Metals Laboratory
Sampling and Testing Guidance Document

Description

The purpose of this Metals Laboratory Guidance Document is to provide the Michigan Department of Transportation (MDOT) and their representatives with information for sampling and testing metals that will be incorporated into MDOT trunkline projects. This guide includes web links to common reference information, MDOT Metals Laboratory's high-level flowchart, common metals testing requirements, a sampling guide that instructs users how to sample metals, typical metal products manufacturer markings, examples of how to put a sample documentation file together, and what the test report will look like. The example sample documentation file includes commentary that provides guidance on which information shown on the material certification document needs to be verified and common pitfalls when completing the sample identification form. This document includes the following sections:

The MDOT Metals Laboratory is managed by the Bureau of Bridges and Structures, Structure Construction Section, Structural Fabrication Unit (hereinafter called SFU). Please send questions about this guidance document to the Metals Laboratory email resource: MDOT-MetalsLab@Michigan.gov

1. Web Links

Below are web links to commonly used resources related to metal sampling and testing. Click on the title of each bullet for the hyperlink.

- Materials Quality Assurance Procedures (MQAP) Manual
- MDOT Structural Fabrication Unit
- MDOT Form Finder
- 2020 MDOT Standard Specifications for Construction (MDOT SSC)
  (See supplemental specifications for errata.)
- Bridge Advisories

2. Laboratory Flowchart

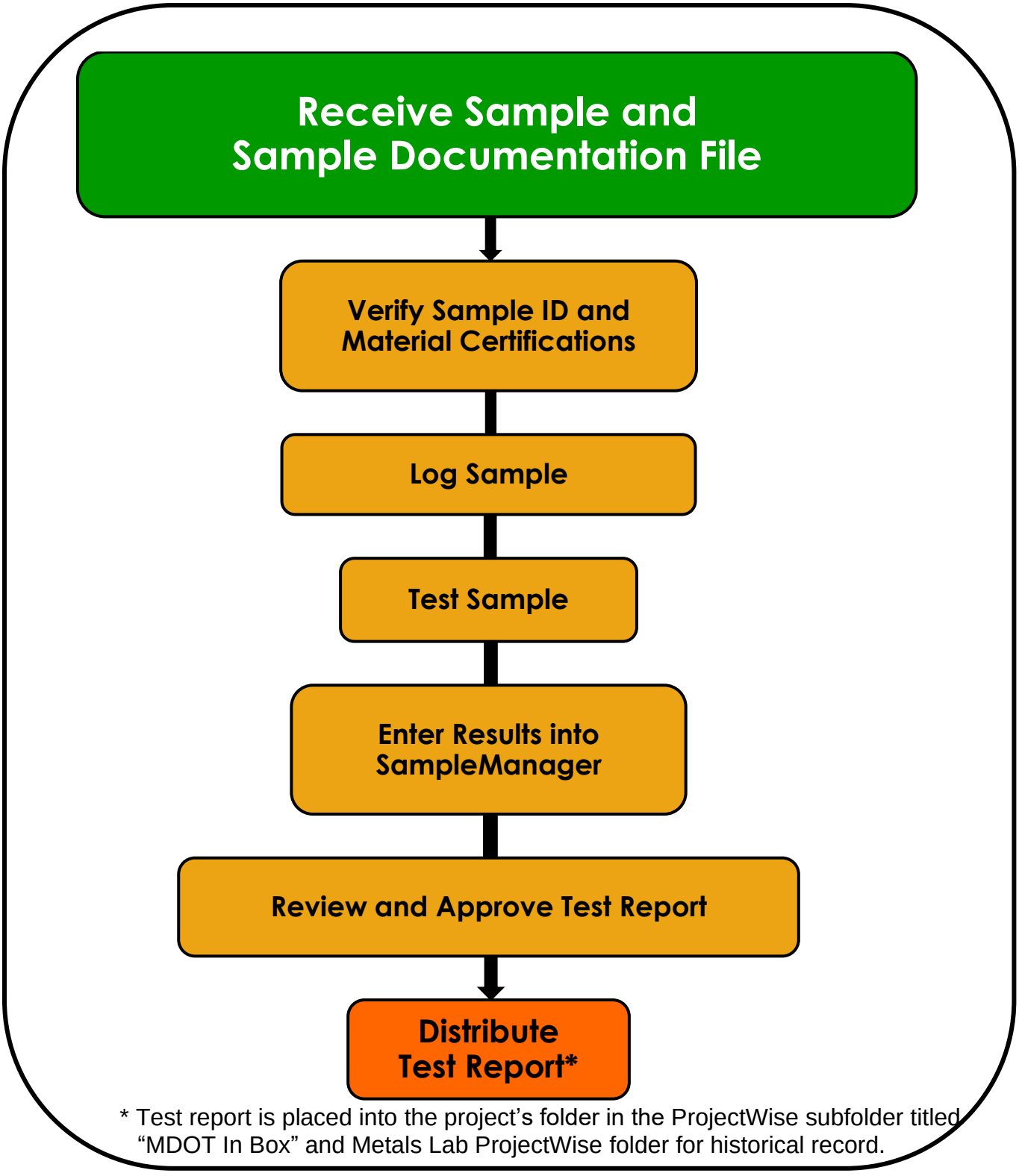


Figure 1. Flowchart showing high-level functions using SampleManager reporting system for electronic records.

3. Testing Requirements

Table 1 lists common metal products used on MDOT trunkline projects and applicable testing if product is required to be tested. Basis of acceptance (acceptance test or certification verification for approved manufacturer) for each metal product can be found in the Materials Acceptance Requirements Table located in the MQAP manual, project special provisions, or MDOT SSC.

Table 1. Common metal products used on MDOT trunkline projects and applicable testing.

