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for Large Structural Systems
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Mr. Joe Greenslade
IFI Director of Engineering

March 5, 2010

Re : Impact of die seams on bearing surfaces

Dear Mr. Greenslade:

I have reviewed the Test report "Die seams on bearing surface of structural bolt analysis Ref; B18.2.6 dated February 22, 2010".

I have examine all of the variables such as bolts with no seams vs. bolts with seams at both the minimum specified preload and at 2/3 turn of nut or bolt head rotation. The torque for A490 bolts turning the bolt vs turning the nut is generally higher for both cases at the minimum specified preload of 49kips when the seam is present. This does not seem to be the case for A325 bolts There differences are not significant.

At the higher loads associated with the 2/3 rotation of the bolt or nut there is not a significant difference for either the A325 or A490 bolts The seam or no seam condition is not a factor. The mean torque can go either way for these two conditions. The preload introduced at 2/3 turn of bolt or nut was very consistent for bolts with and without seams. It was 68 or 69kips for A490 bolts and 62kips for A325 bolts.

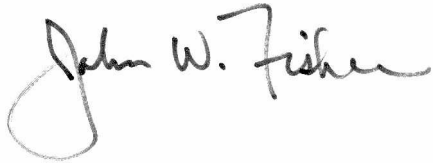
The variability provided by the standard deviations bounces back and forth between the no seam and seam conditions as well as between turning the bolt or turning the nut at both load levels.

Based on these tests results I do not see a significant difference in preload nor torque with or without the seams. In actual installation of bolts of this length, torque values would be established for a preload at least 5% greater than the minimum specified pretension if torque control is used to develop bolt tension Torque control provides the greatest variation in bolt tension and this is seen in the minimum preload results If turn of nut or bolt (TON or TOB) were used, a 1/3 turn would be applicable for these bolt grips. The resulting bolt preload would exceed the minimum specified tension by at least 25% on average. The differences are greater regardless of which element is turned. This is verified by the consistent levels of bolt preload that is provided by the 2/3 TON or TOB.

Hence I do not see any reason to consider the installation of bolts with or without seams to differ in achieving the desired preload thereby providing the desired slip resistance. The torque

variability is consistent with past studies. Seams are not a significant factor as demonstrated by this study.

Sincerely Yours

A handwritten signature in black ink that reads "John W. Fisher". The signature is written in a cursive style with a large, looping initial "J".

John W. Fisher

John W. Fisher

**Joseph T. Stuart Professor, Department of Civil and Environmental Engineering
Center for Advanced Technology for Large Structural Systems
Lehigh University
117 ATLSS Drive
Bethlehem, Pennsylvania 18015-4793
Tele. (610) 758-3535**

Education:

Ph.D. Civil Engineering, [Lehigh University](#), 1964
M.S. Civil Engineering, [Lehigh University](#), 1958
B.S. Civil Engineering, [Washington University](#), 1956

Teaching Areas:

Structural analysis and steel design
Advanced topics in steel structures
Design of fatigue and fracture resistant structures

Research and Scholarship Areas:

Structural connections
Fatigue behavior of welded components
Fracture analysis of steel structures
Behavior and performance of steel bridges

Significant Honors and Awards:

Presented the John Roebling Medal by The Engineer's Society of Western Pennsylvania, 1995
Awarded Frank P. Brown Medal by the Franklin Institute (1992); R.R. and E.C. Hillman Award (1992).
Elected Honorary Member, American Society of Civil Engineers (1989)
Elected Corresponding Member, Swiss Academy of Engineering Sciences (1989)
Named Engineer of the Year in Research by the Institute for Bridge Integrity and Safety (1989)
Joseph T. Stuart Professorship, Lehigh University (1988)
Dr. Honoris Causa from Swiss Federal Inst. of Tech., Lausanne, Switzerland (1988)
Construction's Man of the Year by Engineering News Record (1987)
Engineering Alumni Achievement Award by Washington Univ. (1987)
Elected member, National Academy of Engineering (1986)
Senior Visiting Scholar, Peoples Republic of China (1985)
Eleanor and Joseph Libsch Research Award (1985)
Civil College Eminent Overseas Speaker, Institution of Engineers, Australia (1983); Raymond C. Reese Research Prize, American Society of Civil Engineers (1981)
Engineer of the Year, Lehigh Valley Section PSPE (1980)

Professional Society Memberships:

[American Society of Civil Engineers](#) (Hon.)

International Association of Bridge and Structural Engineers

National Society of Professional Engineers; American Society for Engineering Education

American Welding Society; Transportation Research Board, NAS

Research Council on Structural Joints

American Railroad Engineering Association

[American Institute of Steel Construction](#)

NAE, Advisory Committee, PBS Revolutionary Roads

Consultation and Other External Professional Activities:

Editorial Board, J. Construct. Steel Res., Constrado and Granada Pub. Ltd., England

Specification Advisory Committee, American Institute of Steel Construction (1978-93)

CONRAIL

Connecticut DOT

Pennsylvania DOT

Modjeski and Masters

Wiss, Janney & Eilstner

HDR Engineers

Triborough Bridge and Tunnel Authority

Minnesota DOT, Bechtel Corp., Wilbur Smith Assoc; Michael Baker Inc; Weidlinger Assoc.

Representative Recent Publications:

"High-Performance Steels for America's Bridges," J.W. Fisher & R.J. Dexter, Welding Journal,

Presented at the Natl. Symposium on Steel Bridge Construction, AISC, Atlanta, GA, Nov. 11, 1993

"Construction Technologies in Japan," JTEC Panel Report, R.L. Tucker, J.W. Fisher, D.W. Halpin, R.

Nielsen, B.C. Paulson, Jr., G.H. Watson & R.T. Wright, Japanese Technology Evaluation Center,

Loyola College, MD, June 1991, NTIS Rep. #PB91-100057

"Guide to Design Criteria for Bolted and Riveted Joints," G.L. Kulak, J.W. Fisher & J.H.A. Struik, 2nd

Ed., John Wiley & Sons, New York, 1987, ISBN0-471-83791-1

"Corrosion and Its Influence on Strength of Steel Bridge Members," J.W. Fisher, B.T. Yen & D. Wang,

Transportation Research Record 1290, Vol. 1, March 1991

"Fatigue and Fracture of Steel Bridges," J.W. Fisher, Wiley Interscience 1984, ISBN0-471-80469-X

Test Report

Die Seam on Bearing Surface of Structural Bolt Analysis ref. B18.2.6

Background:

A proposal was made for die seams to be allowed on the bearing surface of structural bolts in a revision of ASME B18.2.6. The proposal was balloted and accepted without objection by the ASME B18 Committee Members. After the balloting concerns about the possible adverse affects occurring on the turn-of-nut installation practice and/or on the torque-tension relationship were presented to the B18 Committee.

It was determined that actual tests should be performed to determine if the concerns were valid and whether the revision should proceed as approved or be revised before publication. It was further agreed that to get a learned and unbiased opinion on the results that Professor Emeritus Dr. John Fisher of Lehigh University should review the test results and provide an professional opinion on how B18 should deal with this issue relative to the revision of B18.2.6.

The FASTENAL Company volunteered the services use of their engineering staff, their A2LA ISO 17025 Accredited Laboratory for performing the tests, and typical structural bolts, washers, and nuts for testing.

Test Samples, Hardware, and Procedures:

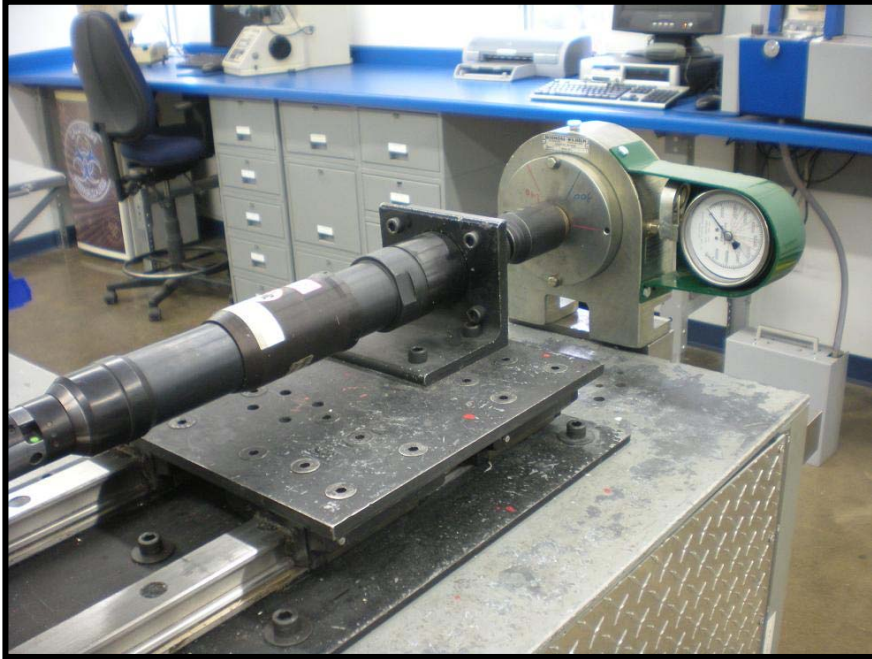
1. Test hardware:
 - a. 7/8-9 X 3 ½ ASTM A325 and ASTM A490 bolts made with and without die seams on the bearing surface.
 - b. 7/8-9 ASTM A194, 2H Heavy Hex Nuts
 - c. 7/8 ASTM F436 Washers
2. Test Equipment:
 - a. Certified 100 ton (200,000 lb.) Hydraulic Tensile Tester
 - b. Certified Skidmore Hydraulic Bolt Tester
 - c. Certified 1000 foot pound torque wrench
3. Test Procedures:
 - a. Perform 10 degree wedge tensile tests from each bolt lot to verify they are in compliance with the applicable material standard (3 pieces).
 - b. Perform a rotational capacity test as required in ASTM A325 and record the torque and tension at four defined positions (5 pieces):
 - i. Torque at "Snug tight" which was 4000 pounds tension on A325 bolts and 6000 pounds on A490 bolts.
 - ii. Torque at 39,000 pounds for A325 bolts and 49,000 pound for A490 bolts.
 - iii. Torque and tension at 240 degrees of rotation passed "snug tight"
 - iv. Torque and tension at 300 degrees of rotation passed "snug tight"

Testing Supervisor: Kevin Menke, M.E.

Test Data: Testing was concluded on February 17, 2010 and the data has been compiled by Mr. Menke and submitted to Dr. John Fischer, PhD, PE. For review and the rendering of an opinion on the whether or not die seams should be allowed on the bearing surfaces of structural bolts as specified in ASME B18.2.6.

February 22, 2010

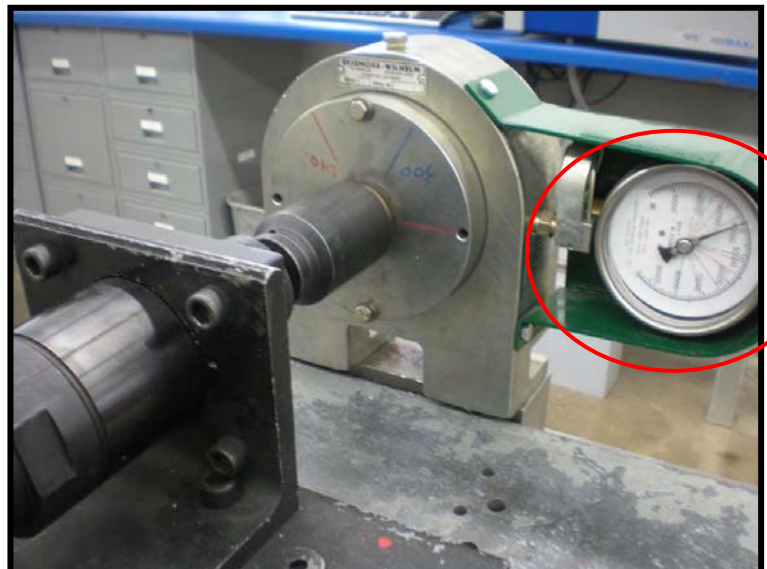
Torque – Tension and Rotational Capacity Testing Equipment



Testing Fixture



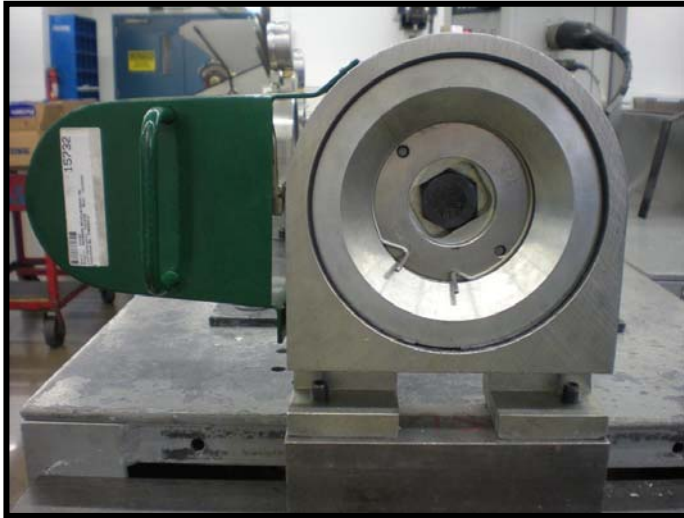
Recording Torque



Recording Tension



Retaining the Nut and Rotating the Bolt



Retaining the Bolt and Rotating the Nut

Summary of Test Data

Turning Bolt Analysis - die seam on bearing surface vs no seam									
Test Method	Five piece per test	1 Snug Tight		Torque at 49,000 lbs		2 - 240 Degrees		3 - 300 Degrees	
		Snug Tension (Min. 4000 lbs. for A325 & 5500 lbs. A490)	Snug Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)
No seam: Turning Bolt - 19585 (A490)	Average	6,000	100	49,000	589	68,000	812	69,000	821
	Std Dev		4		28		18		18
Seam: Turning Bolt - J10243 (A490)	Average	6,000	109	49,000	651	68,000	778	69,000	827
	Std Dev		3		18		45		17
No seam: Turning Bolt - 19257(A325)	Average	4,000	83	39,000	464	62,000	681	64,000	705
	Std Dev		2		15		34		27
No seam: Turning Bolt - 19554 (A325)	Average	4,000	81	39,000	481	62,000	728	64,000	749
	Std Dev		8		26		22		18
Seam: Turning Bolt - J10240 (A325)	Average	4,000	79	39,000	476	62,000	673	64,000	710
	Std Dev		7		34		19		18
Seam: Turning Bolt - J10241 (A325)	Average	4,000	90	39,000	488	62,000	731	64,000	772
	Std Dev		7		15		25		21

Turning Nut Analysis - die seam on bearing surface vs no seam									
Test Method	Five piece per test	1 Snug Tight		Torque at 49,000 lbs		2 - 240 Degrees		3 - 300 Degrees	
		Snug Tension (Min. 4000 lbs. for A325 & 5500 lbs. A490)	Snug Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)
No seam: Turning Nut - 19585 (A490)	Average	6,000	96	49,000	572	69,000	788	70,000	811
	Std Dev		2		15		13		5
Seam: Turning Nut - J10243 (A490)	Average	6,000	101	49,000	668	69,000	775	70,000	851
	Std Dev		11		35		72		40
No seam: Turning Nut - 19257(A325)	Average	4,000	84	39,000	483	62,000	679	64,000	710
	Std Dev		2		4		33		18
No seam: Turning Nut - 19554 (A325)	Average	4,000	70	39,000	499	62,000	723	64,000	742
	Std Dev		1		13		12		8
Seam: Turning Nut - J10240 (A325)	Average	4,000	87.0	39,000	523.1	62,000	681.7	64,000	704.0
	Std Dev		12.5		15.2		37.5		52.2
Seam: Turning Nut - J10241 (A325)	Average	4,000	89	39,000	494	62,000	710	64,000	752
	Std Dev		17		54		30		18



THE AMERICAN ASSOCIATION FOR
LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

FASTENAL COMPANY LABORATORY

Winona, MN

for technical competence in the field of

Mechanical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005*).

