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TL-342

CTL|THOMPSON, INC.
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FORT COLLINS, COLORADO 80524
(970) 206-9455

Product Testing Report
Push Pier Foundation System
STABIL-LOC SYSTEMS, LLC
Pier and Adjustable Head Assembly

Prepared For:

STABIL-LOC SYSTEMS, LLC
P.O Box 1834
Rogers, AR 72756

Attention: Ginger Rogers DeMaris

Project No. FC08472-475 (*rev2*)
Report No. 1449-1450

February 13th, 2019

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Stabil-Loc Systems, LLC
P.O Box 1834
Rogers, AR 72756

Attention: Ginger Rogers DeMaris

Subject: Product Testing Report – Push Pier Foundation System
Stabil-Loc Systems, LLC
Pier and Adjustable Head Assembly
CTL|T Project Number: FC08472-475 (*rev2*)

CTL|Thompson, Inc. has performed product testing on push pier foundation elements in accordance with AC358 (Approved September 2017). CTL|Thompson conducted five tests on the Adjustable Head Assembly and five Axial Compression tests on the Pier Assembly Segments. This report presents the product descriptions, test methods, test data and test summaries of the testing program.

Push pier products included in this testing program are as follows:

Manufacturer ID	Shaft Size
Push Pier Segments	Round HSS 2.875 x 0.217 Round HSS 2.375 x 0.188
Adjustable Head Assembly	-

The testing results presented in this report are not intended to fully satisfy all of the requirements of AC358. Additional design calculations may be necessary to satisfy the acceptance requirements not covered in this report. This report provides the following testing results:

AC 358 Test Method Section No.	Related AC358 Section Nos.	Test ID
4.2.1	3.11.1	Axial Compression
4.1.1.1	3.10.1	Bracket Capacity

Per AC358, some of the testing results provided in the test report shall be corrected for other factors as allowed in the criteria. Summary values below are the corrected values (if applicable).

Summary of Testing Results

Push Pier Foundation Systems		
Sec. No.	**Test ID**	**Result Summary**
4.2.1	Axial Compression	RAS[1] (Bare Steel) = 105,543 lbs. RAS[1] (Galvanized) = 119,965 lbs.
4.1.1.1	Adjustable Head Assembly (Bracket) Capacity	RAS = 96,903 lbs.

[1] *RAS = Reported Allowable RAS*

We appreciate the opportunity to work with you on this project. If you have any questions regarding the information provided in this report, please do not hesitate to contact us.

Sincerely,
CTL|THOMPSON, INC.

R.B. "Chip" Leadbetter, III, PE
Senior Engineer
Accredited Laboratory Director

Ryan Beck, PE
Project Engineer
Accredited Laboratory Testing Manager

Revision Log

Date	*Revision No.*	*Explanation*	*By*
09/30/2018	*0*	*Initial Issue*	*M. Souissi*
11/8/2018	*1*	*Bracket testing updated*	*C. Leadbetter, Director*
2/13/2019	*2*	*Language/References Updates*	*C. Leadbetter, Director*

TABLE OF CONTENTS

Client:	Stabil-loc Systems LLC
Job Number:	FC07844
Product:	2.875 O.D. Shaft Push Pier

Date of Plant Visit: July 20th, 2018

CTL Representative: Moncef Souissi

Manufacturer: Stabil-Loc Systems, LLC

Location City, State: Springdale, Arkansas

Manufacture Type:

✓	Large Inventory – Random Sample
	Manufacture to Order – Comparison to Standard

Components Inspected:

✓	Helical Lead(s)
✓	Extension Shafts
✓	Bracket(s)
	Other

On July 20th, 2018, a representative of CTL|Thompson visited Stabil-Loc Systems, LLC, in Springdale, Arkansas, for product sampling. The samples were reviewed on-site and were marked with a permanent marker. The shipped samples were checked upon arrival and were consistent with the marked samples that were reviewed during the visit. Throughout our testing program (Laboratory and Field), measurements were taken and recorded for every specimen and assembly tested.

