ONAYLANIR.  
WE HEREBY CERTIFY, MATERIAL DESCRIBED ABOVE HAS BEEN TESTED AND COMPLIES WITH THE TERMS OF ORDER CONTRACT.

Santral / Central

Tel. : +90 224 280 61 00

Faks : +90 224 280 62 00

Fabrika / Head Office & Plant

Gemci Köyü Mevkii 16800 Orhangazi / BURSA

Satınalma / Purchasing

+90 224 280 61 20

+90 224 280 61 30

Çelik Servis Merkezi / Steel Service Center

TOSB Organize San. Böl. 13. Sok. No:3 41420

Şekerpınar/KOCAELİ

İç Satış / Domestic Sales

+90 262 781 60 00

+90 262 781 60 05

Vergi Dairesi : Büyük Mükellefler Vergi Dairesi Başkanlığı

Vergi No : 0860052518

Dış Satış / Export

+90 262 781 60 00

+90 262 781 60 05

Ticaret Sicil: 125642 / 72672

33.23.169.A4 (1)

gözetilmiştir



ISO 9001:2008  
Certificate number: 3099



ISO/TS 16949:2009  
Certificate number: 3064



ISO 14001:2004  
Certificate number: 10438

CERTIFICADO DE QUALIDADE  
QUALITY CERTIFICATE  
MILL'S TEST CERTIFICATE  
CERTIFICADO DE CALIDAD

Nº 574693

OUR MANAGEMENT SYSTEM IS CERTIFIED TO ISO9001 / TS16949 / ISO14001

NOTA FISCAL/INVOICE <b>055741</b>	PESO/WEIGHT (Kg) <b>69862,00</b>	PEL CLIENTE/CUST ORDER <b>CSI 209134</b>	ORD FORNEC/ORD-SUPPLY <b>16445557 - 812508050</b>	QUALIDADE/GRADE <b>AISI 4140</b>	PRODUTO/PRODUCT <b>BARRA LAMINADA REDONDA</b>	LOTE/BATCH <b>90217050</b>																
CLIENTE/CUSTOMER <b>CHICAGO STEEL AND IRON - BAR DIVISI</b>					MATERIAL/MATERIAL <b>899658</b>	BITOLA/SIZE (mm) <b>88,900 mm</b>																
ANALISE QUIMICA/CHEMICAL COMPOSITION					NORMA/SPECIFICATION <b>CSI - 4140 (CHICAGO STEEL)-Rev.01 de 06.03.2011</b>	CORRIDA/HEAT <b>22.165.500</b>																
C	Mn	Si	P	S	Cr	Ni	Mo	V	Cu	Sn	Al	Ti	Nb	N	B	Pb	Ca	H	REDUÇAO/REDUCTION <b>42,40 :1</b>			
%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%			
0.42	0.93	0.28	0.011	0.006	1.02	0.16	0.22	0.004	0.15	0.009	0.026	0.0020	0.005	0.0093	0.0003	0.001	0.0008	0.00020				
ENSAIOS MECÂNICOS/MECHANICAL PROP																						
Elongation										Hardness												
%										HB												
10,5										302												
ENSAIOS METALOGRAFICOS/METALLOGRAPHIC TESTS																						
Austenitic																						
Grain Size																						
7																						
MÉTRIC DE INCLUSÕES/INCLUSION RATING NUMBERS																						
AT	AH	BT	BH	CT	CH	DT	DH															
1,00	1,00	0,00	0,00	0,00	0,00	0,50	0,50															
MACROGRAFIA/MACROGRAPHY																						
S	R	C																				
1	2	1																				
TEMPERABILIDADE/HARDENABILITY																						
DI	DI	1/16	2/16	3/16	4/16	5/16	6/16	7/16	8/16	9/16	10/16	11/16	12/16	13/16	14/16	15/16	16/16	18/16	20/16	22/16	24/16	26/16
in	mm	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC
0,39	162,38	59,0	59,0	58,0	58,0	58,0	58,0	58,0	58,0	57,0	57,0	57,0	57,0	57,0	56,0	56,0	56,0	55,0	55,0	53,0	52,0	50,0
TEMPERABILIDADE/HARDENABILITY																						
28/16	30/16	32/16																				
HRC	HRC	HRC																				
49,0	48,0	48,0																				