Presented this 2nd day of October 2008.

A handwritten signature in cursive script, reading "Peter Meyer".

President

For the Accreditation Council

Certificate Number 1046.01

Valid to September 30, 2010



For the tests or types of tests to which this accreditation applies,
please refer to the laboratory's Mechanical Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

FASTENAL COMPANY LABORATORY
1801 Theurer Boulevard
Winona, MN 55987
Brad Partington Phone: 507 453 8163

MECHANICAL

Valid To: September 30, 2010

Certificate Number: 1046.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following fastener tests on steel and stainless steel:

<u>Test</u>	<u>Test Methods</u>
Sampling	per product specification or ASME/ANSI B18.18.2M, B18.18.3M, B18.18.4M
Hardness (Rockwell: B, C, 30N)	ASTM A370, E18, F606, F606M; ISO 898-1, 898-2; NASM 1312-6; SAE J429, J995
Microhardness (Vickers)	ASTM E384
Tensile (axial, wedge, tension)	ASTM A370 (A3.2, 13.2.1), F606, F606M (3.4,3.5,3.6); DIN 267-11; ISO 898-1 (8.1,8.5); NASM 1312-8; SAE J429 (6.5,6.6); Mil Std FFS 85
Proof (internal/external threaded)	
Bolts	ASTM A370 (A3.2.1.2), F606M (3.2.3); ISO 898-1 (8.4); SAE J429 (6.4)
Nuts	ASTM A370 (A3.5.1), F606M (4.2); ISO 898-2 (8.1); SAE J995 (5.1)
Charpy Impact Strength	ASTM E23
Discontinuities (visual, MPT, LPT, NDT)	AMS 2644; ASTM A574, A574M, E709, F788, F788M, F812, F912, E1417, E1444; ISO 6157; SAE J122, J123; NAVSEA T9074-AS-GIB-01/271

<u>Test</u>	<u>Test Methods</u>
Stress durability (hydrogen embrittlement)	ASTM F606, F606M; SAE J81, J933; FIP 1000; ASME B18.6.4
Decarburization	ASTM A574, A574M, F835, F835M, F912, F912M; ISO 898-1, 898-5; SAE J121, J419
Salt Spray	ASTM B117
Torsional strength	SAE J78, J81, J933
Hex socket strength	ASTM F880, F880M, F912, F912M
Ductility (torsional)	SAE J78, J81; FIP 1000, ASME B18.6.4
Plating thickness	ASTM B568
Case depth	SAE J423, J78, J81, J933
Torque tension	IFI 101; SAE J174
Drill test	SAE J81, J933
Drill drive	SAE J78
Rotational capacity	ASTM A325
Optical emission/spectroscopy on alloy & stainless steel for: C, Mn, Si, S, Cr, P, Ni, Mo, Cu, V, Pb, Nb, Co, Ti, W, B	ASTM E415, E1086
XRF PMI Analyzer	Niton Alloy Analyzer User's Guide
Magnetic Permeability	ASTM A342 (Method 3)

Dimensional testing:

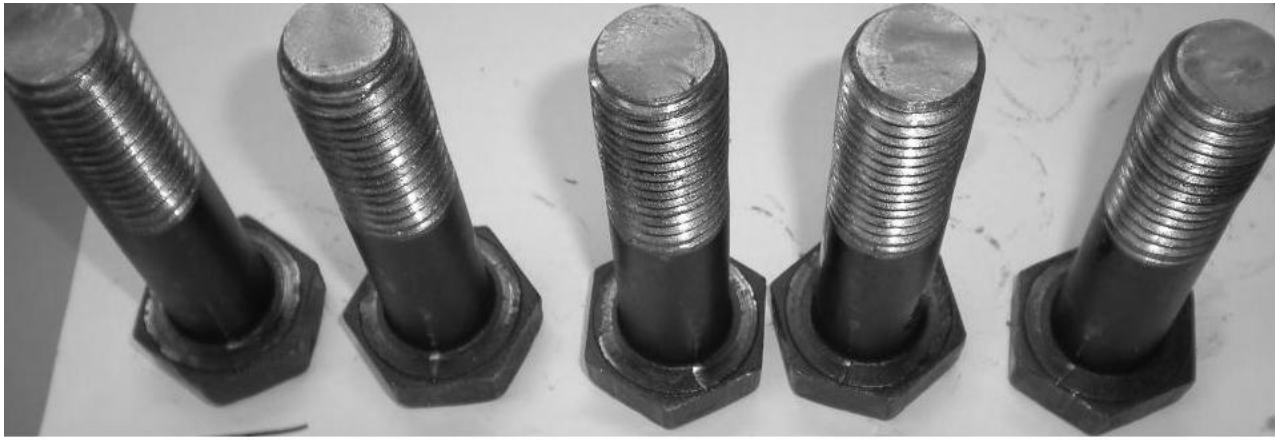
<u>Parameter</u>	<u>Measurement Technique</u>	<u>Range</u>	<u>Best Uncertainty* (±)</u>	<u>Standards</u>
Threads (Sys 21)	Rings, plugs	#4 to 1 $\frac{7}{8}$ in M4 to M24	0.0077 in 0.2 in	ANSI B1.1, B1.3
	Plug gages	($\frac{3}{8}$ to 2 $\frac{1}{2}$) in M3 to M22	0.011 in 0.22 in	ANSI B1.1
	Pitch micrometer	Up to 3 in	0.002 in	ANSI B1.1
Linear	Gage maker	Up to 24 in	0.0003 in	NAVAIR 17-MD20-39
	Outside micrometers	Up to 3 in (3 to 6) in	0.00034 in 0.0013 in	IFI 7 th Edition
	Calipers 6, 12, 60 in	Up to 60 in	0.001 in	IFI 7 th Edition
	Digital indicator	Up to 1 in	0.0004 in	ASME B18.2.1
	Pin gage	(0.011 to 1.00) in	0.0002 in	SAE J81
	Optical comparators	x axis: Up to 8 in y axis: Up to 4 in	0.0007 in 0.0016 in	IFI 7 th Edition IFI 7 th Edition
Angle	Optical comparators	(0 to 360)°	12'	IFI 7 th Edition
Radii	Optical comparators	Up to 0.675 in	0.01 in	IFI 7 th Edition
Recesses	Recess penetration	Up to 1 in	0.002 in	ASME B18.6.3, B18.6.4
Flat head	Protrusion gage	Up to 1 in	0.002 in	ASME B18.6.3, B18.6.4

* "Best Uncertainty" is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

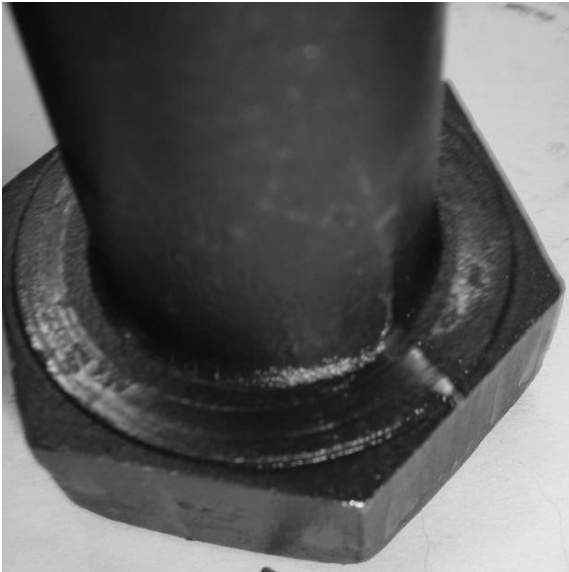
Bolts with Die Seam on Bearing Surface

Lot # J10240

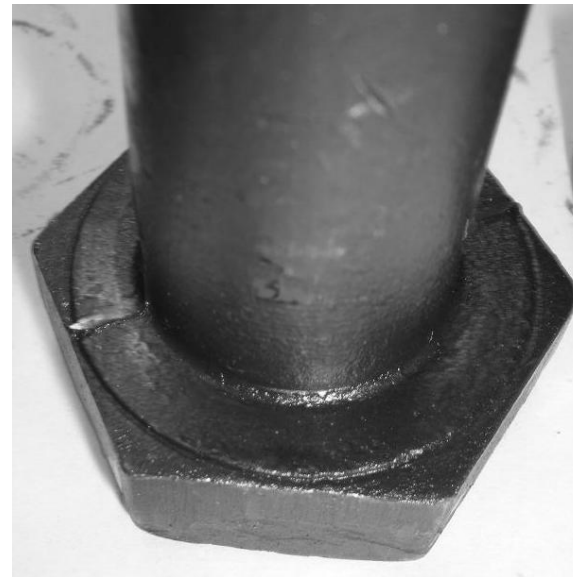
A325 Bolt Blank with Die Seam



J10240 – Torque by Head



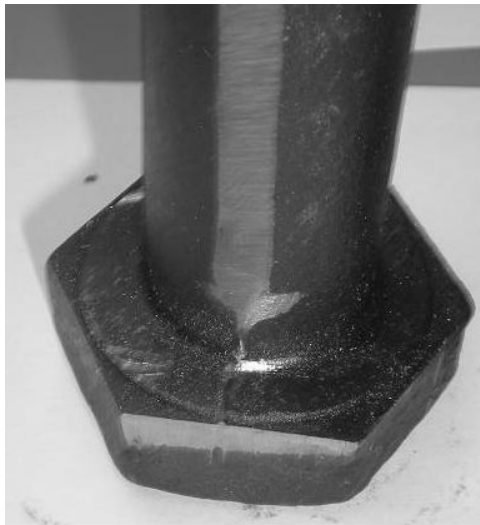
J10240 – Torque by Head



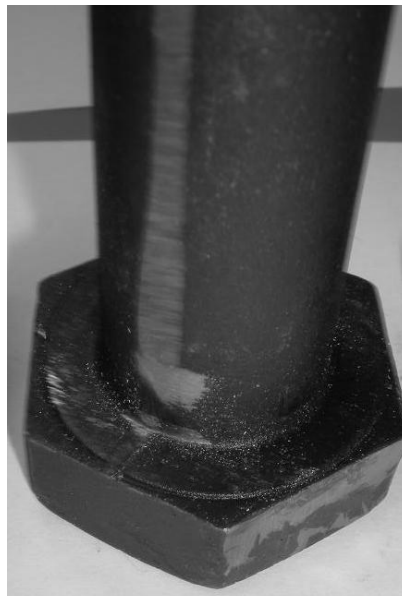
J10240 – Torque by Head



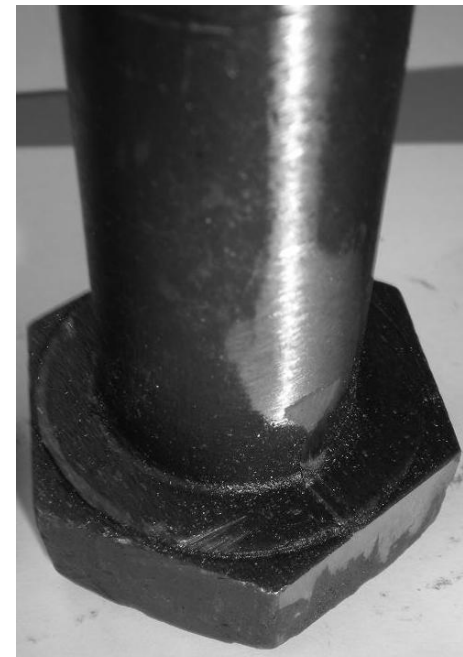
J10240 – Torque by Nut



J10240 – Torque by Nut



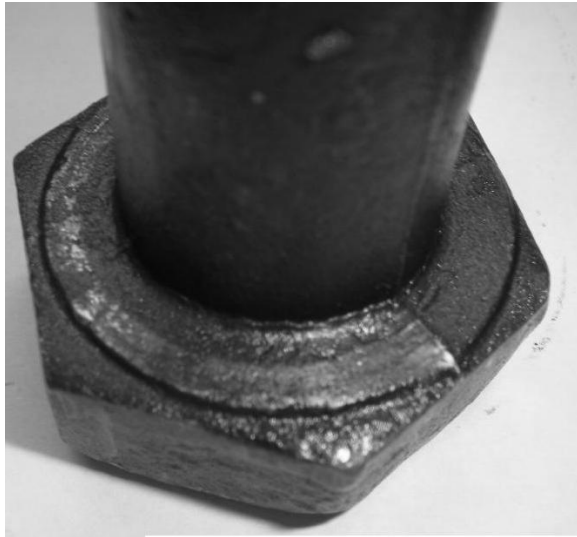
J10240 – Torque by Nut



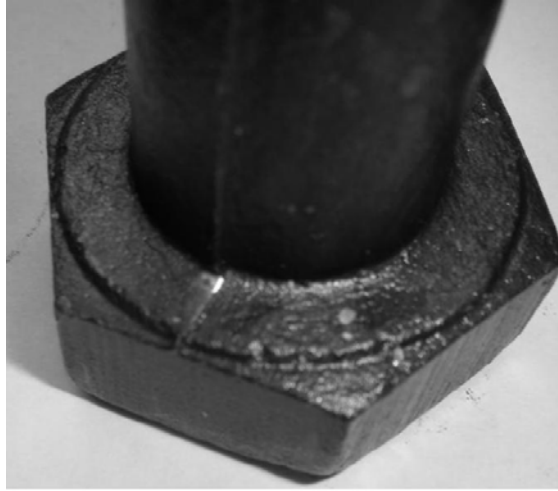
J10240 – Torque by Nut

Lot # J10241

A325 Bolt Blank with Die Seam



J10241 - Torque by Head



J10241 - Torque by Head



J10241 - Torque by Head



J10241 - Torque by Nut



J10241 - Torque by Nut

Lot # J10243

A490 Bolt Blank with Die Seam



J10243 – Torque by Head



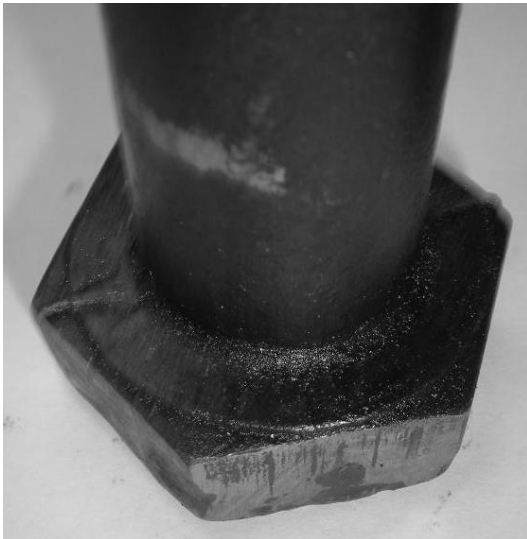
J10243 – Torque by Head



J10243 – Torque by Head



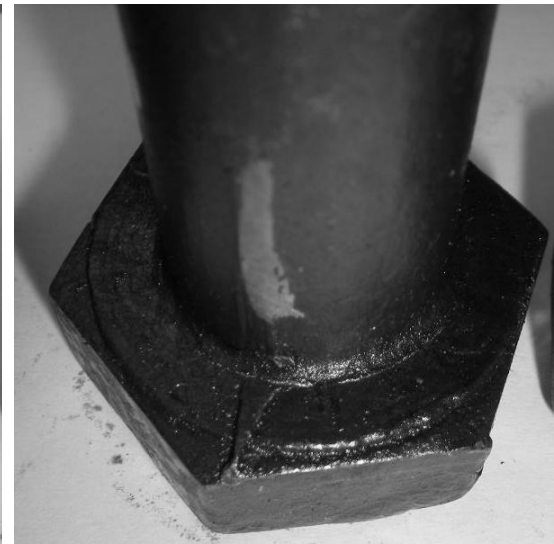
J10243 – Torque by Nut



J10243 – Torque by Nut



J10243 – Torque by Nut



J10243 – Torque by Nut

Dies seam on bearing surface - A325

7/8-9 x 3-1/2 - A325

Lot Number: **J10240**

10° Wedge

Tensile Strength

Sample

(PSI.)