Product Features Inspected:

Product Feature	Sampled at Plant	Received Test Samples Are Representative
Helix Diameter	**n/a**	**n/a**
Helix Pitch	**n/a**	**n/a**
Helix Thickness	**n/a**	**n/a**
Helix Shape, Configuration, Edge	**n/a**	**n/a**
Angle of Helix with Central Shaft	**n/a**	**n/a**
Shaft Diameter or Dimensions	✓	✓
Shaft Length	✓	✓
Shaft Thickness	✓	✓
Tip Configuration	**n/a**	**n/a**
Shaft Connector and Dimensions	**n/a**	**n/a**
Weld Thickness	**n/a**	**n/a**
Weld Length	**n/a**	**n/a**
Weld Quality and Type	**n/a**	**n/a**
Corrosion Protective Coating	✓	✓
Underpinning Brackets	✓	✓
Other		

SECTION 1:

2.875” O.D. PUSH PILE

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AXIAL COMPRESSION

ACCREDITED
Testing
Laboratory

CTL | THOMPSON
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Client:	Stabil-Loc Systems, LLC
Job Number:	FC08472
Product:	Push Pier Foundation Systems

Reference Method

Tests were conducted according to ICC-ES AC358 (4.3.1), and CTL|Thompson's test method QTM 4.3.1.

Standard Procedure

Specimen's dimensions were taken for all test samples. Each specimen was then mounted to a vertical load frame with the sample between a fixed platform and a mobile platform with the capability to apply the load to the specimen in the axial direction (see Figure 1). The real-time data for both load and deformation over the total length of the specimen was recorded by the computer. These data was used to plot load deformation curves for all specimens. Load was applied at moderate rate to simulate actual field loading conditions. Deformation was recorded at intervals of approximately 10% of the anticipated ultimate capacity. Each load increment was held for a minimum of one minute. The test was stopped when large deformations occurred with no increase in applied load.

Figure 1

Deviations from Standard Procedure

There were no deviations from the standard test method.

Description of test samples set up:

Each test sample has the following components: a 12” starter assembly, a 12” assembled inner & outer pier segment and 6” assembly inner & outer pier segment. This will make each test specimen with two connections or couplings. For all test samples, the bottom connection is between the starter assembly and the assembled inner & outer pier segment. The top connection is between two assembled inner & outer Pier segments.

The samples were set up for testing as follows:

- STB1: The assembled sample was set up vertical and plumb. Both connections are coaxial with the specimen’s pier segments.
- STB2: In the bottom connection, the top assembled inner & outer pier segment was slid completely to the right with respect to the starter assembly (off the axis of the test specimen), whereas the top connection was left coaxial with pier segments.
- STB3: In the top connection, the top assembled inner & outer pier segment was slid completely to the right with respect to the other assembled pier segments (off the axis of the test specimen), whereas the bottom connection was left coaxial with pier segments
- STB4: In the top connection, the top assembled inner & outer pier segment was slid completely to the right with respect to the other assembled pier segment (off the axis of the test specimen), and in the bottom connection, the assembled inner & outer pier segment was slid to the right with respect to the starter assembly. In other words, both the top segment and bottom segment of the test sample were slid in the same direction.
- STB5: the same set up as STB4 except, the two connections were slid in opposite direction.

Summary of Results

Specimen Number	Measured Ultimate Load (lbs)	Measured Allowable Load(lbs)	Deviation From Mean	Allowable Load (lbs) [1]	Failure Mode
STB1	258,465	129,233	-0.1%	129,304	Specimen Buckling
STB2	263,119	131,560	+1.7%		Specimen Buckling
STB3	255,414	127,707	-1.2%		Specimen Buckling
STB4	260,625	130,313	+0.8%		Specimen Buckling
STB5	255,414	127,707	-1.2%		Specimen Buckling

[1]: *Per AC358, section 3.7.3, reported allowable capacity shall be the average of the five measurements if individual results are within 15% of the average of tests, otherwise the least test result shall be taken as allowable strength.*

Per AC358 Section 3.9, test values are to be corrected for corrosion. Corrosion correction values were determined based on area reduction of outer pier segment (see calculations at end of report).