ISO 9001:2008  
Certificate number: 30010



ISO/TS 16949:2009  
Certificate number: 30554



ISO 14001:2004  
Certificate number: 70026

CERTIFICADO DE QUALIDADE  
QUALITY CERTIFICATE  
MILL'S TEST CERTIFICATE  
CERTIFICADO DE CALIDAD

Nº 574693

OUR MANAGEMENT SYSTEM IS CERTIFIED TO ISO9001 / TS16949 / ISO14001

NOTA FISCAL/INVOICE 055741	PESO/WEIGHT (kg) 69862,00	PEÇ./CLIENTE/CUSTOMER ORDER CSI 209134	ORD.FORNEC./ORD SUPPLY 16445557 - 812508050	QUALIDADE/GRADE AISI 4140	PRODUTO/PRODUCT BARRA LAMINADA REDONDA SEM TOTO BRUTO	LOTE/BATCH 90217050	CORRIDA/HEAT 22.165.500
CLIENTE/CUSTOMER CHICAGO STEEL AND IRON - BAR DIVISI		MATERIAL/MATERIAL 899658	BITOLA/SIZE (mm) 88,900 mm	NORMA/SPECIFICATION CSI - 4140 (CHICAGO STEEL)-Rev.01 de 06.03.2011	REDUÇÃO/REDUCTION 42,40 : 1		

OBSERVAÇÕES/OBSERVATIONS

Made in Brazil - Size 3.50 in - Color Code: Black - Round Bars As Rolled, Untreated - UT 100% approved as ASTM A388 with criterium FBH max 2,00mm - EF, LF, VD and Ingot Casting - Inspected by magnetic particles - Free of Mercury, Welding and Radioactivity - ASTMs: E112, E45[A], A29, A322, E381, A370 and A711[max. 20%], EN 10204\_3.1. All standards refer to the 2010

DEPARTAMENTO DA QUALIDADE/QUALITY DEPARTMENT  
PINDAMONHANGABA, 30.04.2012



Ildo Jânio Souza de Oliveira - CREA 117203

C E R T I F I C A T E   O F   H E A T   T R E A T M E N T

LONE STAR HEAT TREATING CORPORATION  
3939 BLAFFER  
HOUSTON, TX 77026

CUSTOMER: BAR SOURCE INTERNATIONAL  
PURCHASE ORDER NO.: 31725

DESCRIPTION: 3 1/2"OD X 357"RL HN 22165500  
TAG# 55453 (10) 55452 (10) 55455 (10) 55456 (10)  
55454 (3) 55580 (10) 55660 (10) 55658 (10)  
55457 (10)

NUMBER OF PARTS: 83

TYPE OF MATERIAL: 4140

SHIPPED ON OUR WO #: 535479

DATE OF ORDER: 12/22/14

HEAT TREATING SPECIFICATIONS:

Q&T & TEST TO BSI SPEC BSI-002 REV 4 UT PER ASTM  
A388 PER SPEC S/C EXTRA BRINELL TEST TENSILE  
CHARPY MAINTAIN TRACEABILITY CERT W/MATL

PROCESS AS FOLLOWS:

