



BUILD SHEET: U-062 date

ORDER DATE: \_\_\_\_\_ SHIP BY DATE: \_\_\_\_\_

FOR: WFR PO NO: \_\_\_\_\_

SIZE: 3.5 TYPE: MX

THREAD: 2 3/8 PAC OTHER: \_\_\_\_\_

MATRIX:(H) 1874 WEIGHT \_\_\_\_\_

MATRIX:(S) 1876 WEIGHT \_\_\_\_\_

BINDER: 19584 WEIGHT \_\_\_\_\_

BLANK: MM17109684 TJ: A18448.3

CUTTERS: \_\_\_\_\_

BILLET: \_\_\_\_\_ TUBE: \_\_\_\_\_

WELD BY: AH MPI BY: AH

THREAD GAGE: 48466 STAND-OFF: .620

FINAL DIAMOND GRIND SIZE: 3.500

SHIPPED BY: JM DATE: 2/3/24

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

Short

227



# Certificate of Conformance

| Serial Number | Size  | Type | Steel or Matrix | Shank Diameter | Bore |
|---------------|-------|------|-----------------|----------------|------|
| U-062         | 3.500 | MX   | Matrix          |                |      |

| Component                | Material | Vender     | Lot or Heat Number |
|--------------------------|----------|------------|--------------------|
| Blank                    | 8620     | RHW        | MM17109684         |
| Hard Powder              | WC       | MATRIX     | 1874               |
| Soft Capping Powder      | W2       | MATRIX     | 1876               |
| Tool Joint               | 4130     | RHW        | A184483            |
| MIG Weld                 |          |            |                    |
| Tubing                   |          |            |                    |
| <b>Inspection</b>        |          |            |                    |
| Diamond Grinding To Size |          |            |                    |
| Weld MPI                 |          |            |                    |
| Thread Gaging            |          | 2 3/8" PAC |                    |

Signed By: *P. Beegs* date: *2/5/2024*



|                  |                                   |
|------------------|-----------------------------------|
| 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 |

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

| CHEMICAL COMPOSITION<br>(Weight Percent) |         |         |        |
|--|---------|---------|--------|
| Element                                  | Minimum | Maximum | RESULT |
| Tungsten (W)                             | 99.5    | -       | 99.99  |
| -  | -       | -       | -      |

| PRODUCT SIZING<br>(Weight Percent) |         |         |        |
|------------------------------------|---------|---------|--------|
| Sieve                              | Minimum | 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   |
| -                                  | -       | -         | -      |

|                  |                                   |
|------------------|-----------------------------------|
| 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 |



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

| CHEMICAL COMPOSITION<br>(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<br>(Weight Percent) |         |         |        |
|------------------------------------|---------|---------|--------|
| Sieve                              | Minimum | 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   |
|                                    |         |           | -      |



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

## Certificate of Analysis

December 12, 2016

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

Customer Order No: Verbal-Vicki

Customer ID: SHORTC

Sales Order No: 26688

Material: 4483D

BELMONT *Virgin Grade Binder Alloy*

Shape:  $1/2" \times 1/2" \times 3/4"$  Tumbled Sheared Pcs.

Packaging: 250 Lb. Drums

Lot: 19584

|                |         |
|----------------|---------|
| Copper (Cu)    | 47.8411 |
| Manganese (Mn) | 24.1417 |
| Nickel (Ni)    | 19.6365 |
| Zinc (Zn)      | 7.9674  |
| Boron (B)      | 0.11    |
| Iron (Fe)      | 0.0566  |
| Silicon (Si)   | 0.18    |
| Lead (Pb)      | < 0.05  |
| Tin (Sn)       | < 0.05  |

BELMONT METALS, INC.