Surface Condition	Allowable Load (lbs)	Scaling Factor for Corrosion $(A_c/A_u)^2$	Reported Allowable Strength (lbs)
Bare Steel	129,304	80.9%	105,543
Galvanized	129,304	92.8%	119,965

[2] *A_u: uncorrected section area*
[2] *A_c: corrected section area*

Axial Compression Test

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IAS ACCREDITED Testing Laboratory

Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested :	8/1/2018
Technician:	Moncef Souissi

Specimen Specification

Specimen Number:	STB 1
Number of Couplings:	2
Coupling Type:	Slip Fit
Outer Pier Segment Diameter (in)*:	2.876
Inner Pier Segment Diameter (in)*:	2.377
Outer Pier Segment Thickness (in)*:	0.219
Inner Pier Segment Thickness (in)*:	0.189
Specimen Length (in):	30

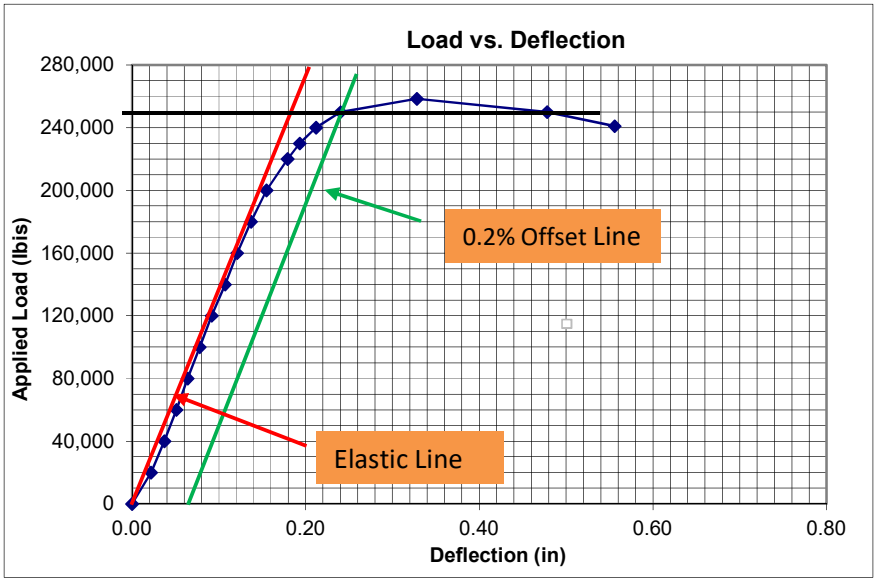
**Average of three measurements*

Load Frame ID:	59R5598Q9266
Loading Device:	Instron Machine
Load Measurement:	Digital Input
Calibration Date:	8/2/2017
Def. Measurement:	Digital Readings
Calibration:	8/2/2017
Testing Location:	Bureau of Reclamation

Test Sample

Measurements:

Load (lbs)	Def (in)
0	0.000
20,000	0.022
40,000	0.037
60,000	0.051
80,000	0.064
100,000	0.078
120,000	0.092
140,000	0.107
160,000	0.121
180,000	0.137
200,000	0.155
220,000	0.179
230,000	0.193
240,000	0.212
250,000	0.240
258,465	0.328
250,000	0.478
241,000	0.556



Failure Mode:	Specimen Buckling
Yield Test Load (lbs.)	250,000
Max Test Load (lbs.):	258,465
Allowable Strength (lbs.)*:	129,233

**:per section 3.7.3 of AC358*

Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.06 inches. A line was plotted parallel to the elastic line and shifted 0.06 inches to the right to obtain the yielding Load. (Yield load = 250,000 lbs.)

Axial Compression Test

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Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested :	8/1/2018
Technician:	Moncef Souissi

Specimen Specification

Specimen Number:	STB 2
Number of Couplings:	2
Coupling Type:	Slip Fit
Outer Pier Segment Diameter (in)*:	2.878
Inner Pier Segment Diameter (in)*:	2.378
Outer Pier Segment Thickness (in)*:	0.220
Inner Pier Segment Thickness (in)*:	0.188
Specimen Length (in):	30