HEATED IN A CONTINUOUS FURNACE TO 1601F IN 48.8 MINUTES

WATER SPRAY QUENCHED

HEATED IN A CONTINUOUS FURNACE TO 1154F IN 39.5 MINUTES

INSPECTED 83 PIECES CHECKED 293-311 HBW SURFACE  
CHECKED 302-311 HBW 1" BELOW  
CHECKED 311-311 HBW MID RADIUS

FIVE TEST PIECES PROLONGATION 3 1/2"OD X 14"LG

S/N 535479-03 HN 22165500 MID RADIUS  
MECHANICALS REFERENCED FROM ACCU TEST REPORT 705666.00 REV A  
ATTACHED

S/N 535479-20 HN 22165500 MID RADIUS  
MECHANICALS REFERENCED FROM ACCU TETS REPORT 705667.00 REV A  
ATTACHED

S/N 535479-40 HN 22165500 MID RADIUS  
MECHANICALS REFERENCED FROM ACCU TEST REPORT 705668.00 REV A  
ATTACHED

C E R T I F I C A T E   O F   H E A T   T R E A T M E N T

SHIPPED ON OUR WO #: 535479

DATE OF ORDER: 12/22/14

S/N 535479-60    HN 22165500    MID RADIUS  
MECHANICALS REFERENCED FROM ACCU TEST REPORT 705669.00 REV A  
ATTACHED

S/N 535479-80    HN 22165500    MID RADIUS  
MECHANICALS REFERENCED FROM ACCU TEST REPORT 705670.00 REV A  
ATTACHED

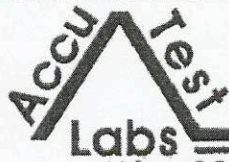
SEE ULTRASONIC TEST REPORT ATTACHED

Furnaces and instruments are calibrated to AMS 2750E. Reported Heat treat times and temperatures are taken from the furnace chart recorder. Our quality system is certified in accordance with AS9100 Cert # 47512. Mechanical testing conforms to the requirements of ASTM A370 and only applies to the sample tested or inspected. Frequency of all testing is dictated by Specification, customer purchase order and our quality manual QM-01 Rev 13. While at Lone Star Heat Treating this material did not come in contact with Mercury nor was it subject to any weld repairs.

LONE STAR HEAT TREATING CORPORATION

  
Todd Pritchard

Prod. Mgr.



LLP P.O. Box 802404 ♦ Houston, TX 77280-2404 ♦ Telephone (713) 460-3655 ♦ FAX (713) 460-3695

Report Date: 01/12/15  
Report No: 705666.00  
Rev.: A  
Cust Acct: LON220

To: Lone Star Heat Treat  
P. O. Box 15621  
Houston, TX 77220-5621

Ordered By: Todd PO#: 535479-03  
Material: 4140 3-1/2"OD x 14"LG test pc  
ID/Heat: 22165500  
Job Info: LSHT Hardness 302-311 HBW

Tensile Test Results

No./Location	Size (in.)	Area (in <sup>2</sup> )	Ult. Load (lbs.)	Yield (psi)	Tensile (psi)	Elong. (%)	R. of A. (%)	Hardness
1	.506 .6% EUL			126,500 126,500	144,400	19.0	58.7	32.2 HRC

Unless otherwise stated, yield stress is 0.2% offset, gauge length is 2 in. for 1/2 in. bars or 1 in. for 1/4 in. bars.

Charpy Test Results

No.	Temp	Location	Foot-Pounds	% Shear	Mils Lat Exp
1	-20°F	LCVN	64-60-61	100-100-100	32-29-30
2	-20°F	TCVN	31-28-28	70-65-65	22-20-20
3	-4°F	LCVN	71-69-68	100-100-100	28-27-27
4	-4°F	TCVN	31-32-31	65-65-65	20-22-21
5	+50°F	LCVN	70-75-71	100-100-100	45-47-46
6	+50°F	TCVN	45-48-42	90-100-90	26-29-23
7	+72°F	LCVN	71-70-80	100-100-100	43-42-45
8	+72°F	TCVN	46-48-45	100-100-100	37-39-37

Unless otherwise stated, Charpy impact specimens are V-notch 10 x 10 mm.

Mechanical testing performed at mid-radius.

Document Reviewed By:

*Yvonne Barajas*  
Yvonne Barajas  
Documentation Specialist

Our reports are for the exclusive use of our customer and our name may be used only with prior written approval. Our reports apply only to the sample tested or inspected and do not necessarily represent the quality of other apparently similar or identical materials. All test specimens and testing conforms to ASTM A-370 requirements unless otherwise stated. This test report shall not be reproduced, except in full, without the written approval of Accu-Test Labs LLP.



LLP P.O. Box 802404 ♦ Houston, TX 77280-2404 ♦ Telephone (713) 460-3655 ♦ FAX (713) 460-3695

Report Date: 01/12/15  
 Report No: 705667.00  
 Rev.: A  
 Cust Acct: LON220

To: Lone Star Heat Treat  
 P. O. Box 15621  
 Houston, TX 77220-5621

Ordered By: Todd PO#: 535479-20  
 Material: 4140 3-1/2"OD x 14"LG test pc  
 ID/Heat: 22165500  
 Job Info: LSHT Hardness 302-311 HBW

**Tensile Test Results**

No./Location	Size (in.)	Area (in <sup>2</sup> )	Ult. Load (lbs.)	Yield (psi)	Tensile (psi)	Elong. (%)	R. of A. (%)	Hardness
1	.506 .6% EUL			130,800 130,100	148,800	18.4	59.5	32.5 HRC

Unless otherwise stated, yield stress is 0.2% offset, gauge length is 2 in. for 1/2 in. bars or 1 in. for 1/4 in. bars.