*Carl Brown*

Laboratory Director

BELMONT



METALS

Sold To

Ship To

|               |   |                 |                 |
|---------------|---|-----------------|-----------------|
| Customer P.O. | 32979   | Sales Order     | 162220.1        |
| Product Group | Special Bar Quality                                   | Part Number     | 30003500222NTC0 |
| Grade         | AISI 8620/8622H (S 015-025%, DI 1.9-2.3) MACRO & MECH | Lot #           | MM1710968402    |
| Size          | 3-1/2" (3.5000) Round                                 | Heat #          | MM17109684      |
| Product       | 3-1/2" (3.5000) Round 18' 6" 8620-C2Q1                | B L Number      | G1-328513       |
| Description   | 8620-C2Q1 AISI 8620/8622H                             | Load Number     | G1-179631       |
| 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: 1/10/2018 Melt Date: 12/22/2017 Qty Shipped LBS: 18,565 Qty Shipped Bundles: 30

**Ladle Chemistry**

| C      | Mn     | P      | S      | Si      | Cu     | Ni     | Cr     | Mo     | V      | Al     | B      |
|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|
| 0.213% | 0.805% | 0.010% | 0.025% | 0.238%  | 0.270% | 0.493% | 0.508% | 0.192% | 0.004% | 0.026% | 0.000% |
| Sn     | Ti     | Cb     | Co     | Ca      | Pb     | As     |        |        |        |        |        |
| 0.008% | 0.001% | 0.005% | 0.009% | 0.0005% | 0.000% | 0.005% |        |        |        |        |        |

**Final Chemistry**

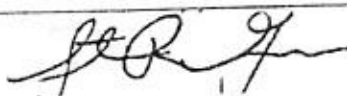
| SP      | C      | Mn      | P      | S       | Si      | Cu      | Ni     | Cr      | Mo      | V      | Al     |
|---------|--------|---------|--------|---------|---------|---------|--------|---------|---------|--------|--------|
| 0.03%   | 0.22%  | 0.81%   | 0.010% | 0.024%  | 0.24%   | 0.27%   | 0.49%  | 0.50%   | 0.19%   | 0.005% | 0.027% |
| B       | Sn     | Ti      | Cb     | Co      | Ca      | Pb      | As     | N       | H       |        |        |
| 0.0003% | 0.008% | 0.0014% | 0.005% | 0.0089% | 0.0007% | 0.0000% | 0.005% | 0.0070% | 1.5 ppm |        |        |

SP sp formula

**Front Chemistry**

| C      | Mn     | P      | S      | Si     | Cu     | Ni     | Cr     | Mo     | V      | Al     | B      |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.206% | 0.802% | 0.010% | 0.022% | 0.234% | 0.274% | 0.483% | 0.500% | 0.189% | 0.005% | 0.028% | 0.000% |
| Sn     | Ti     | Cb     | Co     | Ca     | Pb     | As     |        |        |        |        |        |
| 0.008% | 0.001% | 0.006% | 0.009% | 0.001% | 0.000% | 0.004% |        |        |        |        |        |

DI value 2.24



Steven Gage  
 Division Metallurgist

Sold To

Ship To

|               |  |                 |                 |
|---------------|--|-----------------|-----------------|
| Customer P O. | 32979  | Sales Order     | 162220 1        |
| Product Group | Special Bar Quality                                    | Part Number     | 30003500222N1C0 |
| Grade         | AISI 8620/8622H (S 015-.025%, DI 1 9-2 3) MACRO & MECH | Lot #           | MM1710968402    |
| Size          | 3-1/2" (3 5000) Round                                  | Heat #          | MM17109684      |
| Product       | 3-1/2" (3 5000) Round 18" 6" 8620-C2Q1                 | B L. Number     | G1-328513       |
| Description   | 8620-C2Q1 AISI 8620/8622H                              | Load Number     | G1-179631       |
| 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.

**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 |
|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 46 | 46 | 43 | 37 | 32 | 28 | 26 | 25 | 24 | 23  | 22  | 21  | 20  | 20  | 19  | 19  | 18  | 18  | 17  | 17  | 16  | 16  | 15  | 15  |

E381 Surface (Back) 1

Oxide Cleanliness, SAE J422 0 0

Brinell, 174.000bhn

Reduction Ratio 14 9 1

E381 Mid Radius (Back) 1

Silicate Cleanliness, SAE J422 0 0

Brinell Converted Mid-Radius 179 0bhn

E381 Center (Back) 1

Total Oxygen per ASTM E1019 = 15 4000ppm

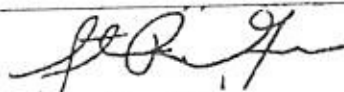
Brinell Converted Surface 163 0bhn

**ASTM E381**

Surface 1 Mid Radius 1 Center 1

**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 performed 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 astensk(\*) 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