Common Metal Products	**MDOT Metals Applicable Testing Procedure** (Where a testing procedure is not listed, the applicable testing requirements are provided.)
Anchor Bolts for Other Purposes	Procedure #3: Anchor Bolts
Anchor Bolts and Nuts for Cantilever and Truss Sign Supports, Light Standards, Dynamic Message Sign, CCTV Poles, Tower Lighting Units, and Traffic Signals Mast Signal Arm Poles	Procedure #3: Anchor Bolts
Anchor Bolts and Nuts for Traffic Signal Strain Poles	Procedure #3: Anchor Bolts
Corrugated Steel Pipe	Procedure #6: Corrugated Steel Pipe
Dowel Bars	Procedure #5: Dowel Bars
Extruded Aluminum Sign Planks	Visual Inspection, indentation, indentation width, corner radius, flatness, moment of inertia, and minimum section modulus
High Strength Bolts	Procedure #1: High Strength Bolts
High Tensile Wire	Visual Inspection, wire diameter, galvanizing, and tensile strength.
Mechanical Reinforcement Splicing	Procedure #8: Mechanical Splice
Post Tensioning Bar	Visual Inspection, deformation height & spacing, linear weight, and tensile strength
Railing Anchor Studs	Procedure #4: Anchor Studs
Bar Reinforcement Epoxy Coated	Procedure #2: Deformed Uncoated and Epoxy Coated Bar Reinforcement
Bar Reinforcement Uncoated	Procedure #2: Deformed Uncoated and Epoxy Coated Bar Reinforcement

Common Metal Products	MDOT Metals Applicable Testing Procedure (Where a testing procedure is not listed, the applicable testing requirements are provided.)
Strand for Prestressed Concrete	Visual Inspection, strand diameter, strand diameter difference, strand pitch, load at 1% extension, maximum load, and elongation
Temporary Support Hanger Rod	Visual Inspection, thread diameter, length, markings, yield & tensile strength, elongation, reduction of area, and CVN impact
Tie Bars	Visual Inspection, bar size, coating thickness, coating flexibility, continuity of coating, linear weight, bend test, markings, yield & tensile strength, and elongation
Welded Wire Reinforcement	Procedure #7: Welded Wire Reinforcement

4. Sampling Guide

The following procedure provides step-by-step instructions on sampling metals for MDOT trunkline projects that are required to be tested by the MDOT Metals Laboratory for acceptance testing or certification verification (approved manufacturer).

Selecting Samples

1. Samples must be selected randomly without bias, must be representative of the material sampled, and can only represent the population of material available at the time of sampling (e.g., makeup material must be resampled since the original sample cannot statistically represent material not available at the time of sampling). Specific sample size and frequency can be found in the Materials Acceptance Requirements Table located in the MDOT MQAP Manual.

Tagging Samples

2. All samples must be securely tagged with a numbered zip tie. MDOT provides zip ties that are uniquely numbered for sample identification purposes. High strength bolt samples must be placed in plastic bags and closed with zip ties. The purpose of the bag is to protect the samples from contamination. All other samples must have zip ties placed securely on the sample.
3. The population of material a sample is pulled from must be tagged or marked in accordance with Subsection 1.07 of the MDOT MQAP Manual.

Submitting Samples

4. MDOT Form 1923 (*Sample Identification*) must be electronically prepared and filled out for each sample. The sample zip tie number must be placed in the “Sender’s Sample I.D.” field on the form in place of the instructions provided on Form 1923.
5. All material certifications for the sample must be electronically combined with Form 1923 (first page of submittal) into one Portable Document Format (PDF) file and emailed (include zip tie number in the subject line) to the Metals Laboratory email resource:

MDOT-MetalsLab@Michigan.gov

If the MDOT SSC does not provide the material specifications for the sample then include all applicable plan sheets, special provisions, and shop drawings in the sample documentation PDF file. The Contractor is responsible for providing all material certification and test data reports to the MDOT field/shop inspector as PDF files.

6. Form 1923 must be securely and physically attached to the sample using a method that would ensure the form remains with the sample and is readable when it arrives to the Metals Laboratory. Hard copies of material certifications must not be physically attached to the sample.
7. Method of transportation of the samples to the Metals Laboratory is at the discretion of the Contractor per the MDOT SSC. The Contractor is responsible for all associated shipping costs and must determine shipment method in a manner deemed most appropriate. Non-MDOT employees dropping off samples must check in with security at the loading dock gate or south entrance of the Construction & Technology Building prior to dropping samples off on the Metals Lab cart located on the loading dock.
8. All samples must be consigned to:

Michigan Department of Transportation
Metals Laboratory
Construction & Technology Building
8885 Ricks Road
Lansing, MI 48917

Testing Results

9. Test results can typically be expected within 2 weeks after the sample arrives in the Metals Laboratory. Inquiries on the testing status or test results may be directed to:

MDOT-MetalsLab@Michigan.gov

10. A Lab Number will be assigned by the Metals Laboratory and incorporated into the test report file name. The product name will be replaced with the product name descriptor shown in Table 2 (e.g., 18M-123 63172 123143 Anchor Bolt 2x114in 5-22-18).
11. Metals Laboratory will place the test report PDF file (test report combined with sample documentation file) into the ProjectWise MDOT In Box folder at the location shown below for each project.

- Region
  - TSC
    - Project Specific Job Number
      - Construction
        - MDOT In Box

The Engineer will move the report file to the appropriate project subfolder. The Metals Laboratory also stores a laboratory copy in its own ProjectWise folder for historical and audit purposes

Table 2. Product name descriptors for laboratory file naming convention.

MDOT SSC Subsection	Product Name	Product Name Descriptor for Laboratory File Naming Convention*
712.03.J	Mechanical Splicing	Splice
713.02.A	Temporary Support Hanger Rod	Hanger Rod
905.03	Bar Reinforcement	Rebar
905.06	Welded Wire Reinforcement	Welded Wire
905.07	Prestressing Strand	Prestressing Strand
906.07	High Strength Bolts	HS Bolt
907.05	High Tensile Wire	Tensile Wire
908.09.C	Railing Anchor Studs	Anchor Stud
908.11.A	Guardrail Beam	Guardrail
908.12	Guardrail Post	Guardrail Post
908.14.B	Anchor Bolts and Nuts for Cantilever and Truss Sign Supports, Light Standards, Dynamic Message Sign, CCTV Poles, Tower Lighting Units, and Traffic Signals Mast Signal Arm Poles	Anchor Bolt
908.14.C	Traffic Signal Strain Poles	Anchor Bolt
908.14.D	Anchor Bolts for Other Purposes	Anchor Bolt
909.05.A.1	Corrugated Steel Pipe	Corrugated
914.07	Dowel Bars	Dowel
918.11.A	Guy Wire	Guy Wire
919.02.A	Aluminum Extruded Sections	Extruded Aluminum
919.02.A.3	Aluminum Sheet	Aluminum Sheet

*Product name descriptor used in the sample documentation file in Step 10 above.

5. Product Markings

Some products listed below are not tested; however, product marking requirements are shared for informational purposes only.