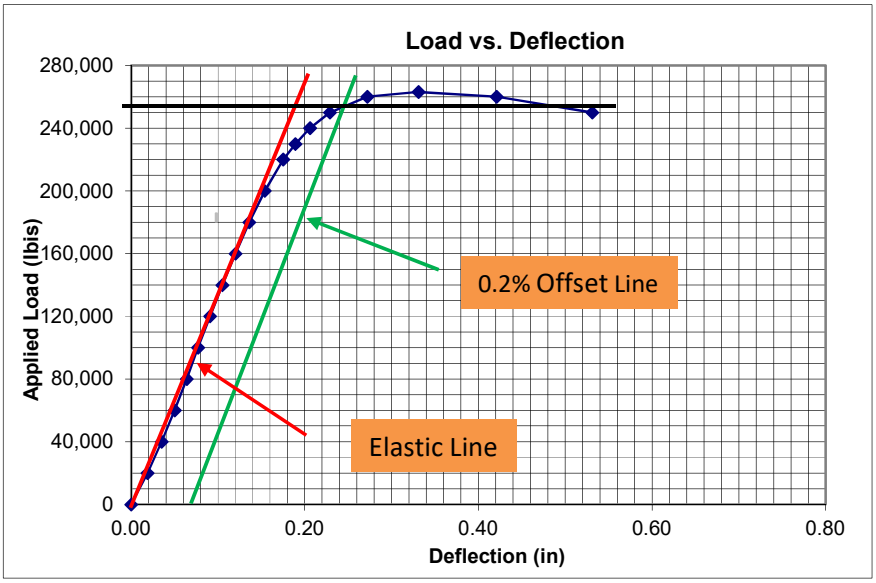
**Average of three measurements*

Load Frame ID:	59R5598Q9266
Loading Device:	Instron Machine
Load Measurement:	Digital Input
Calibration Date:	8/2/2017
Def. Measurement:	Digital Readings
Calibration:	8/2/2017
Testing Location:	Bureau of Reclamation

Test Sample

Measurements:

Load (lbs)	Def (in)
0	0.000
20,000	0.019
40,000	0.035
60,000	0.050
80,000	0.064
100,000	0.077
120,000	0.091
140,000	0.105
160,000	0.120
180,000	0.136
200,000	0.154
220,000	0.175
230,000	0.189
240,000	0.206
250,000	0.229
260,000	0.272
263,119	0.331
260,000	0.421
250,000	0.531



Failure Mode:	Specimen Buckling
Yield Test Load (lbs.)	253,000
Max Test Load (lbs.):	263,119
Allowable Strength (lbs.)*:	131,560

**:per section 3.7.3 of AC358*

Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.06 inches. A line was plotted parallel to the elastic line and shifted 0.06 inches to the right to obtain the yielding Load. (Yield load = 253,000 lbs.)

Axial Compression Test

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Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested :	8/1/2018
Technician:	Moncef Souissi

Specimen Specification

Specimen Number:	STB 3
Number of Couplings:	2
Coupling Type:	Slip Fit
Outer Pier Segment Diameter (in)*:	2.878
Inner Pier Segment Diameter (in)*:	2.378
Outer Pier Segment Thickness (in)*:	0.218
Inner Pier Segment Thickness (in)*:	0.189
Specimen Length (in):	30