## Certified Material Test Report

|  |                       |  |                             |
|--|-----------------------|--|-----------------------------|
| Cert #: 288224                                   | Mill Order: 1819987   | <b>Heat #: A184485</b>                 | Issued: 12/18/2018 10:27:18 |
| Work Order:                                      | Sales Order: 205998-1 | Customer: Crossroads Steel Supply, Inc | PO #: 321-3                 |
| Load #: 316592                                   | Reference #:          | Reference Desc:                        | End Use:                    |
| Size: 4"   | Shape: Round          | Grade: 4130                            | Length: 20' 1"              |
| Grain Practice: Al Fine Grain (5-8) per ASTM A29 |                       | Reduction Ratio: 11.6 to 1             | Disposition: Rolled Prime   |

**Ladle Chemistry Analysis (ASTM A29)**

| C     | Mn    | P     | S     | Si    | Al    | Cu      | Ni      | Cr   | Mo       | Sn    | N      | V     | Cb    | B      | Ca     | W     | Ti    | DI   |
|-------|-------|-------|-------|-------|-------|---------|---------|------|----------|-------|--------|-------|-------|--------|--------|-------|-------|------|
| 0.31  | 0.58  | 0.009 | 0.004 | 0.24  | 0.034 | 0.20    | 0.22    | 1.05 | 0.23     | 0.009 | 0.0148 | 0.015 | 0.010 | 0.0001 | 0.0025 | 0.001 | 0.001 | 3.73 |
| Pb    | Co    | As    | Sb    | Zr    | Bi    | H (ppm) | O (ppm) | Ceq  | J-Factor |       |        |       |       |        |        |       |       |      |
| 0.000 | 0.006 | 0.003 | 0.002 | 0.000 | 0.000 | 1.5     |         | 0.59 | 144      |       |        |       |       |        |        |       |       |      |

**Product Check Analysis (ASTM A29)**

| C     | Mn | P | S | Si | Al | Cu | Ni | Cr | Mo | Sn | N | V | Cb | Ti | B | Ca | O |
|-------|----|---|---|----|----|----|----|----|----|----|---|---|----|----|---|----|---|
| Front |    |   |   |    |    |    |    |    |    |    |   |   |    |    |   |    |   |
| Back  |    |   |   |    |    |    |    |    |    |    |   |   |    |    |   |    |   |

**Jominy (ASTM A255)**

|                 | J1  | J2 | J3 | J4 | J5 | J6 | J7 | J8 | J9 | J10 | J12 | J14 | J16 | J18 | J20 | J24 | J28 | J32 |
|-----------------|-----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Calc'd Standard | 51  | 51 | 51 | 49 | 47 | 44 | 42 | 40 | 39 | 38  | 35  | 33  | 31  | 30  | 29  | 27  | 26  | 25  |
| Calc'd Metric   | 1.5 | 3  | 5  | 7  | 9  | 11 | 13 | 15 | 20 | 25  | 30  | 35  | 40  | 45  | 50  |     |     |     |
|                 | J1  | J2 | J3 | J4 | J5 | J6 | J7 | J8 | J9 | J10 | J12 | J14 | J16 | J18 | J20 | J24 | J28 | J32 |
| Front           |     |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |
| Back            |     |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |

**Microcleanliness (ASTM E45)**

| Method A |    |    |    |    |    |    |    | Method C (SAE J422) |   | Method E |         | Microcleanliness (DIN 50602) |   |     |     |
|----------|----|----|----|----|----|----|----|---------------------|---|----------|---------|------------------------------|---|-----|-----|
| AT       | AH | BT | BH | CT | CH | DT | DH | S                   | O | SAM "B"  | SAM "D" | K                            |   | M   |     |
|          |    |    |    |    |    |    |    |                     |   |          |         | S                            | O | Tot | Tot |
|          |    |    |    |    |    |    |    |                     |   |          |         |                              |   |     |     |