Table 3. Metals product marking requirements.

Product Name (Reference)	Required Product Markings	Common Manufacturer Markings
Temporary Support Hanger Rod (MDOT SSC 712.02A, ASTM A193)	15.1 See Specification A962. The grade symbol shall be as shown in Table 4. From Table 4: B7	
Bar Reinforcement (MDOT SSC 905.03, ASTM A706 & A615)	16.2 Each manufacturer shall identify the symbols of its marking system. For Grade 60 [420] bars, the marking shall be either the number 60 [4] or a single continuous longitudinal line through at least five spaces offset from the center of the bar. For Grade 80 [550] bars, the marking shall be either the number 80 [6] or three continuous longitudinal lines through at least five spaces.	See rebar markings list below (Appendix A). If rebar is coated, then coating company is the manufacturer (ABC Coating Co.)
High Strength Bolts (MDOT SSC 906.07, ASTM F3125)	From Table 1 of ASTM F3125: A325 At a minimum, all bolts shall be marked as required in Table 1. Marking shall be on the bolt head and may be raised or depressed at the manufacturer's option. The marking shall be visible after coating. Grade and Type marking, and the manufacturer's mark shall be in separate and distinct locations on the head. Other markings, if used, such as private label distributor's mark shall also be separate and distinct.	nA325 (Nucor) SLA325 (St. Louis Screw & Bolt) SLA325USA (St. Louis Screw & Bolt) GA325 (Gaffney Bolt Co.)
Nuts (MDOT SSC 906.07, 908.14, ASTM A563 Grade DH or ASTM A194 Grade 2H)	14.5 Nuts made to the requirements of Grade DH shall be marked with the grade symbol, DH (or 2H) (Note 4) on one face. 14.7 In addition, nuts shall be marked with a symbol to identify the manufacturer or private label distributor, as appropriate.	DHU (Unytite) Dhn (Nucor) 2HU (Unytite) DHn (Nucor) TDC2H (Dyson) 2HDHD/N (Dyson) DMCDH (Dyson) FSADH/2H (Foundation Systems)

Product Name (Reference)	Required Product Markings	Common Manufacturer Markings
Hardened Washers (MDOT SSC 906.07, 908.14, ASTM F436)	15.1 Washers shall be marked with a symbol, or other distinguishing marks, to identify the manufacturer or private label distributor, as appropriate.	TSIF436 (Technical Stamping) PF436 (Prestige Stamping) Ws (Wrought Washer)
Anchor Bolts (MDOT SSC 908.14, ASTM F1554)	S3. Permanent grade identification on end of anchor bolt projecting from the concrete. S2. (not required by spec but informational) S2.1 The end of the anchor bolt intended to project from the concrete shall be steel die stamped with the manufacturer's identification.	AVA 55 (AA Anchor Bolt) ASI 55 (Alton Steel) 27 ("XX") (Gerdau Ameristeel) S41 ("XXX") (Cardinal Fabricating) FSA105 (Foundation Systems)
Railing Anchor Studs (MDOT SSC 908.09C, ASTM A449)	16.1 Manufacturers Identification—All hex cap screws and bolts and one end of studs 3⁄8 in. and larger, and whenever feasible studs smaller than 3⁄8 in., shall be marked by the manufacturer with a unique identifier to identify the manufacturer or private label distributor, as appropriate. 16.2.1 Type 1 hex cap screws and bolts and one end of Type 1 studs 3⁄8 in. and larger, and whenever feasible studs smaller than 3⁄8 in., shall be marked "A449."	BFA449 (Birmingham Fastener) SLA449 (St. Louis Screw & Bolt) JHBA449 (J.H. Botts)

6. Frequently Asked Questions

A. Will MDOT's Metals Lab perform testing for Local Agency projects?

No. MDOT's Metals Lab does not perform testing for Local Agency projects.

B. Do all samples need to be tagged with a yellow zip tie?

Yes, all samples must be securely tagged with a yellow zip tie. High strength bolt samples must be placed in a plastic bag that is securely tagged with a yellow zip tie (see sampling guide). The purpose of the plastic bag is to keep the bolts packaged with one zip tie and to protect the bolts from contamination during transport.

C. Do additional or makeup materials need to be resampled and tested?

Yes. A sample can only represent the population of material available at the time of sampling. Additional samples must be taken for makeup or additional materials since the quantity represented by the sample has changed since the first sampling.

D. Can a contractor have a third-party test the material for acceptance?

No. MDOT's Metals Lab must perform the testing for all trunkline projects.

E. What are the requirements for retesting if the sample does not meet specification requirements?

Section 1.09 of the MQAP Manual gives direction on resampling for MDOT projects. In general, the resample must consist of twice the number of samples as submitted in the original sampling, unless a greater number is required by the specification.

7. Appendices

APPENDIX A
Sample Documentation File Example

Michigan Department
Of Transportation
1923 (05/13)

SAMPLE IDENTIFICATION

Send sample to MDOT Construction Field Services
8885 Ricks Rd., Lansing, Michigan 48909
SEE INSTRUCTIONS BELOW

CONTROL SECTION	
75011	
JOB NUMBER/PO NUMBER	DATE SAMPLED
110703A	5/07/13
LAB NUMBER	DATE RECEIVED

LAB: ☐ Aggregate ☐ AWI ☐ Concrete ☐ HMA ☒ Metals ☐ Soils/ Geotextiles

NAME OF MATERIAL
3/4" x 2 1/4" High strength bolts, nut and washers

SOURCE / SUPPLIER / PIT NAME	ADDRESS / PIT NUMBER
123 Bolts	1800 Fake St., Lansing, MI 48917
MANUFACTURER / PRODUCER	ADDRESS
Nucor / Unytite / Prestige Stamping	See certs

SAMPLED FROM
Source

QUANTITY OF MATERIAL REPRESENTED BY SAMPLE
24

CONSIGNED TO	ADDRESS
N/A	

SAMPLED BY	PHONE/EMAIL	TITLE
Joshua Arritt	517-636-5701 / arrittj@michigan.gov	Engineering Technician 11
SUBMITTED BY	PHONE/EMAIL	TITLE
Joshua Arritt	517-636-5701 / arrittj@michigan.gov	Engineering Technician 11

INTENDED USE
Bridge beam assembly

SPECIFICATION	SENDER'S SAMPLE I.D.
MDOT 2012 Std. Spec 906.07	Tag # 153B

TYPE OF SAMPLE
☒ Acceptance ☐ Tested Stock ☐ Certification Verification # _____ ☐ New Source ☐ Information ☐ Q.A.