1 136684

2 137790

3 136323

			1 Snug Tight		Torque at 39,000 lbs		2 - 240 Degrees		3 - 300 Degrees	
			Snug Tension (Min. 4000 lbs. for A325 & 5500 lbs. A490)	Snug Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)
4		Turning Nut	5000	81.2	39000	518.6	54000	709.3	59000	758.7
5			6000	100.1	39000	514.4	54000	645.1	55000	674.3
6			5000	70.1	39000	514.7	54000	714.5	57000	727.9
7			5000	85.1	39000	517.8	54000	702.6	57000	730.9
8			5000	98.4	39000	550.1	55000	636.9	58000	628.2
		Average		87.0		523.1		681.7		704.0
		Std Dev		12.5		15.2		37.5		52.2
9		Turning Bolt	5000	71.2	40000	474.4	54000	672.7	57000	700.6
10			5000	85.4	39000	482.9	56000	683.8	59000	720.9
11			5000	84.1	39000	434.5	56000	659.7	60000	711.9
12			5000	73.1	39000	461.8	55000	651.6	58000	686.2
13			5000	82.8	40000	526.3	54000	698.6	57000	731.2
		Average		79.3		476.0		673.3		710.2
		Std Dev		6.6		33.6		18.8		17.5

Washers used for the rotational capacity testing: ASTM F436 7/8-in diameter Fastenal Part Number 33121 - Fastenal Control Number 12004372

Heavy Hex Nuts used for the rotational capacity testing: ASTM A194 2H - Fastenal Part Number 36556 - Fastenal Control Number 110034569



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS

DATE: 12/15/09

Sales Order# S39872

The below listed Item(s) were manufactured from 7/8 X 1 1/2" WITH A LOT#
OR (HEAT#) Of 081709-36E. Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
7/8 X 3 1/2"	J10240	HX40	A325-1	15

Galvanizing: Hot Dip / Mechanical

Rachel Jones

CERTIFICATIONS

82La

ACCREDITED

This laboratory meets
the requirements of
ISO/IEC 9001:2008

Manufacturers of Quality Hot and Cold Headed Fastener Products and CNC Machining

4210 SHIRLEY LANE
ALSIP, IL 60803

(708) 597-8100

(800) 323-1547

Fax (708) 597-0423

e-mail: BBCFAST@AOL.COM

TEST REPORT

LOUIS SCREW & BOLT COMPANY
9 ACCESS BLVD.
DUNSON, ILLINOIS 62080-0280

AUGUST 24, 2009

PAGE 1 OF 1

MATERIAL AND TEST CERTIFICATE
DESCRIPTION OF MATERIAL AND SPECIFICATIONS

C Part Description:	QHH067N115038PLX, 7/8" X 1 1/2" HEAVY HEX STRUCTURAL BLANKS, A328-1, PLAIN FINISH, DOMESTIC
Customer Order No.	SL30312
Order No.	048087
Quantity	283 PARTS
Specification:	ASTM A328-2808
Shipping Date:	8/21/2009
Sample Plant:	ASTM F1470-2808

"Material was 100% tested and manufactured in the U.S.A."

CHEMICAL ANALYSIS

Dimension: .575"
Steel Type: 1045
Lot Number: M31872

C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Al	V
0.48	0.67	0.010	0.021	0.24	0.06	0.19	0.028	0.20	0.003	0.027

"Certification of chemical analysis as supplied by our steel supplier"

MECHANICAL PROPERTIES

	SAMPLE #1	SAMPLE #2	SAMPLE #3
Yield Strength: Lbf	80,400 Lbf	80,300 Lbf	80,700 Lbf
Tensile Load: Lbf	.0000/38,300 Lbf/10s	.0000/38,300 Lbf/10s	.0000/38,300 Lbf/10s
Rockwell Hardness:	28	28	28

TEST METHODS: ASTM F806-07 & ASTM E18-08

BBC LOT #: 081709-3GE

We hereby certify that the above test results are correct and that all the parts or material identified here were manufactured and inspected in accordance with applicable quality requirements. We also hereby certify that all parts or material conform to the applicable drawings, specifications, and conditions set forth on the purchase order.

Sworn and Subscribed before me this
24th Day of August, 2009.

David Gove
Quality Assurance

Margaret Ann Murray
Notary Public

THIS TEST REPORT CANNOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL FROM BBC FASTENERS, INC.

Tested By: BBC Fasteners AZLA Testing Laboratory Accreditation #0234-01, expires



GERDAU MACSTEELONE JACKSON SQUARE
SUITE 500
JACKSON, MICHIGAN 49201**CERTIFIED MATERIAL TEST REPORT**

CUSTOMER ORDER NUMBER	CUSTOMER PART NUMBER	HEAT NUMBER	WORK ORDER NUMBER	DATE
6942	X	M31872	225445 101	12/17/08

SHIP TO

REPORT TO
DAVE KRAUS
TURRET STEEL CORP.
LEETSDALE INDUSTRIAL PARK
FIRST STREET
P.O. BOX 55
LEETSDALE, PA 15056

TURRET STEEL
PICK UP AT MILL

MONROE, MI

ORDERED

GRADE	SIZE	LENGTH
1045	0.875" RND	20'
CUSTOMER SPECIFICATIONS		
TSI-100 (04/13/2007); ASTM A576-90B; FG		

CHEMICAL ANALYSIS

C	Mn	P	S	Si	Ni	Cr	Mg	Cu	Sn	Al
0.45	0.67	0.010	0.021	0.24	0.06	0.10	0.02	0.20	0.017	0.003
V	Nb									
0.027	0.002									

GRAIN SIZE SPECIFICATION ASTM E112 GRAIN SIZE 5-8

HARDNESS SPECIFICATION ASTM E10 AS ROLLED

AVERAGE
AVERAGE: 228.0 BHN

PHYSICALS SPECIFICATION ASTM A370/E8 AS ROLLED

000.0 IN

TENSILE (KSI)	YIELD (KSI)	% ELONGATION	REDUCTION OF AREA
107.3	69.9	14.0	30.0

PAGE 1

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

Gerda MacSteel Monroe
3000 East Front Street
Monroe, MI 48181

Chris Egan
Chris Egan

CONTINUED ON PAGE 2

GERDAU MACSTEELONE JACKSON SQUARE
SUITE 600
JACKSON, MICHIGAN 48201**CERTIFIED MATERIAL TEST REPORT**

CUSTOMER ORDER NUMBER	CUSTOMER PART NUMBER	HEAT NUMBER	WORK ORDER NUMBER	DATE
26942	X	M31872	225445 101	12/17/08

REPORT TO

DAVE KRAUS
TURRET STEEL CORP.
LEETSDALE INDUSTRIAL PARK
FIRST STREET
P.O. BOX 55
LEETSDALE, PA 15056

SHIP TO

TURRET STEEL
PICK UP AT MILL

MONROE, MI

ORDERED

GRADE	SIZE	LENGTH
1045	0.875" RND	20'

CUSTOMER SPECIFICATIONS

TSI-100 (04/13/2007); ASTM A576-90B; FG

DI CALCULATION SPECIFICATION CAT 1B0024

1.25

REDUCTION RATIO

RATIO= 59.9 TO 1.0

** 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. **

PAGE 2 OF 2

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

Gerdau MacSteel Monroe
3000 East Front Street
Monroe, MI 48161

Chris Ender
Chris Ender



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS

DATE: 12/15/09

Sales Order# S39872

The below listed Item(s) were manufactured from 7/8 X 14" WITH A LOT#
OR (HEAT#) OF 030511. Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
<u>7/8 X 3 1/2"</u>	<u>J10241</u>	<u>HXHD</u>	<u>A325-1</u>	<u>15</u>

Galvanizing: Hot Dip / Mechanical

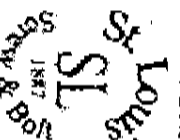
Rachel Jones

CERTIFICATIONS

LOT #: 030511 PG.1 OF 1

TEST REPORT

SLSR, LLC dba St. Louis Screen & Bolt
2000 Access Blvd
PO Box 260
Madison, IL 62060
PH: 866-137-7059
FAX: 314-389-7518



PRODUCTION INFORMATION:

PART:	SIZE:	LOT#:	DESCRIPTION:	ASTM SPEC:	MFG DATE:	FINISH:
AA808R409	7/8(9)UNC2AX14	030511	HHS	A325-1 07A	10/04/09	BLANK

CHEMISTRY FROM RAW MATERIAL SUPPLIER:

GRADE:	HEAT NO:	ASTM SPEC:	STEEL MTL SUPPLIER:
1045	907850	A29	KREHER

CHEMICAL CONTENTS

C	MN	P	S	SI	NI	CR	MO	CU	SN	AL	N
0.47	0.80	0.007	0.027	0.21	0.093	0.090	0.028	0.25	0.011	0.001	0.0112

MECHANICAL PROPERTIES:

PRODUCTION QTY	PCS SAMPLED	ISSUE DATE	SAMPLED BY	TESTED BY	ITEM	TEST METHOD	VISUAL INSPECTION PER	PCS SAMPLED	LOT PASSED
766	3	11/17/09	DH	DH	924244-01	ASTM F606-08	ASTM F788 35	3	PASSED
TENSILE STRENGTH									
WEDGE	10 DEGREE		LB.	65450	LB.	39300	PROOF LOAD TEST		
HARDNESS							HARDNESS		
SURFACE							CORE		
30							N/A		

SAMPLES									
1	2	3	4	5	6	7	8	9	AVG.
TENSILE LOAD	66300	66755	66060						66638
PROOF LOAD	.0002	.0003	.0003						.0003
HRC-SURF	31.0	29.9	30.0						30.
HRC-CORE									

The SLSR, LLC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA) for the testing of mechanical and chemical properties of steel. The testing of mechanical properties of steel is performed in accordance with ASTM A29, A325-1, A325-1M, A325-1H, A325-1H1, A325-1H2, A325-1H3, A325-1H4, A325-1H5, A325-1H6, A325-1H7, A325-1H8, A325-1H9, A325-1H10, A325-1H11, A325-1H12, A325-1H13, A325-1H14, A325-1H15, A325-1H16, A325-1H17, A325-1H18, A325-1H19, A325-1H20, A325-1H21, A325-1H22, A325-1H23, A325-1H24, A325-1H25, A325-1H26, A325-1H27, A325-1H28, A325-1H29, A325-1H30, A325-1H31, A325-1H32, A325-1H33, A325-1H34, A325-1H35, A325-1H36, A325-1H37, A325-1H38, A325-1H39, A325-1H40, A325-1H41, A325-1H42, A325-1H43, A325-1H44, A325-1H45, A325-1H46, A325-1H47, A325-1H48, A325-1H49, A325-1H50, A325-1H51, A325-1H52, A325-1H53, A325-1H54, A325-1H55, A325-1H56, A325-1H57, A325-1H58, A325-1H59, A325-1H60, A325-1H61, A325-1H62, A325-1H63, A325-1H64, A325-1H65, A325-1H66, A325-1H67, A325-1H68, A325-1H69, A325-1H70, A325-1H71, A325-1H72, A325-1H73, A325-1H74, A325-1H75, A325-1H76, A325-1H77, A325-1H78, A325-1H79, A325-1H80, A325-1H81, 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A325-1H830, A325-1H831, A325-1H832, A325-1H833, A325-1H834, A325-1H835, A325-1H836, A325-1H837, A325-1H838, A325-1H839, A325-1H840, A325-1H841, A325-1H842, A325-1H843, A325-1H844, A325-1H845, A325-1H846, A325-1H847, A325-1H848, A325-1H849, A325-1H850, A325-1H851, A325-1H852, A325-1H853, A325-1H854, A325-1H855, A325-1H856, A325-1H857, A325-1H858, A325-1H859, A325-1H860, A325-1H861, A325-1H862, A325-1H863, A325-1H864, A325-1H865, A325-1H866, A325-1H867, A325-1H868, A325-1H869, A325-1H870, A325-1H871, A325-1H872, A325-1H873, A325-1H874, A325-1H875, A325-1H876, A325-1H877, A325-1H878, A325-1H879, A325-1H880, A325-1H881, A325-1H882, A325-1H883, A325-1H884, A325-1H885, A325-1H886, A325-1H887, A325-1H888, A325-1H889, A325-1H890, A325-1H891, A325-1H892, A325-1H893, A325-1H894, A325-1H895, A325-1H896, A325-1H897, A325-1H898, A325-1H899, A325-1H900, A325-1H901, A325-1H902, A325-1H903, A325-1H904, A325-1H905, A325-1H906, A325-1H907, A325-1H908, A325-1H909, A325-1H910, A325-1H911, A325-1H912, A325-1H913, A325-1H914, A325-1H915, A325-1H916, A325-1H917, A32

FILED ROUNDS 10495BQ
 K 30"
 NO

I hereby certify that this data is correct as
 contained in the records of this company.
 I hereby certify that no mercury came in contact

with or so weld repair was done to this product
 while in our possession.
 Date:



CERTIFIED MILL TEST REPORT

Alcon Steel Test Lab
 #5 CUL Street
 Alton, IL 62002-9011
 (618) 463-4490 EXT 2486
 (618) 463-4491 (Fax)

BILL TO

Kroger Steel Company, LLC
 1550 North 15th Avenue
 Melrose Park, IL 60160

SHIP TO

Kroger Steel Company, LLC
 1550 North 15th Avenue
 Melrose Park, IL 60160

Date 07/09/2009
 ASI Ord No. 28662
 ASI Ord Line Item 1

Customer PO 19456
 Customer PT.

Specifications
 SAE 1045
 ASTM A 576-90b

Steel Description

Steel Bar, Hot Rolled, 0.8750, 20" 0"

Strand Cast, RR = 61.49:1

Heat Number

Yield PSI

Tensile PSI

% Elongation

% EOA

Hard Test

CHEMICAL ANALYSIS TEST METHODS ASTM E-415 & E-1019

Heat Number	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	Nb/Cb	V	B	Ti	N	Ca
907850	0.47	0.80	0.007	0.027	0.21	0.25	0.093	0.090	0.028	0.015	0.001	0.024	0.002	0.0002	0.0011	0.0112	0.0012

JOINTLY HARDENABILITY USING ASTM A-255 CALCULATED FROM CHEMICAL DC

Heat Number 05 01
 907850 7 1.42

SPECIAL TEST RESULTS

ADDITIONAL COMMENTS

Made and Manufactured in the USA.

No mercury, lead, cadmium, or other containing material or
 equipment is used or deliberately added in the production of this
 steel. No weld or weld repairs were performed on this material.
 This Steel is 100% Electric Arc Furnace Melted and Rolled in the
 U.S.A. Material qualifies as NAFTA origination.

Alteration or reproduction of this report, except in full, is not
 allowed without written approval by a representative of
 Alcon Steel Incorporated.