**Decarb**

| Decarb |               | Grainsize  |          | Macrostructure (ASTM E381) |   |   | Magnetic Particle Inspection |          |
|--------|---------------|------------|----------|----------------------------|---|---|------------------------------|----------|
| Depth  | % of Diameter | Austenitic | Ferritic | S                          | R | C | Frequency                    | Severity |
|        |               | 8          |          | 1                          | 1 | 2 |                              |          |

**Mechanical Properties (ASTM A370)**

| Tensile Properties |                     |              |       |                          | Hardness |        |
|--------------------|---------------------|--------------|-------|--------------------------|----------|--------|
| Tensile Strength   | 0.2% Yield Strength | % Elong (2") | % ROA | 0.35% EUL Yield Strength | (MR)     | (Surf) |
|                    |                     |              |       |                          |          |        |

Steel Dynamics - Engineered Bar Products has a quality system in place which has been certified ISO 9001:2015 compliant, including PED certification.

**Comments/Specs**

ASTM A322-13 --- UT Tested to ASTM A388 1/8FBH --- UT Tested to ASTM A388 1/5FBH --- NACE MR-01-75 / ISO 15156-2009 --- ASTM A751-14a --- EAF, VTD, 10x14 Bloom, HR, N, Q&T, MS, SR, UT --- DIN EN 10204:2004 Paragraph 3.1 --- API 16C dtd 1/29/1993 Reaffirmed 2001 --- API 16A dtd December 2004 --- ASTM E112 --- ASTM A304-16 --- Crossroads 4130NQ&T L80 R.11(excl'd AMS2750) --- ASTM E10

Condition: Normalize, Quench, Temper, Straighten, Stress Relieve, Chamfer, Immersion UT UT: Passed Ultrasonic Inspection

I hereby certify that the content of this report is correct and accurate, and that all tests and operations performed on this material were in compliance with applicable material specifications and purchaser designated requirements.

*Jonathan Vallosic*  
 Jonathan Vallosic - Rolling Mill Metallurgist (ES)

Any alteration to this report voids Steel Dynamic's warranting of results. No weld repair has been performed on this material. This material is not radioactive and has not been exposed to radioactivity while under the control of Steel Dynamics. This material has not been exposed to mercury while under the control of Steel Dynamics. Unless otherwise noted, this material was melted, continually cast, and rolled in the USA; w/ all testing performed by Steel Dynamics.



## Certified Material Test Report Heat Treatment Addendum

|                |                       |   |                             |
|----------------|-----------------------|---|-----------------------------|
| Cert #: 298224 | Mill Order: 1819987   | Heat #: A184483                         | Issued: 12/18/2018 10:27:19 |
| Work Order:    | Sales Order: 205998-1 | Customer: Crossroads Steel Supply, Inc. | PO #: 321-3                 |
| Load #: 316592 | Reference #:          | Reference Desc:                         | End Use:                    |
| Size: 4"       | Shape: Round          | Grade: 4130                             | Length: 20' 1"              |

| Normalize |        | Austenitize |         | Quench Media |        | Temper   |         | Stress Relieve |         |        |
|-----------|--------|-------------|---------|--------------|--------|----------|---------|----------------|---------|--------|
| Time      | Temp   | Time        | Temp    | Type         | Time   | Temp     | Time    | Temp           | Time    | Temp   |
| 3.0 hrs   | 1650 F | 3.0 hrs     | 1600* F | Water        | 15 min | 85-91* F | 6.0 hrs | 1225* F        | 4.0 hrs | 1050 F |

\* Furnaces are calibrated to API 6A Annex M, and use atmospheric thermocouples.  
 \*\* QTC is 12" prolongation from longitudinal orientation, machined to a 0.505" buttonhead for tensile.

**Charpy Impact (ASTM E23) (v-notch | 10mm x 10mm)**

| Sample ID | Orientation  | Location   | Temp(F) | Impact Energy (ft-lbs) |    |    |     | Lateral Expansion (0.001") |    |    |     | % Shear |    |    |     |    |
|-----------|--------------|------------|---------|------------------------|----|----|-----|----------------------------|----|----|-----|---------|----|----|-----|----|
|           |              |            |         | 1                      | 2  | 3  | Avg | 1                          | 2  | 3  | Avg | 1       | 2  | 3  | Avg |    |
| 40200     | Longitudinal | Mid-Radius | Q1      | -75                    | 45 | 56 | 39  | 47                         | 25 | 33 | 22  | 27      | 20 | 20 | 20  | 20 |
| 40500     | Longitudinal | Mid-Radius | Q1      | -75                    | 58 | 60 | 46  | 55                         | 39 | 43 | 30  | 37      | 20 | 20 | 20  | 20 |
| 40700     | Longitudinal | Mid-Radius | Q1      | -75                    | 49 | 47 | 42  | 46                         | 25 | 24 | 25  | 25      | 20 | 20 | 20  | 20 |