REMARKS
Remarks would go here for any type of special instructions regarding this sample

SEND RESULTS TO:
arrittj@michigan.gov (all results are now being sent by email)

INSTRUCTIONS

NOTE: This ID is the sole basis for identification and distribution of the report.
PLEASE BE ACCURATE

CONTROL SECTION
JOB NO. – As given or PURCHASE ORDER NO. – If applicable
NAME OF MATERIAL – As shown in Standard Specifications – include dimensions for bolts, schedule # for conduit, cement type, etc.
SOURCE – Contractor, supplier, producer, pit name, or location for naturally occurring materials
ADDRESS – Address of source (city & state or county)
SAMPLED FROM – Identifiable lot or batch number, and/or specific location, project site, source, etc.
QUANTITY REPRESENTED – Number of pieces, feet, square feet, pounds, gallons, etc.
CONSIGNED TO – If sampled at source other than project, state to whom and where the material is to be shipped
SAMPLED BY – Name and Title if different from submitter
INTENDED USE – State material's use in general terms (e.g., SS-1h, CRS-2M, CSS-1h, etc. for bolts; geosynthetics for select backfill, embankment, 3ft. granular blanket, etc.)
SPECIFICATION – Anchor Bolt, ASTM F1554, grade 55, 2012 Std. Spec. 908.14B
Aluminum, ASTM B221, 2012 Std. Spec. 919.02A
SENDERS SAMPLE ID – Lot, heat, roll, etc. number; sample dimensions; and any other details specific to the same (not sender's name)
REMARKS – State special tests to be run, if sample is rush or resample, and if results are to be phoned or emailed, state to whom (phone number or email)

Clear Form

CFI JOB #6399 - 20 Pieces

NUCOR
FASTENER DIVISION

LOT NO.
326002A

Post Office Box 6100
Saint Joe, Indiana 46785
Telephone 260/337-1600

CUSTOMER NO/NAME
9080 BIRMINGHAM-CONS/SHIPPING
TEST REPORT SERIAL# FB409148
TEST REPORT ISSUE DATE 6/13/13
DATE SHIPPED 8/15/13
NAME OF LAB SAMPLER: FRANKLIN A. NEAL, LAB TECHNICIAN
NUCOR ORDER # 836160
CUST PART # 75C225A32G/NND
CUSTOMER P.O. # 6031565

A325

**********CERTIFIED MATERIAL TEST REPORT**********

NUCOR PART NO	QUANTITY	LOT NO.	DESCRIPTION
160577	29925	326002A	3/4-10 X 2 1/4 A325 H.D.G.
MANUFACTURE DATE 5/21/13			STRUC SCREW H.D.G.

--CHEMISTRY MATERIAL GRADE -1039ML1

MATERIAL NUMBER	HEAT NUMBER	**CHEMISTRY COMPOSITION (WT% HEAT ANALYSIS) BY MATERIAL SUPPLIER					NUCOR STEEL - NEBRASKA
		C	MN	P	S	SI	
RM028145	NF13101172	.42	.89	.006	.015	.24	
	MIN	.30	.60			.15	
	MAX	.52		.040	.050	.30	

--MECHANICAL PROPERTIES IN ACCORDANCE WITH ASTM A325-10

SURFACE HARDNESS (R30N)	CORE HARDNESS (RC)	PROOF LOAD 28400 LBS	TENSILE STRENGTH 6 DEG-WEDGE (LBS)	STRESS (PSI)
N/A	26.8	PASS	49610	148533
N/A	26.6	PASS	48400	144910
N/A	28.0	PASS	48500	145210
N/A	27.3			
N/A	27.9			
AVERAGE VALUES FROM TESTS		PRODUCTION LOT SIZE 93400 PCS		
	27.3		48837	146218

--VISUAL INSPECTION IN ACCORDANCE WITH ASTM A325-10 5 PCS. SAMPLED LOT PASSED

--COATING - HOT DIP GALVANIZED TO ASTM F2329-11 - GALVANIZING PERFORMED IN THE U.S.A.

1.	0.00277	2.	0.00287	3.	0.00628	4.	0.00363	5.	0.00236	6.	0.00336	7.	0.00316
8.	0.00500	9.	0.00385	10.	0.00223	11.	0.00247	12.	0.00260	13.	0.00210	14.	0.00261
15.	0.00444												

AVERAGE THICKNESS FROM 15 TESTS .00332
HEAT TREATMENT - AUSTENITIZED, OIL QUENCHED & TEMPERED (MIN 800 DEG F)

--DIMENSIONS PER ASME B18.2.6-2010

CHARACTERISTIC	#SAMPLES TESTED	MINIMUM	MAXIMUM
Width Across Corners	8	1.4030	1.4080
Grip Length	8	0.7700	0.8300
Head Height	8	0.4560	0.4820
Threads	8	PASS	PASS

ALL TESTS ARE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE METHODS PRESCRIBED IN THE APPLICABLE SAE AND ASTM SPECIFICATIONS. THE SAMPLES TESTED CONFORM TO THE SPECIFICATIONS AS DESCRIBED/LISTED ABOVE AND WERE MANUFACTURED FREE OF MERCURY CONTAMINATION. NO HEATS TO WHICH BISMUTH, SELENIUM, TELLURIUM, OR LEAD WAS INTENTIONALLY ADDED HAVE BEEN USED TO PRODUCE THE BOLTS.
THE STEEL WAS MELTED AND MANUFACTURED IN THE U.S.A. AND THE PRODUCT WAS MANUFACTURED AND TESTED IN THE U.S.A.
PRODUCT COMPLIES WITH DFARS 252.225-7014. WE CERTIFY THAT THIS DATA IS A TRUE REPRESENTATION OF INFORMATION PROVIDED BY THE MATERIAL SUPPLIER AND OUR TESTING LABORATORY. THIS CERTIFIED MATERIAL TEST REPORT RELATES ONLY TO THE ITEMS LISTED ON THIS DOCUMENT AND MAY NOT BE REPRODUCED EXCEPT IN FULL.