I hereby certify that the above tests are correct as contained
 in the records of ALCON STEEL INCORPORATED

Subscribed and sworn to before me, a Notary Public, in and for
 the county of Madison, State of Illinois

Quality Leader: Robert Cauley

this _____ Day of _____

My commission expires _____

(Notary Public)

R. Cauley

APPROVED

DATE 8/7/09 NAME *Oil*



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS

DATE: 12/15/09

Sales Order# S39872

The below listed Item(s) were manufactured from 7/8 x 8" WITH A LOT#
OR (HEAT#) OF 21256 .Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
7/8 x 3 1/2"	J10242	HXHD	A490-1	15

Galvanizing: Hot Dip / Mechanical

Rachel Jones

CERTIFICATIONS

GAFFNEY BOLT COMPANY
 100 MATERIAL AVENUE
 ROCKFORD, IL 61111

FASTENER TEST REPORT

DATE SHIPPED: March 16, 2009 **LOT NO:** 21258

CUSTOMER: SL8B, LLC

P.O. NO: SL17107 **QUANTITY:** 3502

DESCRIPTION: 7/8 X 8 A490-3 HVYHEX BLANK **HEAT NO:** 806722

HEAT CHEMICAL ANALYSIS

C	MN	P	S	SI	NI	CR
0.41	0.82	0.015	0.019	0.27	0.089	0.939
MO	CU	TI	V	CB	AL	SN
0.159	0.27	0.0022	0.005	0.027	0.003	0.012

MATERIAL: 4140 **ROCKWELL:** 35-36 34-35 35-36 34-35
 35-36 34-35 35-36 34-35

WGT PER INCH: 75,150 LBS 74,830 LBS **PROOFLOAD:** 55,450 LBS
 71,830 LBS 73,370 LBS

THREAD SET: .0001" .0001" **PASSED DECARBURIZATION & CARB TEST**
 .0001" .0002" **PASSED MAGNAFLUX TESTING**

PASSED VISUAL INSPECTION

ALL TESTS ARE IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE APPLICABLE SAE
 & ASTM SPECIFICATIONS. PRODUCT MEETS ANSI B18.2.6 DIMENSIONAL SPECIFICATION
 & THREADS MEET ANSI B1.1 CLASS 2A. WE CERTIFY THAT THIS DATA IS TRUE
 REPRESENTATION OF INFORMATION PROVIDED BY THE MATERIAL SUPPLIER AND OUR
 TESTING LABORATORY.

THESE PARTS WERE MANUFACTURED BY GAFFNEY BOLT COMPANY FROM STEEL MELTED AND
 MANUFACTURED IN THE USA.

GAFFNEY BOLT COMPANY
Rory P. Gaffney
 RORY P. GAFFNEY
 SECRETARY

Eklund Metal Treating Certification

Order No.: 1535

Date: 03/13/2009

Entry Date: 03/11/2009

Page: 1 of 1

affney Bolt, Inc.
O. Box 2053

Purchase Order No.: 15130

Packing List No.:

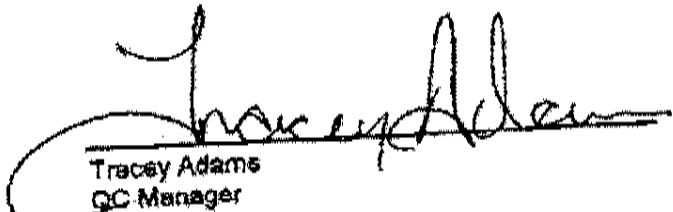
Material: 4140

Rockford IL 61130

We are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,685	7/8X8 HVY	1685

Insp. Type	Scale	Minimum	Maximum	Number	Other
Customer Requirements:					
HARDNESS	R/C	33.	36.		
Results:					
SURFACE	R/C	35.	36.		
CORE HRD	R/C	34.	35.		


Tracey Adams
QC Manager
Eklund Metal Treating

721 Beach Street Loves Park-Rockford IL 61111

Phone: (815) 877-7436

Fax: (815) 877-2759

Eklund Metal Treating Certification

Order No.: 1604

Date: 03/12/2009

Entry Date: 03/10/2009

Page: 1 of 1

2:
affney Bolt, Inc.
O. Box 2053

Purchase Order No.: 15128

Packing List No.:

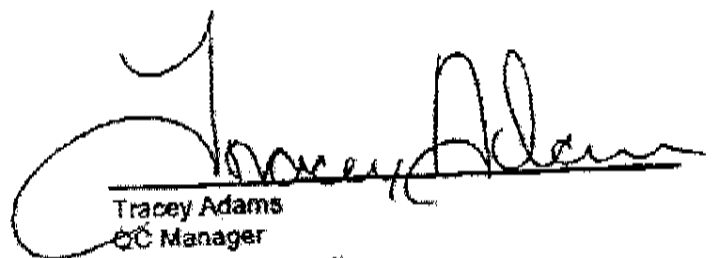
Material: 4140

ockford IL 61130

We are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,250	7/8X8 HVY HEX BLK	1250

Insp. Type	Scale	Minimum	Maximum	Number	Other
<u>Customer Requirements:</u>					
HARDNESS	R/C	33.	36.		
<u>Results:</u>					
SURFACE	R/C	35.	36.		
CORE HRD	R/C	34.	35.		


Tracey Adams
QC Manager
Eklund Metal Treating

721 Beacon Street Loves Park, Rockford IL 61111

Phone: (815) 877-7436

Fax: (815) 877-2759

Eklund Metal Treating Certification

Order No.: 1569

Date: 03/11/2009

Entry Date: 03/09/2009

Page: 1 of 1

ffney Bolt, Inc.
J. Box 2053

Purchase Order No.: 15125

Packing List No.:

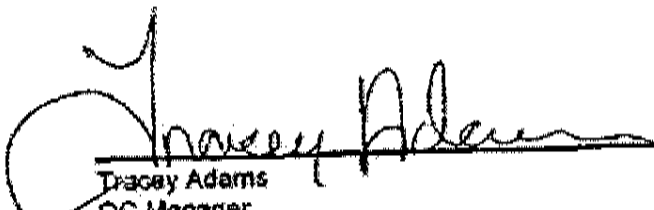
ckford IL 61130

Material: 4140

are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,550	7/8X8 HVY	1550

asp. Type	Scale	Minimum	Maximum	Number	Other
<u>Customer Requirements:</u>					
HARDNESS	R/C	33.	36.		
<u>Results:</u>					
SURFACE	R/C	35.	36.		
CORE HRD	R/C	34.	35.		


Tracey Adams
QC Manager
Eklund Metal Treating

Eklund Metal Treating Certification

Order No.: 1544

Date: 03/11/2009

Entry Date: 03/06/2009

Page: 1 of 1

Freney Bolt, Inc.
Box 2053

Purchase Order No.: 15124

Packing List No.:

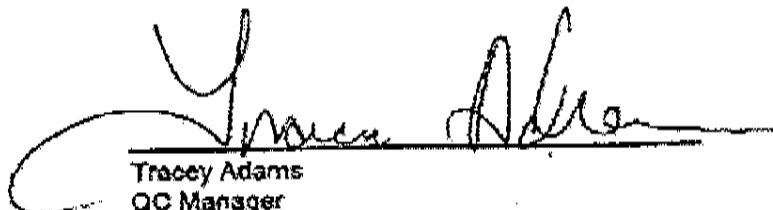
Rockford IL 61130

Material: 4140

We are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,190	7/8X8 HVY HEX	1190

Map. Type	Scale	Minimum	Maximum	Number	Other
Customer Requirements:					
Hardness	R/C	33.	36.		
Surface:					
SURFACE	R/C	35.	36.		
Core Hrd	R/C	34.	35.		


Tracey Adams
QC Manager
Eklund Metal Treating

721 Bescon Street Loves Park-Rockford IL 61111

Phone: (815) 877-7436

Fax: (815) 877-2769

Eklund Metal Treating Certification

21256

Order No.: 1665-1

Date: 03/13/2009

Entry Date: 03/13/2009

Page: 1 of 1

146
fney Bolt, Inc.
Box 2053

skford IL 61130

Purchase Order No.: 15138

Packing List No.:

Material: 4140

are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
50	7/8XB HVY HEX BLK	1685

p. Type Scale Minimum Maximum Number Other

Home Requirements:

GFLUX

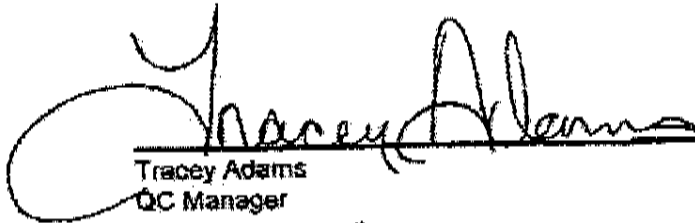
ults:

Process Steps

p: 1 Process: MAGNAFLUX Equipment #:

p: 2 Process: MAGNAFLUX Equipment #:

T BATH MAGNETIC PARTICLE INSPECTION. 1) GENERAL OPERATION AND TRAINING PER MIL-STD 401 PAR
3 AND 84.4. 2) SPECIFIC INSPECTION PER MIL-4-8868. THE ABOVE LISTED PARTS WERE FOUND TO BE
EE OF DEFECTS PER MIL-4-8868 INSPECTION PROCEDURES. (INCLUSIVE OF THE LONGITUDINAL FIELD
LY.)


Tracey Adams
QC Manager
Eklund Metal Treating

Phone: (815) 877-7436

Fax: (815) 877-2753

61111

Eklund Metal Treating Certification

24256

Order No.: 1644-1

Date: 03/13/2009

Entry Date: 03/12/2009

Page: 1 of 1

146
fney Bolt, Inc.
Box 2053

Purchase Order No.: 15133

Packing List No.:

Material: 4140

ckford IL 61130

are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,250	7/8X8 HVY HEX	1250

p. Type Scale Minimum Maximum Number Other

Customer Requirements:

MAGFLUX

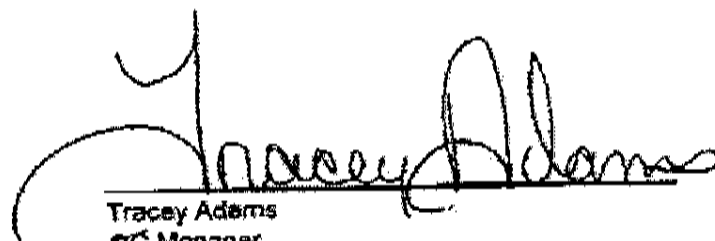
Notes:

Process Steps

Step 1 Process: MAGNAFLUX Equipment #:

Step 2 Process: MAGNAFLUX Equipment #:

ET BATH MAGNETIC PARTICLE INSPECTION. 1) GENERAL OPERATION AND TRAINING PER MIL-STD 401 PAR
3 AND B4.4. 2) SPECIFIC INSPECTION PER MIL-I-8888. THE ABOVE LISTED PARTS WERE FOUND TO BE
FREE OF DEFECTS PER MIL-I-8888 INSPECTION PROCEDURES. (INCLUSIVE OF THE LONGITUDINAL FIELD
TESTING.)


Tracey Adams
QC Manager
Eklund Metal Treating

Eklund Metal Treating Certification

21256

Order No.: 1627-1

Date: 03/12/2009

Entry Date: 03/11/2009

Page: 1 of 1

146
Mey Bolt, Inc.
Box 2053

Purchase Order No.: 15130

Packing List No.:

Material: 4140

Rockford IL 61130

We are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
100	7/8X8 HVY	1550

p. Type Scale Minimum Maximum Number Other

Customer Requirements:

MAGFLUX

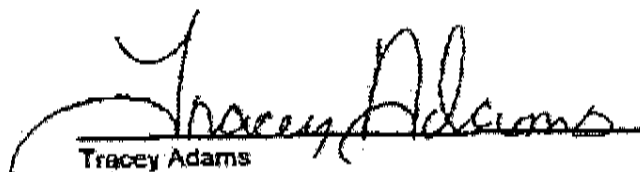
Results:

Process Steps

Step 1 Process: MAGNAFLUX Equipment #:

Step 2 Process: MAGNAFLUX Equipment #:

NET BATH MAGNETIC PARTICLE INSPECTION. 1) GENERAL OPERATION AND TRAINING PER MIL-STD 401 PAR 3 AND B4.4. 2) SPECIFIC INSPECTION PER MIL-I-6868. THE ABOVE LISTED PARTS WERE FOUND TO BE FREE OF DEFECTS PER MIL-I-6868 INSPECTION PROCEDURES. (INCLUSIVE OF THE LONGITUDINAL FIELD ONLY.)


Tracey Adams
QC Manager
Eklund Metal Treating

Eklund Metal Treating Certification

21256
Order No.: 1598-1
Date: 03/11/2009
Entry Date: 03/10/2009
Page: 1 of 1

148
fney Bolt, Inc.
Box 2053

Purchase Order No.: 15128
Packing List No.:
Material: 4140

ckford IL 61130

are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,190	7/8X8 HVY HEX BLK	1190

p. Type Scale Minimum Maximum Number Other

Customer Requirements:

MAGFLUX

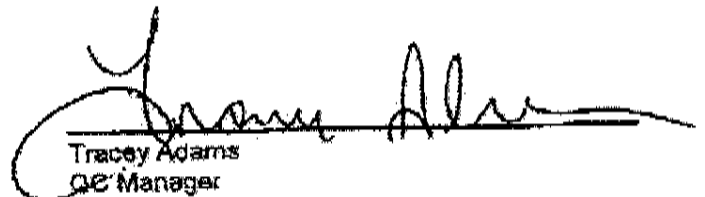
Results:

Process Steps

Step 1 Process: MAGNAFLUX Equipment #:

Step 2 Process: MAGNAFLUX Equipment #:

ET BATH MAGNETIC PARTICLE INSPECTION. 1) GENERAL OPERATION AND TRAINING PER MIL-STD 401 PAR
3 AND B4.4. 2) SPECIFIC INSPECTION PER MIL-I-8868. THE ABOVE LISTED PARTS WERE FOUND TO BE
FREE OF DEFECTS PER MIL-I-8868 INSPECTION PROCEDURES. (INCLUSIVE OF THE LONGITUDINAL FIELD
ILY.)


Tracey Adams
QC Manager
Eklund Metal Treating

Phone: (815) 877-7435

Fax: (815) 877-2758

Rockford, IL 61111



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS

DATE: 12/15/09

Sales Order# 539872

The below listed Item(s) were manufactured from 7/8 x 18" WITH A (LOT#)
OR (HEAT#) OF 029832 .Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
7/8 x 3'6"	J10244	HXHD	A490-1	15

Galvanizing: Hot Dip / Mechanical

Rachel Jones

CERTIFICATIONS

Steel Corporation

P.O. Box 318 Sand Springs, OK 74063

Certified Mill Test Report

Sold To:

ST. LOUIS SCREW & BOLT CO.

P.O. BOX 470037

ST. LOUIS, MO 63147

Attn: TRACY GUITTAR

Fax #: (314) 389-7510

Ship To:

ST. LOUIS SCREW & BOLT CO.

6900 NORTH BROADWAY

1-800-237-7059

ST. LOUIS, MO 63147

Fax #: (314) 389-7510

Ship Date:	Print Date:	Release No:	Mill Order No:	Customer Order:	BOL No:	Carrier:
06/07/2006	6/7/2006	M7449A	10-MO0028-000017-01	SL10798	74946	LOADS INC. AS BROKER
Product:	Grade:	Size:	Length:			
ROUND RS-STD	A325/T3/CA	0.8750"	20' 0"			

Grade Description: ASTM A325/T3/GA & A490/T3

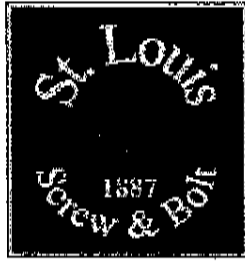
Heat	PCS / BDLs	Pounds
0627621	500	20440

Chemical Analysis:

Heat	C	Mn	P	S	Si	Cu	Cr	Mo	Ni
0627621	0.36	0.94	0.017	0.015	0.26	0.29	0.49	0.02	0.28

J. D. Calhoun
Quality Assurance Department

It is to certify that chemical and/or test results are a true copy of records contained in our company. Sheffield Steel Products are 100% melted and manufactured in the U.S.A. Material is produced Mercury Free and not repaired by welding.