**Charpy Test Results**

No.	Temp	Location	Foot-Pounds	% Shear	Mils Lat Exp
1	-20°F	LCVN	60-65-63	85-100-100	40-43-41
2	-20°F	TCVN	30-27-27	75-75-75	21-17-18
3	-4°F	LCVN	67-69-67	100-100-100	47-48-47
4	-4°F	TCVN	32-33-35	70-70-70	22-23-25
5	+50°F	LCVN	71-77-71	100-100-100	45-47-44
6	+50°F	TCVN	39-43-40	100-100-100	22-27-26
7	+72°F	LCVN	71-71-71	100-100-100	43-44-44
8	+72°F	TCVN	37-36-39	100-100-100	27-26-28

Unless otherwise stated, Charpy impact specimens are V-notch 10 x 10 mm.

Mechanical testing performed at mid-radius.

Document

Reviewed By:

*Yvonne Barajas*  
 Yvonne Barajas  
 Documentation Specialist

Our reports are for the exclusive use of our customer and our name may be used only with prior written approval. Our reports apply only to the sample tested or inspected and do not necessarily represent the quality of other apparently similar or identical materials. All test specimens and testing conforms to ASTM A-370 requirements unless otherwise stated. This test report shall not be reproduced, except in full, without the written approval of Accu-Test Labs LLP.



LLP P.O. Box 802404 ♦ Houston, TX 77280-2404 ♦ Telephone (713) 460-3655 ♦ FAX (713) 460-3695

Report Date: 01/12/15  
Report No: 705666.00  
Rev.: A  
Cust Acct: LON220

To: Lone Star Heat Treat  
P. O. Box 15621  
Houston, TX 77220-5621

Ordered By: Todd PO#: 535479-03  
Material: 4140 3-1/2"OD x 14"LG test pc  
ID/Heat: 22165500  
Job Info: LSHT Hardness 302-311 HBW

Tensile Test Results

No./Location	Size (in.)	Area (In^2)	Ult. Load (lbs.)	Yield (psi)	Tensile (psi)	Elong. (%)	R. of A. (%)	Hardness
1	.506 .6% EUL			126,500 126,500	144,400	19.0	58.7	32.2 HRC

Unless otherwise stated, yield stress is 0.2% offset, gauge length is 2 in. for 1/2 in. bars or 1 in. for 1/4 in. bars.

Charpy Test Results

No.	Temp	Location	Foot-Pounds	% Shear	Mils Lat Exp
1	-20°F	LCVN	64-60-61	100-100-100	32-29-30
2	-20°F	TCVN	31-28-28	70-65-65	22-20-20
3	-4°F	LCVN	71-69-68	100-100-100	28-27-27
4	-4°F	TCVN	31-32-31	65-65-65	20-22-21
5	+50°F	LCVN	70-75-71	100-100-100	45-47-46
6	+50°F	TCVN	45-48-42	90-100-90	26-29-23
7	+72°F	LCVN	71-70-80	100-100-100	43-42-45
8	+72°F	TCVN	46-48-45	100-100-100	37-39-37

Unless otherwise stated, Charpy impact specimens are V-notch 10 x 10 mm.

Mechanical testing performed at mid-radius.

Document Reviewed By:

*Yvonne Barajas*  
Yvonne Barajas  
Documentation Specialist

Our reports are for the exclusive use of our customer and our name may be used only with prior written approval. Our reports apply only to the sample tested or inspected and do not necessarily represent the quality of other apparently similar or identical materials. All test specimens and testing conforms to ASTM A-370 requirements unless otherwise stated. This test report shall not be reproduced, except in full, without the written approval of Accu-Test Labs LLP.



P.O. Box 802404 ♦ Houston, TX 77280-2404 ♦ Telephone (713) 460-3655 ♦ FAX (713) 460-3695

Report Date: 01/12/15  
 Report No: 705670.00  
 Rev.: A  
 Cust Acct: LON220

To: Lone Star Heat Treat  
 P. O. Box 15621  
 Houston, TX 77220-5621

Ordered By: Todd PO#: 535479-80  
 Material: 4140 3-1/2"OD x 14"LG test pc  
 ID/Heat: 22165500  
 Job Info: LSHT Hardness 302-311 HBW

**Tensile Test Results**

No./Location	Size (in.)	Area (in <sup>2</sup> )	Ult. Load (lbs.)	Yield (psi)	Tensile (psi)	Elong. (%)	R. of A. (%)	Hardness
1	.504 .6% EUL			128,800 128,700	146,200	19.3	61.2	32.2 HRC

Unless otherwise stated, yield stress is 0.2% offset, gauge length is 2 in. for 1/2 in. bars or 1 in. for 1/4 in. bars.