**Hardness (ASTM A370)**

| Sample ID | Location      | HB  | Rc |
|-----------|---------------|-----|----|
| 40200     | Mid-Radius Q1 | 224 | 17 |
| 40500     | Mid-Radius Q1 | 226 | 18 |
| 40700     | Mid-Radius Q1 | 226 | 17 |

**Surface Hardness (ASTM A370)**

| Sample ID | Location   | HB  | Rc |
|-----------|------------|-----|----|
| 40204     | Surface Q1 | 224 | 19 |
| 40504     | Surface Q1 | 221 | 18 |
| 40704     | Surface Q1 | 226 | 19 |

**Tensile (ASTM A370)**

| Sample ID | Orientation  | Location      | Tensile     | 0.2% Yield | %ROA   | %E (2") |
|-----------|--------------|---------------|-------------|------------|--------|---------|
| 40200     | Longitudinal | Mid-Radius Q1 | 104,600 psi | 79,900 psi | psi 70 | 25      |
| 40500     | Longitudinal | Mid-Radius Q1 | 105,200 psi | 80,600 psi | psi 66 | 25      |
| 40700     | Longitudinal | Mid-Radius Q1 | 105,200 psi | 80,700 psi | psi 69 | 25      |

I hereby certify that the content of this report is correct and accurate, and that all tests and operations performed on this material were in compliance with applicable material specifications and purchaser designated requirements.

*Jonathan Vallosio*  
 Jonathan Vallosio - Bar Finishing Metallurgist

Any alteration to this report voids Steel Dynamic's warranting of results.



**CERTIFICATION**

**To:** SHORT BIT & TOOL CO.  
 225 GOLD STREET  
 GARLAND TX 75042

Purchase Order No.: THT-A18448  
 Material: 4130  
 Customer Spec  
 HRC 32-35, Per P.O.

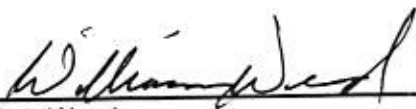
| Quantity | Part Number / Part Name / Part Description | Container   | Pounds |
|----------|--|-------------|--------|
| 45       | 2 3/8 PAC<br>3" 4130 tool joint            | Metal Pan 3 | 540    |