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS

DATE: 12/15/09

Sales Order# S37872

The below listed Item(s) were manufactured from 7/8 X 15" WITH A (LOT#)
OR (HEAT#) Of 110405-10E .Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
<u>7/8 X 3 1/2"</u>	<u>010243</u>	<u>HXHD</u>	<u>A490-1</u>	<u>15</u>

Galvanizing: Hot Dip / Mechanical

Rachel Jones

CERTIFICATIONS

BBC FASTENERS, Inc.**a2La****ACCREDITED**This laboratory meets
the requirements of
ISO/IEC 9001:2008Manufacturers of Quality Hot and Cold Headed Fastener Products and CNC Machining
4210 SHIRLEY LANE
ALBANY, IL 60803

(708) 597-8100

(800) 323-1347

Fax (708) 597-0423

e-mail: BBCFAST@AOL.COM

REVISED TEST REPORT

NOVEMBER 28, 2006

ST. LOUIS SCREW & BOLT COMPANY
8900 NORTH BROADWAY
ST. LOUIS, MO. 63147

PAGE 1 of 1

**MATERIAL AND TEST CERTIFICATE
DESCRIPTION OF MATERIAL AND SPECIFICATIONS**

BBC Part Description:	2411087N160048PLD, 7/16" X 18" HEAVY HEX, A490, BLANK
Customer Order No.	SL10197
Invoice No.	037816
Quantity	263
Specification:	ASTM A490-04a
Shipping Date:	11/14/06
Sample Plan:	ASTM F1479-02

"Sample Lot - Magnetic Particle Inspected"

CHEMICAL ANALYSISDiameter: .875"
Steel Type: A047
Heat Number: 356839

C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Al	V
0.47	0.75	0.013	0.020	0.17	0.10	0.15	0.21	0.26	0.002	0.028

"Certification of chemical analysis as supplied by our steel supplier"

MECHANICAL PROPERTIES

	SAMPLE # 1	SAMPLE # 2
Tensile Strength: LBF	70,800 LBF	71,400 LBF
Proof Load: LBF	.000055,450/10s	.000105,450/10S
Mid-Radius Hardness:	36	34

TEST METHOD: ASTM F806-02a1 & ASTM E18-06a1

LOT #: 110405-1DE

We hereby certify that the above test results are correct and that all the parts or material identified have been manufactured and inspected in accordance with applicable quality requirements. We also hereby certify that all parts or material conform to the applicable drawings, specifications, and conditions set forth on the purchase order.

QA**APPROVED**DATE 12/1/06 NAME QA

Quality Assurance

THIS TEST REPORT CANNOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL FROM BBC FASTENERS, INC.

Tested By: BBC Fasteners A2LA Accreditation #0234-01, expires 8/31/2007

NORTH STAR STEEL MINNESOTA

P.O. Box 84148
1875 Red Rock Road
Saint Paul, Minnesota 55194

CERTIFIED TEST REPORT

Item #: 355530
Size: 7/8"
Product: Round Bar
Grade: A30478A
Date Replied: 10/22/02
P.O. # 22225
M.O.R.: 223612

CHEMICAL ANALYSIS (WT %)

C	Mn	P	S	Si	Sa	Cu	Ni	Cr	Mo	Cb	V	Co	Al	Ca	N
0.47	0.75	0.013	0.020	0.17	0.024	0.28	0.10	0.18	0.21	0.001	0.024		0.001	12	

MANUFACTURING PROCESSES FOR THIS STEEL, WHICH MAY INCLUDE SCRAP MELTED IN AN ELECTRIC ARC FURNACE AND HOT ROLLING, HAVE BEEN PERFORMED AT NORTH STAR STEEL MINNESOTA, 1875 RED ROCK ROAD, SAINT PAUL, MINNESOTA, USA. ALL PRODUCTS PRODUCED FROM STRAND CAST BILLETS. NO WELD REPAIRS WERE PERFORMED. STEEL NOT SUPPLIED TO MERCURY OR ANY OTHER ALLOY WHICH IS LOADED AT AMBIENT TEMPERATURES DURING PROCESSING OR WHILE IN NORTH STAR STEEL MINNESOTA POSSESSION.

JOINT TWO DIRECTION HARDENABILITY RESULTS (HRC)

J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12
31	32	33	34	35	36	37	38	39	40	41	42
30	31	32	33	34	35	36	37	38	39	40	41
31.3	31.4	31.5	31.6	31.7	31.8	31.9	32.0	32.1	32.2	32.3	32.4
27	28	29	30	31	32	33	34	35	36	37	38

Joint Hardened Per ASTM A 304-02

MECHANICAL TEST REPORT

SPECIMEN	YIELD (MPa)	TENSILE (MPa)	ELONG. (IN)	REDUC. AREA (%)	CHARPY (J)	TEMP. (°C)	TESTER
ASTM A 304-02							

Additional Specifications/Comments:

ASTM A 304-02
A304-96

Grain Size:	Reduction Ratio:	C.S. Per	AS Rolled Surface Hardness
FINE	60.3:1		Min HRC
Coding:	0.1 2.31 4.1	Min: 580.7 D-4 F.	Test 1: Test 2:

CHARPY IMPACT TEST

Temp (°F)	Test 1	Test 2
110 1		
110 2		
110 3		

The above results relate only to the items tested.

Chemical tests performed by subcontractors in accordance with ASTM standards.

Mechanical tests performed in accordance with ASTM E815 and E1019. All other tests performed in accordance with the requirements of applicable specifications unless otherwise noted above. We hereby certify that the above test results are representative of those noted in the records of the company.

Any modification to the certificate as provided by North Star Steel Minnesota without the expressed written consent of North Star Steel Minnesota negates the validity of this test report. This report shall not be reproduced except in full without the expressed written consent of North Star Steel Minnesota. North Star Steel Minnesota is not responsible for the liability of this material to meet specific applications.

SIGNED:

DATE: 10/29/2002

APPROVAL:

QA Approval

Peter E. Shaver

Peter Shaver

SWORN AND SUBSCRIBED TO BEFORE ME
THIS DAY

NOTARY PUBLIC:

THIS CERTIFICATE IS NOTARIZED ONLY WHEN REQUESTED.

Dies seam on bearing surface - A325

7/8-9 x 3-1/2 - A325

Lot Number: **J10241**

10° Wedge

Tensile Strength

Sample

	(PSI.)
1	137379
2	142249
3	136426

			1 Snug Tight		Torque at 39,000 lbs		2 - 240 Degrees		3 - 300 Degrees	
			Snug Tension (Min. 4000 lbs. for A325 & 5500 lbs. A490)	Snug Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)
4		Turning Nut	5000	99.7	39000	491.9	61000	720.6	63000	752.4
5			5000	67.8	39000	471.2	57000	707.3	64000	759.7
6			5000	88.4	39000	422.3	59000	659.9	65000	722.6
7			5000	77.4	39000	565.2	60000	738.3	64000	753.4
8			5000	109.4	39000	521.7	62000	723.2	63000	771.7
		Average		88.5		494.5		709.9		752.0
		Std Dev		16.7		53.6		30.0		18.1
9		Turning Bolt	5000	82.3	40000	477.8	58000	704.2	64000	744.1
10			5000	94.0	39000	479.1	59000	707.8	64000	772.3
11			5000	99.9	39000	509.8	59000	734.6	66000	801.2
12			5000	88.9	39000	473.7	61000	761.4	65000	762.2
13			5000	83.9	39000	497.2	58000	745.6	62000	778.6
		Average		89.8		487.5		730.7		771.7
		Std Dev		7.3		15.4		24.5		21.0

Washers used for the rotational capacity testing: ASTM F436 7/8-in diameter Fastenal Part Number 33121 - Fastenal Control Number 12004372

Heavy Hex Nuts used for the rotational capacity testing: ASTM A194 2H - Fastenal Part Number 36556 - Fastenal Control Number 110034569



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS

DATE: 12/15/09

Sales Order# S39872

The below listed Item(s) were manufactured from 7/8 X 14" WITH A LOT#
OR (HEAT#) OF 030511. Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
7/8 X 3 1/2"	J10241	HXHD	A325-1	15

Galvanizing: Hot Dip / Mechanical

Rachel Jones

CERTIFICATIONS

LOT #:

030511

PG. 1 OF 1

TEST REPORT

SLSB, LLC dba St. Louis Screen & Bolt
2000 Access Blvd
PO Box 260
Mundicon, IL 62060

PH: 860-237-7059
FAX: 314-388-7510

PRODUCTION INFORMATION:

PART#:	SIZE:	LOT#:	DESCRIPTION:	ASTM SPEC:	MFG DATE:	FINISH:
AAB088400	7/8(9)UNC2AX14	030511	HHS	A325-1 07A	10/01/09	BLANK

CHEMISTRY FROM RAW MATERIAL SUPPLIER:

GRADE: 1045	HEAT NO: 907850	ASTM SPEC: A29	STEEL MFG SUPPLIER: KREHER
-------------	-----------------	----------------	----------------------------

CHEMICAL CONTENTS

C	MN	P	S	Si	Ni	Cr	Mo	Cu	Sn	Al	N
0.47	0.80	0.007	0.027	0.21	0.093	0.090	0.028	0.25	0.011	0.001	0.0112

MECHANICAL PROPERTIES:

MECHANICAL PROPERTIES:

PRODUCTION QTY	PCS SAMPLED	ISSUE DATE	SAMPLE ID	TESTED BY	U.T. DWG	TEST METHODS	VISUAL INSPECTION PER	PCS SAMPLED	LOT PASSED
766	3	11/17/09	DH	DH	924244-01	ASTM F806-08	ASTM F776 35	3	PASSED
TENSILE STRENGTH									
WEDGE	LBS.		PROOF LOAD TEST				HARDNESS		
10 DEGREE	55450		LBS.				SURFACE		CORE
			39300				30		N/A

[illegible][illegible]

MANUFACTURERS ID HEAD MARKING: SL

Sign

Date: 11/17/09

AMENDED ☐

DATE: INITIAL:



OTHER Testing Cert 0696-Q1

OFFICIAL SEAL
MICHAEL JONES
History Public - Office of the

means or sites used have not had nor had the following materials intentionally added: bismuth, selenium, tellurium, or lead. A480 parts have passed EPA's breath testing and MAC



CERTIFIED MILL TEST REPORT

Alton Steel Test Lab
#5 CUL Street
Alton, IL 62002-9011
(618) 463-4490 EXT 2486
(618) 463-4491 (Fax)

BILL TO

Kraher Steel Company, LLC
1550 North 15th Avenue
Melrose Park, IL 60160

SHIP TO

Kraher Steel Company, LLC
1550 North 15th Avenue
Melrose Park, IL 60160

Date 07/09/2009
ASI Ord No. 28662
ASI Ord Line Item 1

Customer PO 19456
Customer PT

Specifications
SAE 1045
ASTM A 576-90b

Steel Description

Steel Bar, Hot Rolled, 0.8750, 20" 0"

Strand Cast, RR = 61.49:1

Heat Number

Yield PSI

Tensile PSI

% Elongation

% EOA

Band Test

CHEMICAL ANALYSIS TEST METHODS ASTM E-415 & E-1019

Heat Number	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	Nb/Cb	V	B	Ti	N	Ca
907850	0.47	0.80	0.007	0.027	0.21	0.25	0.093	0.090	0.028	0.015	0.001	0.024	0.002	0.0002	0.0011	0.0112	0.0012

JOINTLY HARDENABILITY USING ASTM A-255 CALCULATED FROM CHEMICAL DC

Heat Number 05 01
907850 7 1.42

SPECIAL TEST RESULTS

ADDITIONAL COMMENTS

Made and Manufactured in the USA.

No mercury, lead, cadmium, or other containing material or
equipment is used or deliberately added in the production of this
steel. No weld or weld repairs were performed on this material.
This Steel is 100% Electric Arc Furnace Melted and Rolled in the
U.S.A. Material qualifies as NAFTA origination.

Alteration or reproduction of this report, except in full, is not
allowed without written approval by a representative of
Alton Steel Incorporated.

I hereby certify that the above tests are correct as contained
in the records of ALTON STEEL INCORPORATED

Subscribed and sworn to before me, a Notary Public, in and for
the county of Madison, State of Illinois

Quality Leader: Robert Cauley

this _____ Day of _____

My commission expires _____

R. Cauley

(Notary Public)

APPROVED

DATE 8/7/09 NAME *Oil*



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

**CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS**

DATE: 12/15/09

Sales Order# S39872

The below listed Item(s) were manufactured from 7/8 x 8" WITH A LOT#
OR (HEAT#) OF 21256 .Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
7/8 x 3 1/2"	J10242	HXHD	A490-1	15

Galvanizing: Hot Dip / Mechanical

Rachel Jones

CERTIFICATIONS

GAFFNEY BOLT COMPANY
100 MATERIAL AVENUE
ROCKFORD, IL 61111

FASTENER TEST REPORT

DATE SHIPPED: March 16, 2009 **LOT NO:** 21258
CUSTOMER: SL8B, LLC
P.O. NO: SL17107 **QUANTITY:** 3502
DESCRIPTION: 7/8 X 8 A490-3 HVYHEX BLANK **HEAT NO:** 806722

HEAT CHEMICAL ANALYSIS

C 0.41	MN 0.82	P 0.015	S 0.019	SI 0.27	NI 0.089	CR 0.939
MO 0.159	CU 0.27	TI 0.0022	V 0.005	CB 0.027	AL 0.003	SN 0.012

MATERIAL: 4140 **ROCKWELL:** 35-38 34-35 35-36 34-35
35-38 34-35 35-36 34-35

TENSILE: 75,150 LBS 74,830 LBS **PROOFLOAD:** 55,450 LBS
71,830 LBS 73,370 LBS

TORQUE SET: .0001" .0001" **PASSED DECARBURIZATION & CARB TEST**
.0001" .0002" **PASSED MAGNAFLUX TESTING**

PASSED VISUAL INSPECTION

ALL TESTS ARE IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE APPLICABLE SAE
& ASTM SPECIFICATIONS. PRODUCT MEETS ANSI B18.2.6 DIMENSIONAL SPECIFICATION
& THREADS MEET ANSI B1.1 CLASS 2A. WE CERTIFY THAT THIS DATA IS TRUE
REPRESENTATION OF INFORMATION PROVIDED BY THE MATERIAL SUPPLIER AND OUR
TESTING LABORATORY.

THESE PARTS WERE MANUFACTURED BY GAFFNEY BOLT COMPANY FROM STEEL MELTED AND
MANUFACTURED IN THE USA.

GAFFNEY BOLT COMPANY
Rory P. Gaffney
RORY P. GAFFNEY
SECRETARY

Eklund Metal Treating Certification

Order No.: 1535

Date: 03/13/2009

Entry Date: 03/11/2009

Page: 1 of 1

affney Bolt, Inc.
O. Box 2053

Purchase Order No.: 15130

Packing List No.:

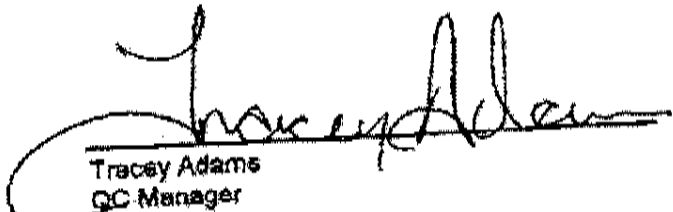
Material: 4140

ockford IL 61130

We are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,685	7/8X8 HVY	1685

Insp. Type	Scale	Minimum	Maximum	Number	Other
Customer Requirements:					
HARDNESS	R/C	33.	36.		
Results:					
SURFACE	R/C	35.	36.		
CORE HRD	R/C	34.	35.		