**Charpy Test Results**

No.	Temp	Location	Foot-Pounds	% Shear	Mils Lat Exp
1	-20°F	LCVN	56-66-59	75-100-75	34-40-37
2	-20°F	TCVN	25-27-26	45-45-45	16-16-17
3	-4°F	LCVN	73-60-71	100-80-85	44-28-40
4	-4°F	TCVN	27-31-29	55-55-55	21-23-22
5	+50°F	LCVN	83-71-84	100-100-100	56-47-57
6	+50°F	TCVN	42-40-43	85-85-85	27-27-28
7	+72°F	LCVN	79-81-87	100-100-100	52-53-54
8	+72°F	TCVN	42-44-46	90-90-90	31-32-35

Unless otherwise stated, Charpy Impact specimens are V-notch 10 x 10 mm.

Mechanical testing performed at mid-radius.

Document Reviewed By:

*Yvonne Barajas*  
 Yvonne Barajas  
 Documentation Specialist

Our reports are for the exclusive use of our customer and our name may be used only with prior written approval. Our reports apply only to the sample tested or inspected and do not necessarily represent the quality of other apparently similar or identical materials. All test specimens and testing conforms to ASTM A-370 requirements unless otherwise stated. This test report shall not be reproduced, except in full, without the written approval of Accu-Test Labs LLP.

### Ultrasonic Certification Report

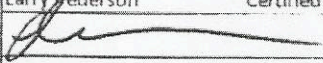
Report Number:	535479	Po #:	031725 REV02	Date:	03/31/2015
Company:	Bar Source International				
Specification:	BSI-002 Rev 4				
Acceptance Criteria:	ASTM-A388/API 6A				

### Ultrasonic Inspection

Equipment:	Sonatest 250	Calibration Date:	12/02/2015	S/N #:	1005128		
Longitudinal:	Size: 1" od	MHZ:	2.25	SN#:	45000		
Shear Wave:	Size:	Deg:	MHZ:	SN#:			
Part Condition:	clean	RMS:	250	Couplant:	cellulose		
Longitudinal Standardization:	80%fsh 1/8" Flat Bottom Hole			Ref DB:	6.4	DB:	70
Shear Standardization:				Ref DB:		DB:	

Material:	4140				
Heat #:	22165500				
Size:	3 1/2" od x 35.7"-35.8" R/L				
Total Pcs:	83	Acceptable:	83	Rejectable:	0

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Technician:	Larry Pederson	Certified 3-21-2008	SNT-TC- LEVEL II
			

Rev:		Date:	
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This report represents the results obtained from the test and is not to be construed as a guarantee or warranty of the materials listed. Lone Star Heat Treating Corp shall not be held liable for misinterpretation of Conditions, Loss, damage, or Death rising from or attributable to performance of a test. This report applies only to the material tested and or inspected and does not represent the quality of apparently similar or identical material.



ISO 9001:2008  
Certificate Number: 50010



ISO/TS 16949:2009  
Certificate Number: 38554



ISO 14001:2004  
Certificate Number: 70638

OUR MANAGEMENT SYSTEM IS CERTIFIED TO ISO9001 / TS16949 / ISO14001

PRODUTO/PRODUCT	Cert. N°
HOT ROLLED ROUND BAR	0000012623
NO HEAT TREATMENT	CORRIDA/HEAT
AS ROLLED	22085862
BITOLA/SIZE	
5.0000 "	