ACCREDITED

MECHANICAL FASTENER
CERTIFICATE NO. A2LA 0139.01
EXPIRATION DATE 12/31/13

NUCOR FASTENER
A DIVISION OF NUCOR CORPORATION

John W. Ferguson

JOHN W. FERGUSON
QUALITY ASSURANCE SUPERVISOR

28145

NUCOR
NUCOR CORPORATION
NUCOR STEEL NEBRASKA

2911 East Nucor Road
NORFOLK, NE 68701
(402) 644-0200
Fax: (402) 644-0329

Mill Certification

3/25/2013

Sold To: NUCOR FASTENER INDIANA
PO BOX 6100
6790 COUNTY RD 60
ST JOE, IN 46785-0000
(260) 337-1600
Fax: (435) 734-4581

Ship To: NUCOR FASTENER INDIANA
COUNTY RD 60
ST JOE, IN 46785-0000

Customer P.O.	136521	Sales Order	127462.0
Product Group	Special Bar Quality	Part Number	31B007850007770
Grade	1039ML1	Lot #	NF1310117211
Size	.7656-49/64 Round Coil	Heat #	NF13101172
Product	.7656-49/64 Round Coil 1039ML1	B.L. Number	N1-250495
Description	1039ML1	Load Number	N1-196441
Customer Spec		Customer Part #	005012

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: 3/24/2013 **Melt Date: 3/22/2013** **Qty Shipped LBS: 147,176** **Qty Shipped Pcs: 28**

C	Mn	V	Si	S	P	Cu	Cr	Ni	Mo	Al	Cb
0.42%	0.89%	0.003%	0.24%	0.015%	0.006%	0.08%	0.05%	0.04%	0.01%	0.003%	0.001%

Pb	Sn	Ca	B	Ti	N
0.000%	0.006%	0.0002%	0.0004%	0.004%	65 ppm

Reduction Ratio 95 :1

Specification Comments: Coarse Grain Practice

Selenium,Tellurium,Lead,Bismuth or Boron were not intentionally added to this heat.

1. All manufacturing processes of the steel materials in this product, including melting, have been performed in the United States.
2. All products produced are weld free.
3. Mercury, in any form, has not been used in the production or testing of this material.
4. Test conform to ASTM A29-12, ASTM E415 and ASTM E1019-resulphurized grades or applicable customer requirements.
5. All material melted at Nucor Steel Nebraska is produced in an Electric Arc Furnace
6. Strand Cast
7. ISO-17025 LAB accreditation cert. available upon request

Chemistry Verification Checks

Part# 5012 RM# 28145

	Checked By	Date
Receiving OK:	297	4-13-13
Certifications OK:	375	4-15-13

Jim Hill
Division Metallurgist

AZZ GALVANIZING-HAMILTON
7825 S. HOMESTEAD DRIVE
HAMILTON, IN 46742
TEL: (260) 488-4477
FAX: (260) 488-4499

NUCOR FASTENER
6730 CR 60
ST JOE. IN 46785

6-8-2013

MATERIAL CERTIFICATION

	Part #	Lot #
DESCRIPTION:		
1 BIN (162297) (326170A) 1-8 x 2 17 BINS (160577) (326002A) ¾-10 x 2 1/4		

P. O. #: 138812

GALVANIZIED WEIGHT#: 39,802

AZZ JOB #: 43512615

CERTIFICATION: AZZ GALVANIZING-HAMILTON CERTIFIES THAT SAMPLES REPRESENTING ABOVE LISTED LOT(S) HAVE BEEN TESTED AND INSPECTED AS REQUIRED BY APPLICABLE SPECIFICATIONS. THE RESULTS OF THIS INSPECTION AND TESTING DEMONSTRATES THAT THE REQUIREMENTS FOR ASTM F2329, INCLUDING THE REQUIREMENTS OF ASTM A153 THAT ARE REFERENCED WITHIN THIS SPECIFICATION, HAVE BEEN MET.

"THE GALVANIZING WAS PERFORMED IN THE U.S.A"

AVERAGE MIL THICKNESS: 3.50

ZINC BATH TEMP: 839 [+ OR - 5 AS CALIBRATED]

Maurice Cox
ISO Mgmt. Rep.

CFI JOB #6399

UNYTITE INC.
INNOVATIVE FASTENING SYSTEMS

Unytite, Inc.
One Unytite Drive
Peru, IL 61354
Tel 815-224-2221
Fax 815-224-3434

INSPECTION CERTIFICATE

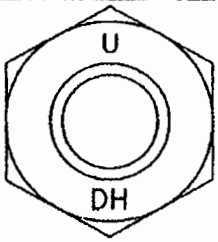
Job No: 17013 **Job Information** **Certified Date:** 12/3/13

Customer: **Ship To:**

Customer PO No: **Shipped Qty:**

Lot Number: 17013-M52134

Part Information



Part No: A563 3/4-10 +0.020 DH HHN HDG BLUE DYE

Name: ASTM A563 Heavy Hex Nut, Grade DH, Hot Dipped Galv, Blue Dye

Manufactured Quantity: 97,613 pcs

Applicable Specifications

Specification	Amend	Specification	Amend
ASME B1.1	2003	ASME B18.2.2	2005
ASME B18.2.6	2010	ASTM A563	2007
ASTM F2329	2011	ASTM F606	2011
ASTM F812/F812M	2012		

Test Results

Test No: 2781 **Test:** A563 DH Mechanical Properties

Description	Hardness (HRC)	Tempering (800 degree F Min)	Proof Load (Pass/Fail) (ASTM Min)	Shape & Dimension ASME B18.2.2	Thread Precision ASME B18.1.1	Visual ASTM F812
Sample Inspection	27.9	1,202	58,450	Pass	Pass	Pass

Certified Chemical Analysis

Heat No	Grade	Manufacturer	Origin	C	Mn	P	S	Si	Cr	Ni	Cu
M52134	1045	Gerdau Mac Steel	USA	0.4600	0.7600	0.016	0.030	0.2500	0.1500	0.0800	0.1700

Notes

All tests are in accordance with the latest revisions of the methods prescribed in the applicable SAE and ASTM Specifications. The samples tested conform the specifications as described/listed above and were manufactured free of mercury contamination. No heats to which Bismuth, Selenium, Tellurium, or Lead was intentionally added have been used to produce products. The steel was melted and manufactured in the U.S.A. and the product was manufactured and tested in the U.S.A. We certify that this data is true representation of information provided by the material supplier and our testing laboratory. This certified material test report relates only to the items listed on this document and may not be reproduced except in full.