Tracey Adams
QC Manager
Eklund Metal Treating

721 Beach Street Loves Park-Rockford IL 61111

Phone: (815) 877-7436

Fax: (815) 877-2759

Eklund Metal Treating Certification

Order No.: 1604

Date: 03/12/2009

Entry Date: 03/10/2009

Page: 1 of 1

2:
affney Bolt, Inc.
O. Box 2053

Purchase Order No.: 15128

Packing List No.:

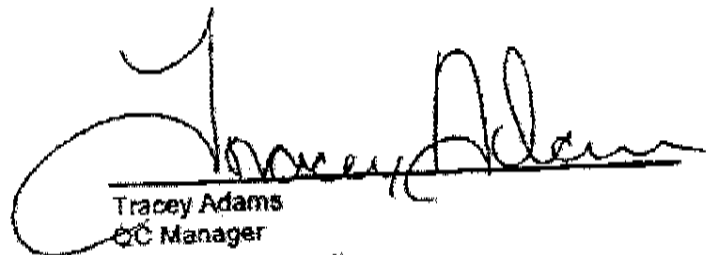
Material: 4140

ockford IL 61130

We are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,250	7/8X8 HVY HEX BLK	1250

Insp. Type	Scale	Minimum	Maximum	Number	Other
Customer Requirements:					
HARDNESS	R/C	33.	36.		
Results:					
SURFACE	R/C	35.	36.		
CORE HRD	R/C	34.	35.		


Tracey Adams
QC Manager
Eklund Metal Treating

721 Beacon Street Loves Park, Rockford IL 61111

Phone: (815) 877-7436

Fax: (815) 877-2759

Eklund Metal Treating Certification

Order No.: 1569

Date: 03/11/2009

Entry Date: 03/09/2009

Page: 1 of 1

ffney Bolt, Inc.
J. Box 2053

Purchase Order No.: 15125

Packing List No.:

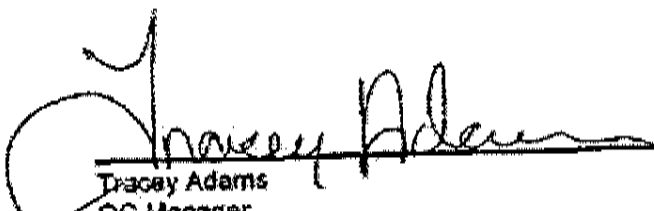
ckford IL 61130

Material: 4140

are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,550	7/8X8 HVY	1550

asp. Type	Scale	Minimum	Maximum	Number	Other
<u>Customer Requirements:</u>					
HARDNESS	R/C	33.	36.		
<u>Results:</u>					
SURFACE	R/C	35.	36.		
CORE HRD	R/C	34.	35.		


Tracey Adams
QC Manager
Eklund Metal Treating

Eklund Metal Treating Certification

Order No.: 1544

Date: 03/11/2009

Entry Date: 03/06/2009

Page: 1 of 1

Freney Bolt, Inc.
Box 2053

Purchase Order No.: 15124

Packing List No.:

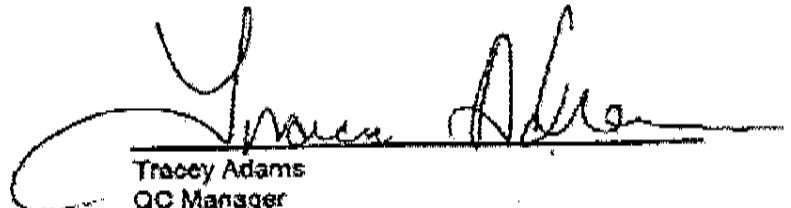
Rockford IL 61130

Material: 4140

We are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,190	7/8X8 HVY HEX	1190

Map. Type	Scale	Minimum	Maximum	Number	Other
<u>Customer Requirements:</u>					
Hardness	R/C	33.	36.		
<u>Surface:</u>					
SURFACE	R/C	35.	36.		
Core HRD	R/C	34.	35.		


Tracey Adams
QC Manager
Eklund Metal Treating

721 Bescon Street Loves Park-Rockford IL 61111

Phone: (815) 877-7436

Fax: (815) 877-2769

Eklund Metal Treating Certification

21256

Order No.: 1665-1

Date: 03/13/2009

Entry Date: 03/13/2009

Page: 1 of 1

146
fney Bolt, Inc.
Box 2053

skford IL 61130

Purchase Order No.: 15138

Packing List No.:

Material: 4140

are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
50	7/8X8 HVY HEX BLK	1685

p. Type Scale Minimum Maximum Number Other

Home Requirements:

GFLUX

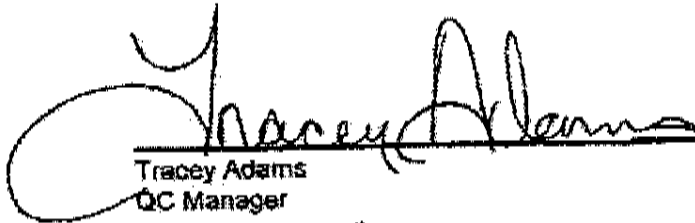
ults:

Process Steps

p: 1 Process: MAGNAFLUX Equipment #:

p: 2 Process: MAGNAFLUX Equipment #:

T BATH MAGNETIC PARTICLE INSPECTION. 1) GENERAL OPERATION AND TRAINING PER MIL-STD 401 PAR
3 AND 84.4. 2) SPECIFIC INSPECTION PER MIL-4-8868. THE ABOVE LISTED PARTS WERE FOUND TO BE
EE OF DEFECTS PER MIL-4-8868 INSPECTION PROCEDURES. (INCLUSIVE OF THE LONGITUDINAL FIELD
LY.)


Tracey Adams
QC Manager
Eklund Metal Treating

Phone: (815) 877-7436

Fax: (815) 877-2753

61111

Eklund Metal Treating Certification

24256

Order No.: 1644-1

Date: 03/13/2009

Entry Date: 03/12/2009

Page: 1 of 1

146
fney Bolt, Inc.
Box 2053

Purchase Order No.: 15133

Packing List No.:

Material: 4140

ckford IL 61130

are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,250	7/8X8 HVY HEX	1250

p. Type Scale Minimum Maximum Number Other

Customer Requirements:

MAGFLUX

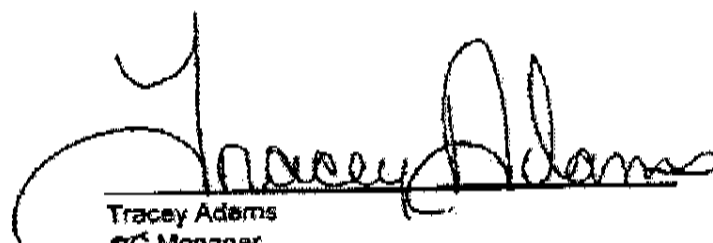
Notes:

Process Steps

Step 1 Process: MAGNAFLUX Equipment #:

Step 2 Process: MAGNAFLUX Equipment #:

ET BATH MAGNETIC PARTICLE INSPECTION. 1) GENERAL OPERATION AND TRAINING PER MIL-STD 401 PAR
3 AND B4.4. 2) SPECIFIC INSPECTION PER MIL-I-8838. THE ABOVE LISTED PARTS WERE FOUND TO BE
FREE OF DEFECTS PER MIL-I-8838 INSPECTION PROCEDURES. (INCLUSIVE OF THE LONGITUDINAL FIELD
TESTING.)


Tracey Adams
QC Manager
Eklund Metal Treating

Eklund Metal Treating Certification

Order No.: 1627-1

Date: 03/12/2009

Entry Date: 03/11/2009

Page: 1 of 1

146
Inney Bolt, Inc.
Box 2053

Purchase Order No.: 15130

Packing List No.:

Material: 4140

Rockford IL 61130

We are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
100	7/8X8 HVY	1550

p. Type	Scale	Minimum	Maximum	Number	Other
---------	-------	---------	---------	--------	-------

Customer Requirements:

MAGFLUX

Results:

Process Steps

Step 1 Process: MAGNAFLUX Equipment #:

Step 2 Process: MAGNAFLUX Equipment #:

NET BATH MAGNETIC PARTICLE INSPECTION. 1) GENERAL OPERATION AND TRAINING PER MIL-STD 401 PAR
3 AND B4.4. 2) SPECIFIC INSPECTION PER MIL-I-6868. THE ABOVE LISTED PARTS WERE FOUND TO BE
FREE OF DEFECTS PER MIL-I-6868 INSPECTION PROCEDURES. (INCLUSIVE OF THE LONGITUDINAL FIELD
ONLY.)

Tracey Adams

QC Manager

Eklund Metal Treating

Eklund Metal Treating Certification

21256
Order No.: 1598-1
Date: 03/11/2009
Entry Date: 03/10/2009
Page: 1 of 1

148
fney Bolt, Inc.
Box 2053

Purchase Order No.: 15128
Packing List No.:
Material: 4140

ckford IL 61130

are pleased to provide you with the following Certification

Quantity	Part Number / Part Name / Part Description	Pounds
1,190	7/8X8 HVY HEX BLK	1190

p. Type Scale Minimum Maximum Number Other

Customer Requirements:

MAGFLUX

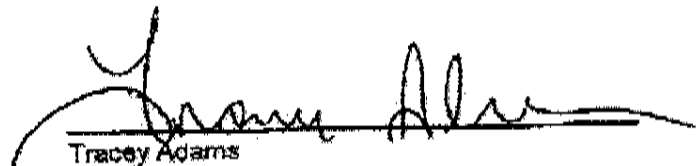
Results:

Process Steps

Step 1 Process: MAGNAFLUX Equipment #:

Step 2 Process: MAGNAFLUX Equipment #:

ET BATH MAGNETIC PARTICLE INSPECTION. 1) GENERAL OPERATION AND TRAINING PER MIL-STD 401 PAR
3 AND B4.4. 2) SPECIFIC INSPECTION PER MIL-I-8868. THE ABOVE LISTED PARTS WERE FOUND TO BE
FREE OF DEFECTS PER MIL-I-8868 INSPECTION PROCEDURES. (INCLUSIVE OF THE LONGITUDINAL FIELD
ILY.)


Tracey Adams
QC Manager
Eklund Metal Treating

Phone: (815) 877-7435

Fax: (815) 877-2758

Rockford, IL 61111



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS

DATE: 12/15/09

Sales Order# 539872

The below listed Item(s) were manufactured from 7/8 x 18" WITH A (LOT#)
OR (HEAT#) OF 029832 .Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
7/8 x 3'6"	J10244	HXHD	A490-1	15

Galvanizing: Hot Dip / Mechanical

Rachel Jones

CERTIFICATIONS

Steel Corporation

P.O. Box 318 Sand Springs, OK 74063

Certified Mill Test Report

Sold To:

ST. LOUIS SCREW & BOLT CO.

P.O. BOX 470037

ST. LOUIS, MO 63147

Attn: TRACY GUITTAR

Fax #: (314) 389-7510

Ship To:

ST. LOUIS SCREW & BOLT CO.

6900 NORTH BROADWAY

1-800-237-7059

ST. LOUIS, MO 63147

Fax #: (314) 389-7510

Ship Date:	Print Date:	Release No:	Mill Order No:	Customer Order:	BOL No:	Carrier:
06/07/2006	6/7/2006	M7449A	10-MO0028-000017-01	SL10798	74946	LOADS INC. AS BROKER
Product:	Grade:	Size:	Length:			
ROUND RS-STD	A325/T3/CA	0.8750"	20' 0"			

Grade Description: ASTM A325/T3/GA & A490/T3

Heat	PCS / BDLs	Pounds
0627621	500	20440

Chemical Analysis:

Heat	C	Mn	P	S	Si	Cu	Cr	Mo	Ni
0627621	0.36	0.94	0.017	0.015	0.26	0.29	0.49	0.02	0.28

J. D. Calhoun
Quality Assurance Department

It is to certify that chemical and/or test results are a true copy of records contained in our company. Sheffield Steel Products are 100% melted and manufactured in the U.S.A. Material is produced Mercury Free and not repaired by welding.



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS

DATE: 12/15/09

Sales Order# S37872

The below listed Item(s) were manufactured from 7/8 X 15" WITH A (LOT#)
OR (HEAT#) Of 110405-10E .Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
<u>7/8 X 3 1/2"</u>	<u>010243</u>	<u>HXHD</u>	<u>A490-1</u>	<u>15</u>

Galvanizing: Hot Dip / Mechanical

Rachel Jones

CERTIFICATIONS

BBC FASTENERS, Inc.**a2La****ACCREDITED**This laboratory meets
the requirements of
ISO/IEC 9001:2008Manufacturers of Quality Hot and Cold Headed Fastener Products and CNC Machining
4210 SHIRLEY LANE
ALBANY, IL 60803

(708) 597-8100

(800) 323-1347

Fax (708) 597-0423

e-mail: BBCFAST@AOL.COM

REVISED TEST REPORT

NOVEMBER 28, 2006

ST. LOUIS SCREW & BOLT COMPANY
8900 NORTH BROADWAY
ST. LOUIS, MO. 63147

PAGE 1 of 1

MATERIAL AND TEST CERTIFICATE
DESCRIPTION OF MATERIAL AND SPECIFICATIONS

BBC Part Description:	2411087N160048PLD, 7/16" X 18" HEAVY HEX, A490, BLANK
Customer Order No.	SL10197
Invoice No.	037816
Quantity	263
Specification:	ASTM A490-04a
Shipping Date:	11/14/06
Sample Plan:	ASTM F1479-02

"Sample Lot - Magnetic Particle Inspected"

CHEMICAL ANALYSISDiameter: .875"
Steel Type: A490
Heat Number: 550839

C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Al	V
0.47	0.75	0.013	0.020	0.17	0.10	0.15	0.21	0.26	0.002	0.028

"Certification of chemical analysis as supplied by our steel supplier"

MECHANICAL PROPERTIES

	SAMPLE # 1	SAMPLE # 2
Tensile Strength: LBF	70,800 LBF	71,400 LBF
Proof Load: LBF	.000055,450/10s	.000105,450/10S
Mid-Radius Hardness:	36	34

TEST METHOD: ASTM F806-02a1 & ASTM E18-06a1

LOT #: 110405-1DE

We hereby certify that the above test results are correct and that all the parts or material identified have been manufactured and inspected in accordance with applicable quality requirements. We also hereby certify that all parts or material conform to the applicable drawings, specifications, and conditions set forth on the purchase order.

QA**APPROVED**DATE 12/1/06NAME QA

Quality Assurance

THIS TEST REPORT CANNOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL FROM BBC FASTENERS, INC.