PART NUMBER	PESO/WEIGHT (KG)	MATERIAL/MATERIAL														
	22.402,000	705009664														
CLIENTE/CLIENT	QUALIDADE/GRADE	BITOLA/SIZE														
MAGELLAN CORPORATION	AISI 8620/8620H	5.0000 "														
NORMA/SPECIFICATION																
MIC 13016 ADDENDUM 9 AUG. 2016 31.08.2016																
Nota Fiscal/Invoice	Pedido/Cust.Order	Ord-Fornec/Ord-Supply	Lote/Batch	Peso/Weight (Kg)												
0000007760	211139	4337314 - 8106902574	2208586206	22.402,000												
ANÁLISE QUÍMICA/CHEMICAL COMPOSITION																
C	Mn	Si	P	S	Cr	Ni	Mo	V	Cu	Sn	Al	Ti	Nb	N	B	Pb
%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
0,210	0,87	0,33	0,012	0,026	0,52	0,49	0,17	0,0030	0,170	0,0110	0,0250	0,0012	0,0040	0,0096	0,0005	0,0020
H	Ca	W	Co	As	Zr	Sb	Zn	Al+Nb	Cu+10Sn	DI						
%	%	%	%	%	%	%	%	%	%	"						
0,00011	0,0012	0,0020	0,0070	0,0040	0,0010	0,0004	0,0010	0,0290	0,2800	2,1949						
ENSAIOS MECÂNICOS/MECHANICAL PROP																
Mid Radius Hardness		Surface Hardness														
HB		HB														
183		183														
ENSAIOS METALOGRAFICOS/METALLOGRAPHIC TESTS																
Austenitic Grain Size																
6																
MICROINCLUSÕES/INCLUSION RATING NUMBER																
ASTM/SAE																
A - TS	A - HS	B - TS	B - HS	C - TS	C - HS	D - TS	D - HS									
2,0	1,5	0,0	0,0	0,0	0,0	0,5	0,5									
MACROGRAFIA/MACROGRAPHY																
Macro S	Macro R	Macro C														
1	1	1														
TEMPERABILIDADE/HARDENABILITY																
1/16"	2/16"	3/16"	4/16"	5/16"	6/16"	7/16"	8/16"	9/16"	10/16"	11/16"	12/16"	13/16"	14/16"	15/16"	16/16"	18/16"
HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC	HRC
46,2	45,7	42,2	38,4	34,9	31,9	29,9	28,2	27,0	26,2	25,2	24,4	23,8	23,2	22,8	22,4	21,7
20/16"	22/16"	24/16"	26/16"	28/16"	30/16"	32/16"										
HRC	HRC	HRC	HRC	HRC	HRC	HRC										
21,3	21,0	20,9	20,8	20,8	20,7	20,6										



**PINDAMONHANGABA**



ISO 9001:2008  
Certificate Number: 30010



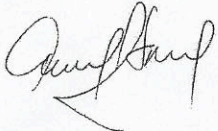
ISO/TS 16949:2009  
Certificate Number: 39554



ISO 14001:2004  
Certificate Number: 70638

CERTIFICADO DE QUALIDADE  
QUALITY CERTIFICATE  
CERTIFICADO DE CALIDAD

OUR MANAGEMENT SYSTEM IS CERTIFIED TO ISO9001 / TS16949 / ISO14001

PART NUMBER	PESO/WEIGHT (KG) 22.402,000	MATERIAL/MATERIAL 705009664	PRODUTO/PRODUCT HOT ROLLED ROUND BAR NO HEAT TREATMENT AS ROLLED	Cert. N° 0000012623 CORRIDA/HEAT 22085862
CLIENTE/CLIENT MAGELLAN CORPORATION		QUALIDADE/GRADE AISI 8620/8620H	BITOLA/SIZE 5.0000 "	
GRAU DE REDUÇÃO/REDUCTION RATE 26,2000 : 1				
<p>OBSERVAÇÕES/OBSERVATIONS</p> <p>Color code: Orange and Green. Ca-Al Treated</p> <p>Material according A29/A29M, John Deere JDM AO QL-2 and CAT 1E02743</p> <p>US test 100% approved as ASTM A388/A388M-11</p> <p>EF, LF, VD and Ingot Casting</p> <p>No Weld Repair, Mercury and Radioactivity Free.</p> <p>EN 10204_3.1 - ASTMs: E112-13, E45[A]-13, E381-01, A322-13, A304-11, A751-11, A370-12a, A255-10, A711/A711M-07 and E10-12.</p> <p>All standards refers to the 2013 volume.</p> <p>Made in Brazil. Rod. Luiz Dumont Villares, km 2 Pindamonhangaba SP - Brazil</p> <p>ENVIRONMENTAL RECOMENDATIONS RELATED TO PRODUTCS:</p> <p>In order to contribute with the environment and sustainable development of our productive chain, we recommend to our clients to dispose accordingly the waste related to our products, according to the environmental legislation of your region, state or country.</p>			<p>DEPARTAMENTO DA QUALIDADE / QUALITY DEPARTMENT PINDAMONHANGABA. 25.02.2017</p>  <p>ANDRÉ L. SILVA FAGUNDES CREA 0682601000</p>	