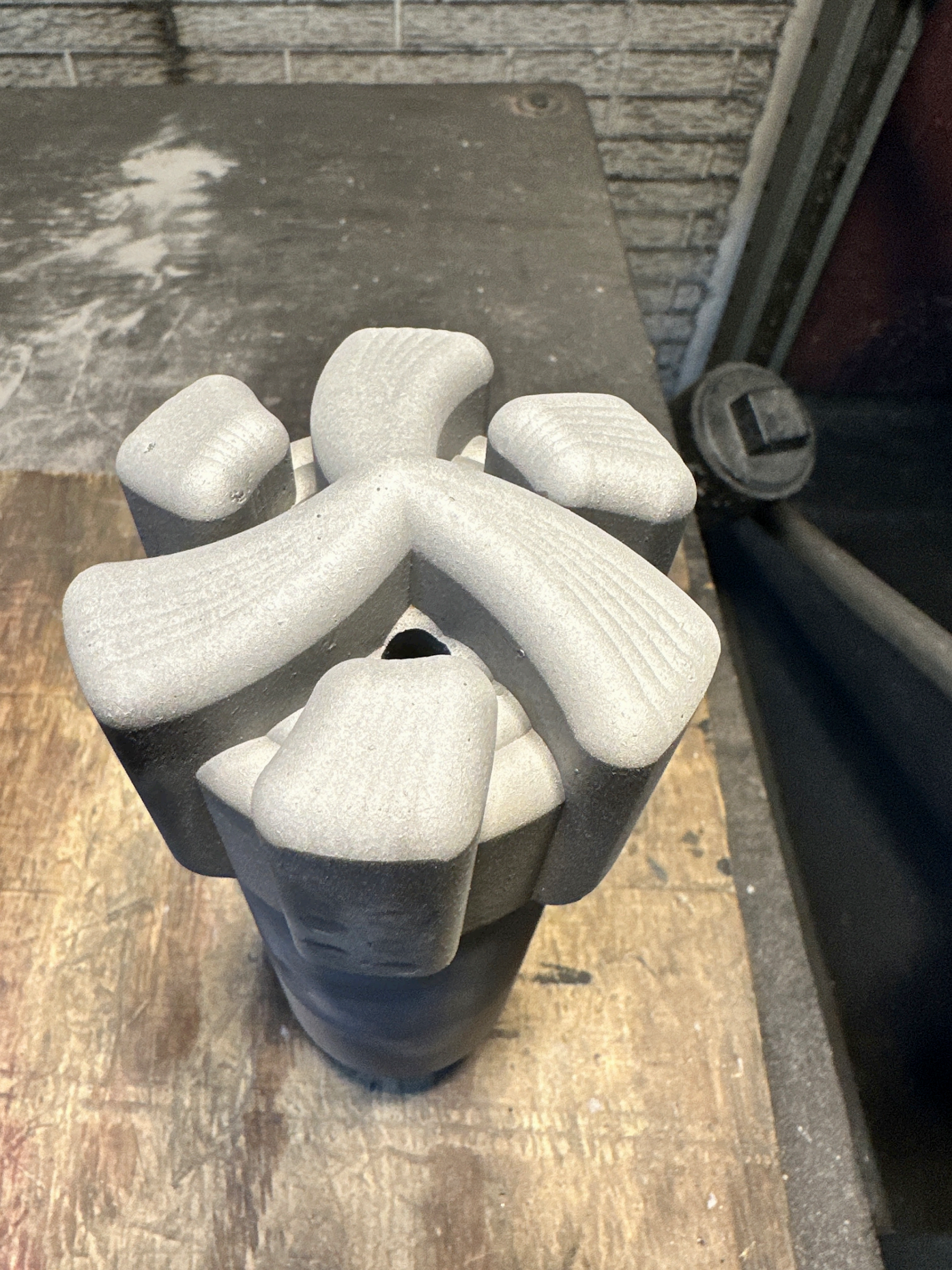
Harden at 1,550°F for 2 hours. Oil quench.  
 Temper at 1,000°F for 3 Hours. Air cool.  
 Temper at 1,050°F for 4 Hours. Air cool.

| Insp. Type                    | Scale | Minimum | Maximum | Insp. Type                                  | Scale | Minimum | Maximum | Value |
|-------------------------------|-------|---------|---------|---|-------|---------|---------|-------|
| <b>Customer Requirements:</b> |       |         |         | <b>Results:</b>                             |       |         |         |       |
| Surface                       | HRC   | 32.0    | 35.0    | Surface                                     | HRC   | 34.3    | 34.9    |       |
| Method: E18                   |       |         |         | 3 Pieces Inspected, Date Tested: 10-29-2020 |       |         |         |       |
| Tensile Strength              | KSI   | 100.0   | 156.0   | Tensile Strength                            | KSI   |         |         | 154.8 |
| Method: E8/8M                 |       |         |         | Date Tested: 10-30-2020                     |       |         |         |       |
| Yield Strength                | KSI   |         | 100.0   | Yield Strength                              | KSI   |         |         | 138.3 |
| Report Values                 |       |         |         | 0.2% Offset                                 |       |         |         |       |
| % Elongation                  | %     |         |         | % Elongation                                | %     |         |         | 20.6  |
| Report Values                 |       |         |         | 1" Initial Gauge                            |       |         |         |       |
| % Reduction in                | %     |         |         | % Reduction in Area                         | %     |         |         | 61.0  |
| Report Values                 |       |         |         | 0.253" Initial Diameter                     |       |         |         |       |

**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 does 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.

  
 William Weed  
 Quality Representative  
 Texas Heat Treating





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