Tested By: BBC Fasteners A2LA Accreditation #0234-01, expires 8/31/2007

NORTH STAR STEEL MINNESOTA

P.O. Box 84148
1875 Red Rock Road
Saint Paul, Minnesota 55194

CERTIFIED TEST REPORT

Item #: 355530
Size: 7/8"
Product: Round Bar
Grade: A30478A
Date Replied: 10/22/02
P.O. # 22225
M.O.#: 223612

CHEMICAL ANALYSIS (WT %)

C	Mn	P	S	Si	Sn	Cu	Ni	Cr	Mo	Cb	V	Co	Al	Ca	N
0.47	0.75	0.013	0.020	0.17	0.024	0.28	0.10	0.18	0.21	0.001	0.024		0.001	12	

MANUFACTURING PROCESSES FOR THIS STEEL, WHICH MAY INCLUDE SCRAP MELTED IN AN ELECTRIC ARC FURNACE AND HOT ROLLING, HAVE BEEN PERFORMED AT NORTH STAR STEEL MINNESOTA, 1875 RED ROCK ROAD, SAINT PAUL, MINNESOTA, USA. ALL PRODUCTS PRODUCED FROM STRAND CAST BILLETS. NO WELD REPAIRS WERE PERFORMED. STEEL NOT SUPPLIED TO MERCURY OR ANY OTHER ALLOY WHICH IS LOADED AT AMBIENT TEMPERATURES DURING PROCESSING OR WHILE IN NORTH STAR STEEL MINNESOTA POSSESSION.

JOINT TWO DIRECTION HARDENABILITY RESULTS (HRC)

J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12
60	56	54	49	43	37	28	24	33	31		29
J13	J14	J15	J16	J17	J18	J19	J20	J21	J22	J23	J24
27	27	28	28	28	28	28	22	21			20

Joint Hardened Per ASTM A 304-02

MECHANICAL TEST REPORT

SPECIMEN	YIELD (MPa)	TENSILE (MPa)	ELONG. (IN)	REDU. (IN)	GAUGE LENGTH (IN)	END	%	SPECIFICATION
ASTM A 304-02								GRADE

Additional Specifications/Comments:

A304-01 1995
A304-96

Grain Size:	Reduction Ratio:	C.S. Per	AS Rolled Surface Hardness
FINE	60.3:1		Min HRC
Coding:	0.1 2.31 14	Min: 580.7 D-4 F.	Test 1: Test 2:

CHARPY IMPACT TEST

Temp (F)	Test 1	Test 2
110 1		
110 2		
110 3		

The above results relate only to the items tested.

Chemical tests performed by subcontractors in accordance with ASTM standards.

Mechanical tests performed in accordance with ASTM E415 and E1019. All other tests performed in accordance with the requirements of applicable specifications unless otherwise noted above. We hereby certify that the above test results are representative of those noted in the records of the company.

Any modification to the certificate as provided by North Star Steel Minnesota without the expressed written consent of North Star Steel Minnesota negates the validity of this test report. This report shall not be reproduced except in full without the expressed written consent of North Star Steel Minnesota. North Star Steel Minnesota is not responsible for the quality of the material in most specific applications.

SIGNED:

DATE: 10/29/2002

APPROVAL:

QA Approval

Peter E. Sharpe

Peter Sharpe

SWORN AND SUBSCRIBED TO BEFORE ME
THIS DAY

NOTARY PUBLIC:

THIS CERTIFICATE IS NOTARIZED ONLY WHEN REQUESTED.

Dies seam on bearing surface - A490

7/8-9 x 3-1/2 - A490

Lot Number: **J10243**

10° Wedge
Tensile Strength
(PSI.)

Sample
1 155326
2 158225
3 157526

			1 Snug Tight		Torque at 49,000 lbs		2 - 240 Degrees		3 - 300 Degrees	
			Snug Tension (Min. 4000 lbs. for A325 & 5500 lbs. A490)	Snug Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)
4		Turning Nut	6000	111.6	49000	660.2	66000	877.4	69000	919.0
5			6000	89.8	49000	626.0	57000	678.2	67000	843.2
6			6000	110.1	49000	720.1	69000	757.3	69000	813.2
7			6000	90.1	49000	679.5	68000	768.0	70000	839.0
8			6000	104.2	49000	654.1	70000	795.9	73000	839.9
		Average		101.2		668.0		775.4		850.9
		Std Dev		10.6		34.9		71.9		39.9
9		Turning Bolt	6000	107.6	49000	626.7	67000	751.3	70000	807.2
10			6000	113.7	49000	663.2	68000	783.6	71000	817.2
11			6000	107.8	49000	661.7	61000	715.6	69000	819.7
12			6000	110.5	49000	636.5	71000	825.5	74000	848.0
13			6000	105.5	49000	666.5	71000	812.8	73000	841.1
		Average		109.0		650.9		777.8		826.6
		Std Dev		3.2		18.1		45.0		17.2

Washers used for the rotational capacity testing: ASTM F436 7/8-in diameter Fastenal Part Number 33121 - Fastenal Control Number 12004372

Heavy Hex Nuts used for the rotational capacity testing: ASTM A194 2H - Fastenal Part Number 36556 - Fastenal Control Number 110034569



SLSB LLC dba
St. Louis Screw & Bolt
2000 Access Blvd.
Madison, IL 62060

CERTIFICATE OF CONFORMANCE FOR PARTS MANUFACTURED FROM RAW
MATERIAL (OR) BLANKS

DATE: 12/15/09

Sales Order# S37872

The below listed Item(s) were manufactured from 7/8 X 15" WITH A (LOT#)
OR (HEAT#) Of 110405-10E .Certification follows. All listed item(s) meets
ASTM standards.

<u>SIZE</u>	<u>LOT</u>	<u>DESCRIPTION</u>	<u>SPECIFICATION</u>	<u>#PCS</u>
<u>7/8 X 3 1/2"</u>	<u>010243</u>	<u>HXHD</u>	<u>A490-1</u>	<u>15</u>

Galvanizing: Hot Dip / Mechanical

Rachel Jones

CERTIFICATIONS

BBC FASTENERS, Inc.**a2La****ACCREDITED**This laboratory meets
the requirements of
ISO/IEC 9001:2008Manufacturers of Quality Hot and Cold Headed Fastener Products and CNC Machining
4210 SHIRLEY LANE
ALBANY, IL 60803

(708) 597-8100

(800) 323-1347

Fax (708) 597-0423

e-mail: BBCFAST@AOL.COM

REVISED TEST REPORT

NOVEMBER 28, 2006

ST. LOUIS SCREW & BOLT COMPANY
8900 NORTH BROADWAY
ST. LOUIS, MO. 63147

PAGE 1 of 1

MATERIAL AND TEST CERTIFICATE
DESCRIPTION OF MATERIAL AND SPECIFICATIONS

BBC Part Description:	2411087N160048PLD, 7/16" X 18" HEAVY HEX, A490, BLANK
Customer Order No.	SL10197
Invoice No.	037816
Quantity	263
Specification:	ASTM A490-04a
Shipping Date:	11/14/06
Sample Plan:	ASTM F1479-02

"Sample Lot - Magnetic Particle Inspected"

CHEMICAL ANALYSISDiameter: .875"
Steel Type: A490
Heat Number: 550839

C	Mn	P	S	Si	Mi	Cr	Mo	Cu	Al	V
0.47	0.75	0.013	0.020	0.17	0.10	0.15	0.21	0.26	0.002	0.028

"Certification of chemical analysis as supplied by our steel supplier"

MECHANICAL PROPERTIES

	SAMPLE # 1	SAMPLE # 2
Tensile Strength: LBF	70,800 LBF	71,400 LBF
Proof Load: LBF	.000055,450/10s	.000105,450/10S
Mid-Radius Hardness:	36	34

TEST METHOD: ASTM F806-02a1 & ASTM E18-06a1

LOT #: 110405-1DE

We hereby certify that the above test results are correct and that all the parts or material identified have been manufactured and inspected in accordance with applicable quality requirements. We also hereby certify that all parts or material conform to the applicable drawings, specifications, and conditions set forth on the purchase order.

QA**APPROVED**DATE 12/1/06 NAME QA

Quality Assurance

THIS TEST REPORT CANNOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL FROM BBC FASTENERS, INC.

Tested By: BBC Fasteners A2LA Accreditation #0234-01, expires 8/31/2007

NORTH STAR STEEL MINNESOTA

P.O. Box 84148
1875 Red Rock Road
Saint Paul, Minnesota 55194

CERTIFIED TEST REPORT

Item #: 355530
Size: 7/8"
Product: Round Bar
Grade: A5047RA
Date Replied: 10/22/02
P.O. #8225
M.O.R.: 223612

CHEMICAL ANALYSIS (WT %)

C	Mn	P	S	Si	Sa	Cu	Ni	Cr	Mo	Cb	V	Co	Al	Ca	N
0.47	0.75	0.013	0.020	0.17	0.024	0.28	0.10	0.10	0.21	0.001	0.024		0.001	12	

MANUFACTURING PROCESSES FOR THIS STEEL, WHICH MAY INCLUDE SCRAP MELTED IN AN ELECTRIC ARC FURNACE AND HOT ROLLING, HAVE BEEN PERFORMED AT NORTH STAR STEEL MINNESOTA, 1875 RED ROCK ROAD, SAINT PAUL, MINNESOTA, USA. ALL PRODUCTS PRODUCED FROM STRAND CAST BILLETS. NO WELD REPAIRS WERE PERFORMED. STEEL NOT SUPPLIED TO MERCURY OR ANY OTHER ALLOY WHICH IS LOADED AT AMBIENT TEMPERATURES DURING PROCESSING OR WHILE IN NORTH STAR STEEL MINNESOTA POSSESSION.

JOINT TWO DIRECTION HARDENABILITY RESULTS (HRC)

J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12
60	56	54	49	43	37	28	24	33	31		29
J13	J14	J15	J16	J17	J18	J19	J20	J21	J22	J23	J24
27	27	28	28	28	28	28	22	21			20

Jointed: Combined Test A578 A304.34

MECHANICAL TEST REPORT

SPECIMEN	YIELD (MPa)	TENSILE (MPa)	ELONG. (IN)	REDUC. (IN)	GAUGE LENGTH (IN)	REND	% ELONG.	SPECIFICATION GRADE
A578 (A304.34)								A5047RA

Additional Specifications/Comments:

A304.34-96
A304-96

Grain Size:	Reduction Ratio:	C.S. Per	AS Rolled Surface Hardness
FINE	60.3:1		Blm HRC
Coding:	0.1 2.31 14	Mn:580.7 D-4 F.	Test 1: Test 2:

CHARPY IMPACT TEST

Temp (F)	Test 1	Test 2
110 1		
110 2		
110 3		

The above results relate only to the items tested.

- Charpy tests performed by subcontractors in accordance with ASTM standards.

Chemical tests performed in accordance with ASTM E415 and E1019. Mechanical tests performed in accordance with ASTM E810 and A370. All other tests performed in accordance with the requirements of applicable specifications unless otherwise noted above. We hereby certify that the above test results are representative of those noted in the records of the company.

Any modification to the certificate as provided by North Star Steel Minnesota without the expressed written consent of North Star Steel Minnesota negates the validity of this test report. This report shall not be reproduced except in full without the expressed written consent of North Star Steel Minnesota. North Star Steel Minnesota is not responsible for the liability of this material to meet specific applications.

SIGNED:

DATE: 10/29/2002

APPROVAL:

QA Approval

Peter E. Shaver
Peter Shaver

SWORN AND SUBSCRIBED TO BEFORE ME
THIS DAY

NOTARY PUBLIC:

THIS CERTIFICATE IS NOTARIZED ONLY WHEN REQUESTED.

No Die Seams
on Bearing Surface

19257 - 120067401

A325 Bolt



19257 – 12002494
Torque by Head



19257 – 12002494
Torque by Head



19257 – 12002494
Torque by Nut



19257 – 12002494
Torque by Nut

19554 - 120070956

A325 Bolt



19554 (Torque by Head)



19554 (Torque by Head)



19554 (Torque by Nut)



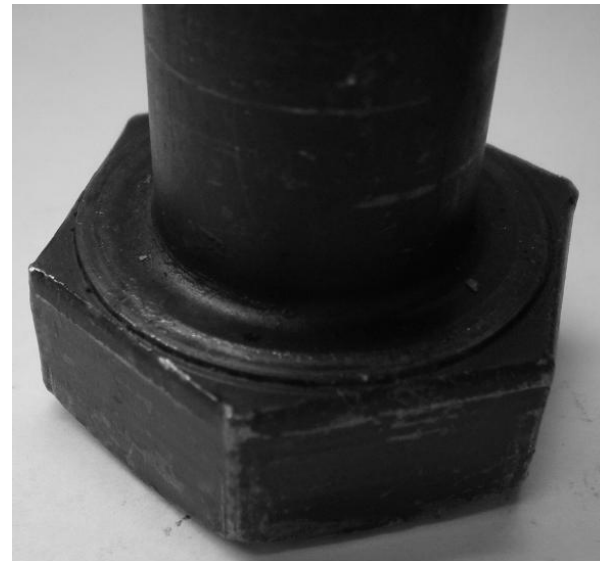
19554 (Torque by Nut)

91585 - 120037670

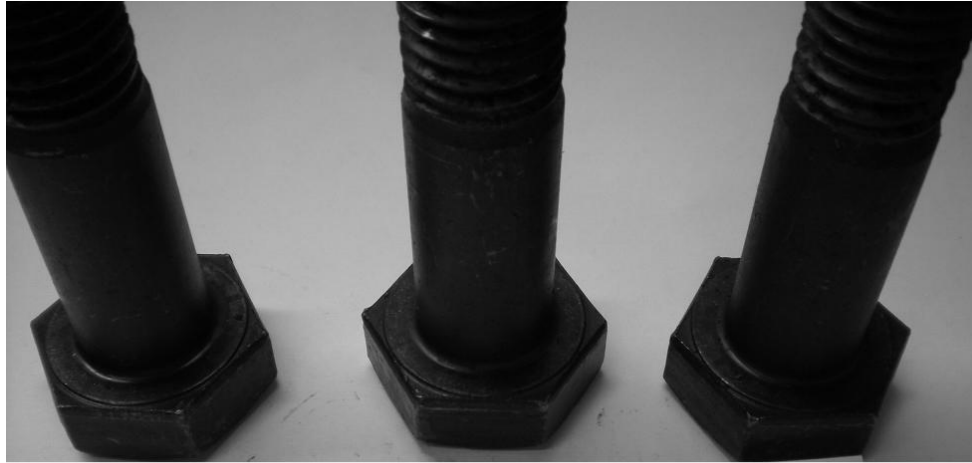
A490 Bolt



91585 (Torque by Head)



91585 (Torque by Head)



91585 (Torque by Nut)



91585 (Torque by Nut)

No dies seam - A325

7/8-9 x 3-1/2 - A325

Bolts were taken from Fastenal Part Number: **19257** (manufacture Infasco)

Fastenal Control Number: **120067401**

10° Wedge

Tensile Strength

Sample	(PSI.)
1	139682
2	139950
3	140642

			1 Snug Tight		Torque at 39,000 lbs		2 - 240 Degrees		3 - 300 Degrees	
			Snug Tension (Min. 4000 lbs. for A325 & 5500 lbs. A490)	Snug Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)
4		Turning Nut	4000	81.3	39000	486.8	63000	699.5	64000	723.0
5			4000	85.9	39000	488.5	62000	709.7	64000	732.3
6			4000	82.4	39000	481.2	61000	623.4	64000	686.8
7			4000	85.3	39000	480.1	62000	679.3	64000	700.6
8			4000	83.2	39000	478.4	62000	684.3	64000	708.4
		Average		83.6		483.0		679.2		710.2
		Std Dev		1.9		4.4		33.5		18.0
9		Turning Bolt	4000	82.0	39000	440.7	62000	624.1	64000	658.3
10			4000	85.1	39000	460.9	60000	685.4	62000	719.7
11			4000	79.4	39000	480.2	60000	717.2	62000	722.4
12			4000	82.6	39000	467.2	60000	693.2	63000	717.3
13			4000	85.3	39000	473.4	61000	685.8	63000	705.3
		Average		82.9		464.5		681.1		704.6
		Std Dev		2.4		15.1		34.4		26.7