OFFICIAL SEAL
JEAN MARGHERIO
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES:10/18/17

Savage, Dan - Supervisor, Quality

12/3/13
Date

GERDAU

GERDAU SPECIAL STEEL NORTH AMERICA
5591 MORRILL ROAD
JACKSON, MICHIGAN 49201

CERTIFIED MATERIAL TEST REPORT

CUSTOMER ORDER NUMBER	CUSTOMER PART NUMBER	HEAT NUMBER	WORK ORDER NUMBER	DATE
P004691-1	B1045SC10000	M52134	281699 201	11/19/13

Danieli Cast

REPORT TO	SHIP TO
UNYTITE, INC.	UNYTITE, INC.
ONE UNYTITE DRIVE	ONE UNYTITE DRIVE
PERU , IL 61354-9710	PERU , IL 61354

ORDERED

GRADE	SIZE	LENGTH
1045	1" RND	24' 10 1/2"

CUSTOMER SPECIFICATIONS

SAE 1045; ASTM E381-01; RMS 021 DATED 9/28/06

CHEMICAL ANALYSIS

C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Sn	Al
0.46	0.76	0.016	0.030	0.25	0.08	0.15	0.03	0.17	0.008	0.000

V	Nb
0.060	0.001

GRAIN SIZE SPECIFICATION ASTM E112 FINE GRAIN 5-8

MICROCLEANLINESS SPECIFICATION ASTM E45 METH A

	A		B		C		D	
	T	H	T	H	T	H	T	H
AVERAGE	1.0	0.1	0.9	0.1	0.5	0.2	1.1	0.5

MACROCLEANLINESS SPECIFICATION ASTM E381

PLATE I PLATE II

	S	R	C
FRONT	1	1	1
MIDDLE	1	1	1

We certify that these data are correct and in compliance with specified requirements.

Gerdau Monroe
3000 East Front Street
Monroe, MI 48161

Wendy J. Craig
Quality Assurance Representative

CONTINUED ON PAGE 2

GERDAU

GERDAU SPECIAL STEEL NORTH AMERICA
5591 MORRILL ROAD
JACKSON, MICHIGAN 49201

CERTIFIED MATERIAL TEST REPORT

CUSTOMER ORDER NUMBER	CUSTOMER PART NUMBER	HEAT NUMBER	WORK ORDER NUMBER	DATE
P004691-1	B1045SC10000	M52134	281699 201	11/19/13

Danieli Cast

REPORT TO	SHIP TO
UNYTITE, INC.	UNYTITE, INC.
ONE UNYTITE DRIVE	ONE UNYTITE DRIVE
PERU , IL 61354-9710	PERU , IL 61354

ORDERED

GRADE	SIZE	LENGTH
1045	1" RND	24' 10 1/2"

CUSTOMER SPECIFICATIONS

SAE 1045; ASTM E381-01; RMS 021 DATED 9/28/06

BACK	1	1	1	
AVERAGE	1	1	1	NONE

DECARB SPECIFICATION ASTM E1077

F TOTAL= 0.009

REDUCTION RATIO

RATIO= 45.8 TO 1.0

RESIDUAL MAX SPECIFICATION RMS 021

Ni+Cr = 0.2300

** MATERIAL 100% MELTED AND MANUFACTURED IN THE U.S.A. BY THE ELECTRIC ARC FURNACE AND CONTINUOUS CASTING METHOD. THE PRODUCT HAS NOT BEEN REPAIRED BY WELDING AND THIS MATERIAL HAS NOT BEEN EXPOSED TO MERCURY OR TO ANY OTHER METAL ALLOY THAT IS LIQUID AT AMBIENT TEMPERATURES DURING PROCESSING OR WHILE IN OUR POSSESSION.
GERDAU MONITORS ALL INCOMING SCRAP AND ALL HEATS OF STEEL TO ENSURE THAT PRODUCTS SHIPPED ARE FREE OF RADIOACTIVE MATERIAL.

We certify that these data are correct and in compliance with specified requirements.

Gerdau Monroe
3000 East Front Street
Monroe, MI 48161

Wendy J. Craig
Quality Assurance Representative

ROGERS BROTHERS INC.

HOT DIP
GALVANIZING

November 19, 2013

Unytite, Inc.
Unytite Quality Department
One Unytite Drive
Peru, IL 61354

To Whom It May Concern:

This is to certify that the hot dip galvanizing of the following material on your Purchase Order number 4851 conforms to specification ASTM A-153. The following sizes and lot numbers comply with the coating, workmanship, finish, and appearance requirements of ASTM F2329 specifications. The hot dip galvanizing is ROHS compliant. The galvanizing process was conducted in a temperature range of 830F to 850F.

92,936 Pieces	3/4"-10 A563 DH HHN	Lot#17013-M52134	5.28 Avg. Mils.
6,348 Pieces	1-1/2"-6 A563 DH HHN	Lot#16973-M50217	6.48 Avg. Mils.
3,305 Pieces	2"-4.5 A563 DH HHN	Lot#16382-M50967	5.91 Avg. Mils.

This certification in no way implies anything other than the quality of our hot dip galvanizing as it pertains to your order.

This product was galvanized in Rockford, IL USA

Yours very truly,

ROGERS BROTHERS INC.

Lorraine P Shelburne

Lorraine P. Shelburne
Vice President

LPS:pd

SUBSCRIBED AND SWORN
BEFORE ME THIS 19TH DAY
OF NOVEMBER 2013, AD

Judith A Ferolie
NOTARY PUBLIC

OFFICIAL SEAL
JUDITH A FEROLIE
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES 01/23/16

ROGERS BROTHERS, INC. 1925 KISHWAUKEE STREET, ROCKFORD, ILLINOIS 61104-5197 PHONE: 815/965-5132 FAX: 815/965-3765
E-MAIL: rogersbros@lds.net

CFI JOB #6399

Prestige Stamping, Inc.

23513 Groesbeck Highway
Warren, Michigan 48089
(586)773-2700 * Fax (586)773-2298
www.PrestigeStamping.com

PRODUCT CERTIFICATION

CERTIFICATION NUMBER

115458

THIS IS TO CERTIFY THE PRODUCT STATED BELOW WAS FABRICATED AND PROCESSED TO THE ORDER AS INDICATED AND CONFORMS TO THE APPLICABLE SPECIFICATIONS AND STANDARDS.