Washers used for the rotational capacity testing: ASTM F436 7/8-in diameter Fastenal Part Number 33121 - Fastenal Control Number 1200437

Heavy Hex Nuts used for the rotational capacity testing: ASTM A194 2H - Fastenal Part Number 36556 - Fastenal Control Number 110034569

FASTENER TEST REPORT

(THIS DOCUMENT MAY BE REPRODUCED, BUT ONLY IN ITS ENTIRETY)

DATE : 2009-03-26

DESCRIPTION C A325-1+A563-C NA UNC N

7/8-9 X 3 1/2

BOLT

A325-1 STRUCTURAL BOLT UNC N P

MARKING : HOLLOW TRIANGLE & "A325"

LOT NO.		MANUFACTURED BY			HARDNESS (ROCKWELL)		PROOF LOAD (LBS)		TENSILE STRENGTH (LBS)			
0901-50560		INFASCO			HRC 25.0 – HRC 34.0		MIN: 39,250		MIN: 55,450			
MEAN VALUE					29.9		PASS		65,933			
HEAT NO.	C %	Mn %	P %	S %	Si %							
A93709	0.37	0.99	0.010	0.016	0.22							

HVY HEX NUT A563-C FNA UNC N P

MARKING : TRIANGLE & 3 CIRCUMFERENTIAL LINES

NUT

LOT NO. 0901-80046		MANUFACTURED BY INFASCO			HARDNESS (ROCKWELL) HRBW 78.0 – HRC 38.0		PROOF LOAD (LBS) MIN: 66,550				
MEAN VALUE					88.8		PASS				
HEAT NO.	C %	Mn %	P %	S %	Si %	Cu %					
D70359	0.45	0.84	0.005	0.010	0.20	0.07					





FASTENER TEST REPORT

(THIS DOCUMENT MAY BE REPRODUCED, BUT ONLY IN ITS ENTIRETY)

DATE 2009-02-04

DESCRIPTION A325-1 STRUCTURAL BOLT UNC N P
AND MARKING HOLLOW TRIANGLE & "A325"

SIZE	7/8-9 X 3 1/2	GRADE	1037ML	QUANTITÉ	15,400
------	---------------	-------	--------	----------	--------

HEAT CHEMICAL ANALYSIS

HEAT NO.	C %	Mn %	P %	S %	Si %				
A93709	0.37	0.99	0.010	0.016	0.22				

METHOD	ASTM F606	ASTM F606			ASTM F606		
	PROOF LOAD	WEDGE TENSILE STRENGTH	SHEAR STRENGTH	SURFACE HARDNESS (HR 30N)	CORE HARDNESS (ROCKWELL)	MICRO HARDNESS	COATING THICKNESS
	(psi)	(psi)					
SPEC. MIN.	85,000	120,000			HRC 25.0		
SPEC. MAX:					HRC 34.0		
S NO.1	85,000	140,000			HRC 29.0		
A NO.2	85,000	145,000			31.3		
M NO.3	85,000	144,000			28.8		
P NO.4					30.3		
L							
E							

THE ABOVE TESTED SAMPLES HAVE BEEN INSPECTED FOR VISUAL DISCONTINUITIES AND FOUND ACCEPTABLE. THEY COMPLY IN ALL RESPECTS WITH THE FOLLOWING SPECS:
ASTM A325 TYPE 1 ASME B18.2.6, THREADS PER ANSI B1.1 CLASS 2A. UNLESS OTHERWISE SPECIFIED. MEETS THE SURFACE DISCONTINUITIES REQUIREMENTS
THESE FASTENERS WERE OIL QUENCHED AND TEMPERED AT A TEMP. ABOVE 800°F.
NO BISMUTH, SELENIUM, TELLURIUM OR LEAD HAVE BEEN INTENTIONALLY ADDED

MANUFACTURED IN CANADA BY: INFASCO

Raw material used to manufacture fasteners is mercury and asbestos-free.
Fasteners were tested in the bare metal condition.

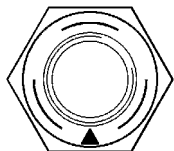
INFASCO

A division of Ifastgroupe LP 700 Ouellette, Marieville (Quebec) J3M 1P6
A Heico Company Tel.: (450) 658-8741 Fax: (450) 460-5496

Page 81 of 86



Dominic Martineau, eng.
Metallurgical Engineer



FASTENER TEST REPORT

(THIS DOCUMENT MAY BE REPRODUCED, BUT ONLY IN ITS ENTIRETY)

DATE 2009-03-24

DESCRIPTION HVY HEX NUT A563-C FNA UNC N P
AND MARKING TRIANGLE & 3 CIRCUMFERENTIAL LINES

SIZE	7/8-9	GRADE	1046	QUANTITÉ	4,000
------	-------	-------	------	----------	-------

HEAT CHEMICAL ANALYSIS

HEAT NO.	C %	Mn %	P %	S %	Si %	Cu %			
D70359	0.45	0.84	0.005	0.010	0.20	0.07			

METHOD	ASTM F606				ASTM F606		
SAMPLES SELECTED BY: 0487	PROOF LOAD (psi)	WEDGE TENSILE STRENGTH	SHEAR STRENGTH	SURFACE HARDNESS (HR 30N)	CORE HARDNESS (ROCKWELL)	MICRO HARDNESS	COATING THICKNESS
SPEC. MIN. SPEC. MAX:	144,000				HRBW 78.0 HRC 38.0		
S NO.1 A NO.2 M P L E	144,000 144,000				HRBW 89.8 87.7		

THE ABOVE TESTED SAMPLES HAVE BEEN INSPECTED FOR VISUAL DISCONTINUITIES AND FOUND ACCEPTABLE.
THEY COMPLY IN ALL RESPECTS WITH THE FOLLOWING SPECS:
ASTM A563 GRADE C TYPE 1, ASME B18.2.2, THREADS PER ASME B1.1 CLASS 2B UNLESS OTHERWISE SPECIFIED.


MANUFACTURED IN CANADA BY: INFASCO

Raw material used to manufacture
fasteners is mercury and asbestos-free.
Fasteners were tested in the bare metal condition.

INFASCO

A division of Ifastgroupe LP 700 Ouellette, Marieville (Quebec) J3M 1P6
A Heico Company Tel.: (450) 658-8741 Fax: (450) 460-5496

Page 82 of 86


Daniel Guilbault
Quality Assurance Foreman

No dies seam, - A325

7/8-9 x 3-1/2 - A325

Fastenal Part Number: **19554**

Fastenal Control Number: **120070956** (Manufacturer Nucor)

10° Wedge

Tensile Strength

Sample

(PSI.)

1 137357

2 137790

3 141275

			1 Snug Tight		Torque at 39,000 lbs		2 - 240 Degrees		3 - 300 Degrees	
			Snug Tension (Min. 4000 lbs. for A325 & 5500 lbs. A490)	Snug Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)
4		Turning Nut	4000	71.2	39000	494.4	61000	706.4	64000	733.3
5			4000	68.1	39000	516.5	61000	733.2	63000	738.0
6			4000	71.8	39000	481.4	62000	714.5	64000	754.7
7			4000	70.3	39000	499.4	62000	724.6	63000	743.9
8			4000	69.2	39000	505.3	61000	733.9	65000	740.0
		Average		70.1		499.4		722.5		742.0
		Std Dev		1.5		13.0		12.0		8.1
9		Turning Bolt	4000	72.5	39000	513.7	60000	742.8	63000	769.9
10			4000	94.7	39000	445.8	60000	749.2	63000	755.3
11			4000	77.8	39000	482.8	61000	693.1	64000	720.7
12			4000	80.3	39000	495.3	60000	721.3	64000	744.2
13			4000	79.5	39000	467.4	61000	734.6	63000	752.6
		Average		81.0		481.0		728.2		748.5
		Std Dev		8.3		26.0		22.2		18.1

Washers used for the rotational capacity testing: ASTM F436 7/8-in diameter Fastenal Part Number 33121 - Fastenal Control Number 12004372

Heavy Hex Nuts used for the rotational capacity testing: ASTM A194 2H - Fastenal Part Number 36556 - Fastenal Control Number 110034569

NUCOR

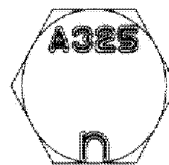
FASTENER DIVISION

LOT NO.
259508A

Post Office Box 6100
Saint Joe, Indiana 46785
Telephone 260/337-1800

CUSTOMER NO/NAME

7494 FASTENAL COMPANY PURCHASI
TEST REPORT SERIAL# FB330209
TEST REPORT ISSUE DATE 8/26/09
DATE SHIPPED 12/03/09
NAME OF LAB SAMPLER: Deann Moreno, LAB TECHNICIAN
*****CERTIFIED MATERIAL TEST REPORT*****
NUCOR PART NO QUANTITY LOT NO. DESCRIPTION
161460 2250 259508A 7/8-9 X 3 1/2 A325 HVY HX
MANUFACTURE DATE 8/21/09 STRUC SCREW PLAIN



--CHEMISTRY

MATERIAL GRADE -1037ML
MATERIAL HEAT **CHEMISTRY COMPOSITION (WT% HEAT ANALYSIS) BY MATERIAL SUPPLIER
NUMBER NUMBER C MN P S SI CR
RM025352 NF09100482 .36 .80 .017 .017 .24 .35
MIN .30 .60 .10
MAX .52 .040 .050 .30
NUCOR STEEL - NEBRASKA
A2LA NO: 780.01 EXP: 2010-11-30
FOR CHEMICAL TESTING

--MECHANICAL PROPERTIES IN ACCORDANCE WITH ASTM A325-07a

SURFACE	CORE	PROOF LOAD	TENSILE STRENGTH
HARDNESS	HARDNESS	39300 LBS	10 DEG-WEDGE
(R30N)	(RC)		(LBS) STRESS (PSI)
N/A	28.2	PASS	66720 144416
N/A	27.1	PASS	64250 139069
N/A	29.1	PASS	65120 140952
N/A	27.6		
AVERAGE VALUES FROM TESTS	28.0	PRODUCTION LOT SIZE	11300 PCS
		65363	141479

--VISUAL INSPECTION IN ACCORDANCE WITH ASTM A325-06 4 PCS. SAMPLED LOT PASSED
HEAT TREATMENT - AUSTENITIZED, OIL QUENCHED & TEMPERED (MIN 800 DEG F)

--DIMENSIONS PER ASME B18.2.6-2006

CHARACTERISTIC	#SAMPLES TESTED	MINIMUM	MAXIMUM
Width Across Corners	8	1.6200	1.6230
Grip Length	8	1.8770	1.9040
Head Height	8	0.5500	0.5540
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.



MECHANICAL FASTENER
CERTIFICATE NO. A2LA 139-01
EXPIRATION DATE 12/31/09

NUCOR FASTENER
A DIVISION OF NUCOR CORPORATION

Bob Haywood
BOB HAYWOOD
QUALITY ASSURANCE SUPERVISOR

No dies seam - A490

7/8-9 x 3-1/2 - A490

Fastenal Part Number: **91585**

Fastenal Control Number: **120037670** (Manufacturer Nucor)

10° Wedge

Tensile Strength

Sample	(PSI.)
1	159134
2	161502
3	161623

			1 Snug Tight		Torque at 49,000 lbs		2 - 240 Degrees		3 - 300 Degrees	
			Snug Tension (Min. 4000 lbs. for A325 & 5500 lbs. A490)	Snug Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)	Tension (lbs.)	Torque (ft-lbs.)
4		Turning Nut	6000	92.8	49000	588.9	68000	771.1	69000	803.1
5			6000	98.3	49000	580.9	68000	806.7	69000	812.6
6			6000	93.8	49000	548.6	69000	784.3	70000	809.7
7			6000	95.4	49000	566.8	68000	782.1	69000	811.4
8			6000	97.4	49000	574.5	69000	794.3	70000	817.4
		Average		95.5		571.9		787.7		810.8
		Std Dev		2.3		15.4		13.4		5.2
9		Turning Bolt	6000	100.1	49000	540.6	68000	803.3	69000	812.4
10			6000	105.6	49000	594.5	68000	798.2	70000	803.0
11			6000	95.8	49000	601.5	68000	843.4	69000	849.9
12			6000	96.7	49000	610.4	69000	812.3	70000	823.5
13			6000	100.7	49000	600.4	68000	802.7	69000	815.5
		Average		99.8		589.5		812.0		820.9
		Std Dev		3.9		27.9		18.3		17.8

Washers used for the rotational capacity testing: ASTM F436 7/8-in diameter Fastenal Part Number 33121 - Fastenal Control Number 12004372

Heavy Hex Nuts used for the rotational capacity testing: ASTM A194 2H - Fastenal Part Number 36556 - Fastenal Control Number 110034569

NUCOR

FASTENER DIVISION

LOT NO.
243092A

Post Office Box 6100
Saint Joe, Indiana 46785
Telephone 260/337-1800

CUSTOMER NO/NAME

7494 FASTENAL COMPANY PURCHASE
TEST REPORT SERIAL# FB310602
TEST REPORT ISSUE DATE 7/15/08
DATE SHIPPED 9/14/08
NAME OF LAB SAMPLER: Jeff Hoering, LAB TECHNICIAN
*****CERTIFIED MATERIAL TEST REPORT*****
NUCOR PART NO QUANTITY LOT NO. DESCRIPTION
165460 250 243092A 7/8-9 X 3 1/2 A490 HVY HX
MANUFACTURE DATE 6/02/08 STRUC SCREW PLAIN



--CHEMISTRY

MATERIAL GRADE -4135MLV
MATERIAL HEAT **CHEMISTRY COMPOSITION (WT% HEAT ANALYSIS) BY MATERIAL SUPPLIER
NUMBER NUMBER C MN P S SI CR MO V NUCOR STEEL - NEBRASKA
RM024413 NU 844781 .34 .86 .011 .019 .25 .94 .16 .020 A2LA NO: 780.01 EXP: 2008-11-30
MIN .30 FOR CHEMICAL TESTING
MAX .48 .040 .040

--MECHANICAL PROPERTIES IN ACCORDANCE WITH ASTM A490-08a

SURFACE CORE	PROOF LOAD	TENSILE STRENGTH
HARDNESS HARDNESS	55450 LBS	10 DEG-WEDGE
(R30N) (RC)	(LBS)	STRESS (PSI)
N/A 35.1	PASS	75350 163095
N/A 33.2	PASS	75050 162446
N/A 34.2	PASS	75220 162814
N/A 34.7		
AVERAGE VALUES FROM TESTS	PRODUCTION LOT SIZE	3000 PCS
34.3	75207	162785

--VISUAL INSPECTION IN ACCORDANCE WITH ASTM F788

--WET MAGNETIC PARTICLE INSPECTION IN ACCORDANCE WITH ASTM A490-08a 4 PCS. SAMPLED LOT PASSED

--MICROHARDNESS TEST RESULT IN ACCORDANCE WITH SAE J121-99(HKN)

POSITION 1. 382 2. 389 3. 398
CARBURIZATION/DECARBURIZATION TEST IN ACCORDANCE WITH A490- 08a LOT PASSED
HEAT TREATMENT - AUSTENITIZED, OIL QUENCHED & TEMPERED (MIN 800 DEG F)

--DIMENSIONS PER ASME B18.2.6-2003

CHARACTERISTIC	#SAMPLES TESTED	MINIMUM	MAXIMUM
Width Across Corners	4	1.6190	1.6230
Grip Length	4	1.8740	1.8850
Head Height	4	0.5570	0.5610
Threads	4	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. 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.



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JAMES GIALAMAS
TECHNICAL SERVICES MANAGER