Customer: SLSB LLC
DBA ST LOUIS SCREW & BOLT
2000 ACCESS BLVD
MADISON, IL 62060

Customer Part: AAWG075
Prestige Part: P1480HP300
Part Name: 3/4"F436 H/DIP
Purchase Order: SL53126-3
Shipment BOL: B170417
Shipment ID: A0181039
Quantity: 57600
Manufacturers Marking: "P"

Steel Supplier: HORIZON STEEL CO.
Grade: CF436 GRADE STEEL
Lot: C7155D
Heat: 362948
Carbon: .24 (.21 - .93)
Manganese: 1.31 (.43 - 1.6)
Phosphorous: .003 (.03 Max.)
Sulfur: .001 (.05 Max.)
Silicon: .26

SPECIFICATIONS	TEST RESULTS
HARDNESS: TEST METHOD: ASTM E18 HRC 38 - 45 CHECK TO ASTM F606	HARDNESS: HRC 41 - 43
PLATING: TEST METHOD: ASTM B499 0.0017" Min. HOT DIP GALV TO ASTM F-2329	PLATING: 0.0020" - 0.0025"

Chemistry is as reported from raw material certification and does not fall under Prestige Stamping's accreditation.
This product was produced under an ISO/TS 16949 Quality Assurance System.
ISO/TS 16949 Certification No: 0002033.
Material was melted and manufactured in the U.S.A.
This product was manufactured in Warren, Michigan U.S.A.
This product conforms to all requirements for washers as produced according to A.S.T.M. F-436-10.
Sampling Plan per P.S.I W.I. # 5.4.18.018.
The test results only apply to the items tested.
This test report must not be reproduced except in full without prior written approval.
Materials used to manufacture these products are mercury, asbestos and radio activity free.
No weld repairs made to material.

FRANK SCHUBERT
Quality Assurance Manager

C7155

CERTIFIED TEST REPORT

*HORIZON STEEL
50390 UTICA DRIVE
SHELBY TWP., MICH. 48315
800-575-9914

6/24/13

TO:
PRESTIGE STAMPING
23513 GROESBECK HWY.
WARREN, MI 48090

SHIP TO:
PRESTIGE STAMPING, INC.
23513 GROESBECK HIGHWAY
WARREN, MI. 48090
586-773-2700

SIZE: .122 MIN X 5.50 X COIL
GRADE: HRPO F436 GRADE
MELTED & MFG IN USA

B/L Date 6/24/13 Bill/Ladng# 115757 Sales Ordr: 806974 01
Cust. P/O#: 21412-2 Part No.: ZZ5500122 FOR PT# P1480H00

Tag# 738282 01 Heat# 362948 MasterTag# 232716 01
C : .2400 Mn: 1.310 P : .0090 S : .0010 Al: .0400 Si: .2600
Ni: .0060 Mo: .0020 Cu: .0070 Va: .0010 Cr: .2450
Ca: .0010 N : .0040 Ti: .0010
Rock: 87 Olsn: 570

Tag# 738283 01 Heat# 362948 MasterTag# 232716 01
C : .2400 Mn: 1.310 P : .0090 S : .0010 Al: .0400 Si: .2600
Ni: .0060 Mo: .0020 Cu: .0070 Va: .0010 Cr: .2450
Ca: .0010 N : .0040 Ti: .0010
Rock: 87 Olsn: 570

Tag# 738284 01 Heat# 362948 MasterTag# 232716 01
C : .2400 Mn: 1.310 P : .0090 S : .0010 Al: .0400 Si: .2600
Ni: .0060 Mo: .0020 Cu: .0070 Va: .0010 Cr: .2450
Ca: .0010 N : .0040 Ti: .0010
Rock: 87 Olsn: 570

Tag# 738285 01 Heat# 362948 MasterTag# 232716 01
C : .2400 Mn: 1.310 P : .0090 S : .0010 Al: .0400 Si: .2600
Ni: .0060 Mo: .0020 Cu: .0070 Va: .0010 Cr: .2450
Ca: .0010 N : .0040 Ti: .0010
Rock: 87 Olsn: 570

Tag# 738286 01 Heat# 362948 MasterTag# 232716 01
C : .2400 Mn: 1.310 P : .0090 S : .0010 Al: .0400 Si: .2600
Ni: .0060 Mo: .0020 Cu: .0070 Va: .0010 Cr: .2450
Ca: .0010 N : .0040 Ti: .0010
Rock: 87 Olsn: 570

Tag# 738287 01 Heat# 362948 MasterTag# 232716 01
C : .2400 Mn: 1.310 P : .0090 S : .0010 Al: .0400 Si: .2600
Ni: .0060 Mo: .0020 Cu: .0070 Va: .0010 Cr: .2450
Ca: .0010 N : .0040 Ti: .0010
Rock: 87 Olsn: 570

WE HEREBY CERTIFY THE ABOVE IS CORRECT AS CONTAINED IN THE RECORDS OF THE

Continued...

CERTIFIED TEST REPORT

*HORIZON STEEL
50390 UTICA DRIVE
SHELBY TWP., MICH. 48315
800-875-9914

6/24/13

TO:
PRESTIGE STAMPING
23513 GROESBECK HWY.
WARREN, MI 48090

SHIP TO:
PRESTIGE STAMPING, INC.
23513 GROESBECK HIGHWAY
WARREN, MI. 48090
586-773-2700

SIZE: .122 MIN X 5.50 X COIL
GRADE: HRPO P436 GRADE
MELTED & MFG IN USA

B/L Date 6/24/13 Bill/Ladng# 115757 Sales Ordr: 800974 01
Cust. P/O#: 21412-2 Part No.: ZZ5500122 FOR PT# P1400H00
COMPANY

.....HORIZON STEEL CO.....
QUALITY ASSURANCE MANAGER

ArcelorMittal
Indiana Harbor
Flat Carbon
East Chicago, In 46312

ArcelorMittal

Horizon Steel Company
50390 Utica Dr.
Shelby Township, MI. 48315

Dear Jim,

June 21st, 2013

I have reviewed our records and have confirmed that the following coil was manufactured from a heat that was "melted/smelted" at the Indiana Harbor Facility.

The heat number and the relating coil are stated below:

- Heat number: 362948 Coil number 06902128

Heat Chemistries																	
C	Mn	P	S	Si	Cu	Sn	Ni	Cr	Mo	V	Al	Cb	B	Ti	N	Sb	Ca
0.2409	1.31	0.009	0.0015	0.209	0.0076	0.0003	0.0063	0.2451	0.002	0.0012	0.0402	0.0008	0.0001	0.0019	0.0049	0.0004	0.0018

Best regards

Thomas Godfroy
Manager -- Quality systems
Quality Assurance
T 219-399-5123
F 219-399-4798
Thomas.godfroy@arcelormittal.com

ROGERS BROTHERS INC.

HOT DIP GALVANIZING

November 6, 2013

Frank Schubert
Prestige Stamping
23513 Groesbeck Highway
Warren, MI 48089

To Whom It May Concern:

This certifies that the following product that we have galvanized for your company meets the specifications of ASTM A153, Class C and the hot dip galvanizing requirements of ASTM F2329.

The hot dip galvanizing is RoHS compliant. The galvanizing process was conducted in a temperature range of 830F to 850F.

This certification in no way implies anything other than the quality of our hot dip galvanizing as it pertains to your order.

This product was galvanized in Rockford, IL USA

37,372 pieces	P1480HP300	3/4" F436 Structural Washer	Lot#C7155	4.16 Avg. Mils
33,665 pieces	P1480HP300	3/4" F436 Structural Washer	Lot#C7155	4.65 Avg. Mils
12,063 pieces	P1480HP300	3/4" F436 Structural Washer	Lot#C7155	4.27 Avg. Mils

Yours very truly,

ROGERS BROTHERS INC.
Lorraine P Shelburne
Lorraine P. Shelburne
Vice President

LPS:pd

SUBSCRIBED AND SWORN
BEFORE ME THIS 6TH DAY
OF NOVEMBER 2013, AD

Judith A Ferolie
NOTARY PUBLIC

OFFICIAL SEAL
JUDITH A FEROLIE
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES:01/23/16

ROGERS BROTHERS, INC. 1925 KISHWAUKEE STREET, ROCKFORD, ILLINOIS 61104-5197 PHONE: 815/965-5132 FAX: 815/965-3765
E-MAIL: rogersbros@lds.net

APPENDIX B
Example of Incorrect Sample Documentation

Michigan Department Of Transportation 1923 (05/13)

SAMPLE IDENTIFICATION

Send sample to MDOT Construction Field Services
8885 Ricks Rd., Lansing, Michigan 48909
SEE INSTRUCTIONS BELOW

CONTROL SECTION 13033	
JOB NUMBER/PO NUMBER 103727	DATE SAMPLED
LAB NUMBER	DATE RECEIVED

LAB: ☐ Aggregate ☐ AWI ☐ Concrete ☐ HMA ☒ Metals ☐ Soils/ Geotextiles

NAME OF MATERIAL 3/4" High Strength Bolts, Nuts & Washers

SOURCE / SUPPLIER / PIT NAME 123 Bolts — ADDRESS / PIT NUMBER

MANUFACTURER / PRODUCER Nucor — ADDRESS

SAMPLED FROM Source

QUANTITY OF MATERIAL REPRESENTED BY SAMPLE

CONSIGNED TO — ADDRESS

SAMPLED BY	PHONE/EMAIL	TITLE
SUBMITTED BY [illegible]	PHONE/EMAIL 517-322-1330 [illegible]@michigan	TITLE ET II

INTENDED USE Bolts

SPECIFICATION Std. Spec. Book — SENDER'S SAMPLE I.D.

TYPE OF SAMPLE
☒ Acceptance ☐ Tested Stock ☐ Certification Verification # _____ ☐ New Source ☐ Information ☐ Q.A.

REMARKS

SEND RESULTS TO: Josh

INSTRUCTIONS

NOTE: This ID is the sole basis for identification and distribution of the report.
PLEASE BE ACCURATE

CONTROL SECTION
JOB NO. – As given or PURCHASE ORDER NO. – If applicable
NAME OF MATERIAL – As shown in Standard Specifications – include dimensions for bolts, schedule # for conduit, cement type, etc.
SOURCE – Contractor, supplier, producer, pit name, or location for naturally occurring materials
ADDRESS – Address of source (city & state or county)
SAMPLED FROM – Identifiable lot or batch number, and/or specific location, project site, source, etc.
QUANTITY REPRESENTED – Number of pieces, feet, square feet, pounds, gallons, etc.
CONSIGNED TO – If sampled at source other than project, state to whom and where the material is to be shipped
SAMPLED BY – Name and Title if different from submitter
INTENDED USE – State material's use in general terms (e.g., SS-1h, CRS-2M, CSS-1h, etc. for bolts; geosynthetics for select backfill, embankment, 3ft. granular blanket, etc.)
SPECIFICATION – Anchor Bolt, ASTM F1554, grade 55, 2012 Std. Spec. 908.14B
Aluminum, ASTM B221, 2012 Std. Spec. 919.02A
SENDERS SAMPLE ID – Lot, heat, roll, etc. number; sample dimensions; and any other details specific to the same (not sender's name)
REMARKS – State special tests to be run, if sample is rush or resample, and if results are to be phoned or emailed, state to whom (phone number or email)

APPENDIX C - Test Report Example

MDOT Michigan Department of Transportation

REPORT OF TEST

Metals Laboratory
Construction & Technology
8885 Ricks Rd.
Lansing, MI 48917

Control section :	**82195**
Job number :	**210217A**
Lab number :	**22M-0437**
Date :	**06/07/22**

RESULTS: Sample Tested Meets Specification Requirements

Material :	**HS bolts ASTM F3125 grade A325**		
Size :	**HS bolts .750" X 1.96 "**	Quantity represented :	227 pieces
Source :	[Supplier's Name]	Tag # :	016990
Sampled from :	Source	Date sampled :	05/27/22
Submitted by :	[Sampler's Name]	Date received :	05/31/22

Component	Lot Number	Heat Number	Product Markings	Manufacturer
Bolt	BG2217	10748570	SL A325 USA	St Louis Screw and Bolt
Nut	L581X1	20741230	LE DH USA	Fontana Fasteners
Washer	219376	219376	ws	Wrought Washer

Test	Result	Spec	Units
Visual inspection	Pass		
Bolt diameter	0.754	0.729 - 0.768	in
Bolt major thread diameter	0.738	0.735 - 0.768	in
Overall length	1.96		in
Thread pitch	10.0	10 - 10	tpi
Wedge/Axial tensile	47600	>=40100	lbf
Turn of nut	36500		lbf
Rotational capacity	Pass		

REMARKS:

Report approved by : Matt Filcek

Cc
[Send results to]

Generated: 06/08/2022