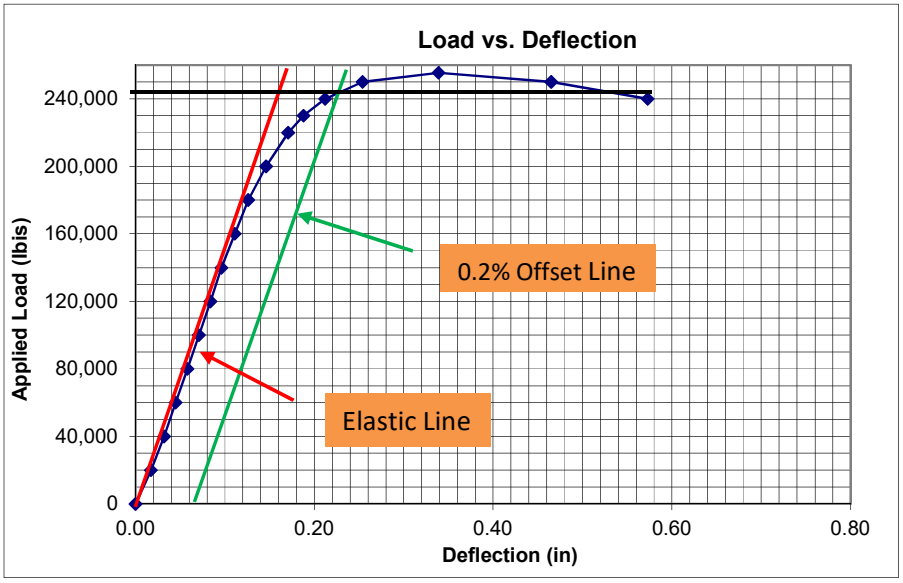
**Average of three measurements*

Load Frame ID:	59R5598Q9266
Loading Device:	Instron Machine
Load Measurement:	Digital Input
Calibration Date:	8/2/2017
Def. Measurement:	Digital Readings
Calibration:	8/2/2017
Testing Location:	Bureau of Reclamation

Test Sample

Measurements:

Load (lbs)	Def (in)
0	0.000
20,000	0.017
40,000	0.032
60,000	0.045
80,000	0.058
100,000	0.071
120,000	0.084
140,000	0.096
160,000	0.111
180,000	0.126
200,000	0.146
220,000	0.171
230,000	0.188
240,000	0.212
250,000	0.254
255,414	0.339
250,000	0.465
240,000	0.573



Failure Mode:	Specimen Buckling
Yield Test Load (lbs.)	245,000
Max Test Load (lbs.):	255,414
Allowable Strength (lbs.)*:	127,707

**:per section 3.7.3 of AC358*

Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.06 inches. A line was plotted parallel to the elastic line and shifted 0.06 inches to the right to obtain the yielding Load. (Yield load = 242,000 lbs.)

Axial Compression Test

Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested :	8/1/2018
Technician:	Moncef Souissi

Specimen Specification

Specimen Number:	STB 4
Number of Couplings:	2
Coupling Type:	Slip Fit
Outer Pier Segment Diameter (in)*:	2.879
Inner Pier Segment Diameter (in)*:	2.376
Outer Pier Segment Thickness (in)*:	0.220
Inner Pier Segment Thickness (in)*:	0.189
Specimen Length (in):	30

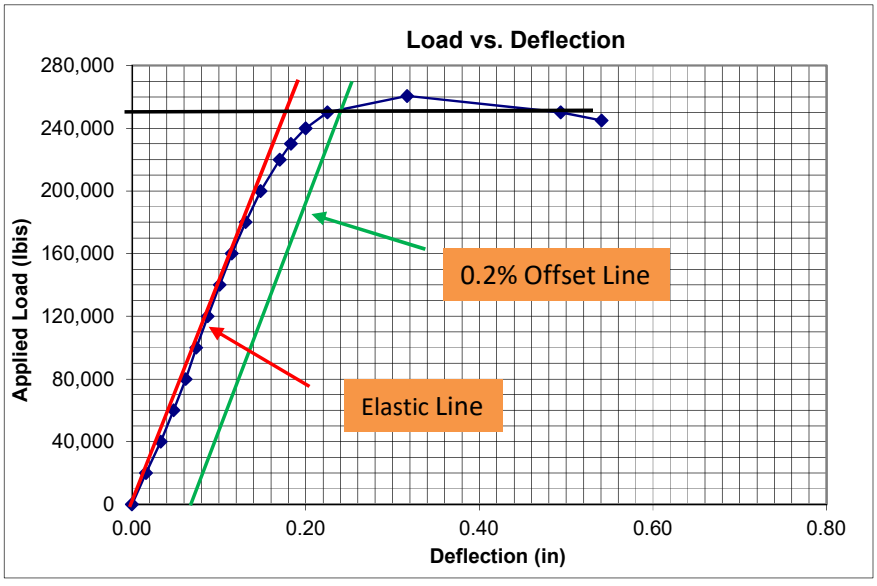
**Average of three measurements*

Load Frame ID:	59R5598Q9266
Loading Device:	Instron Machine
Load Measurement:	Digital Input
Calibration Date:	8/2/2017
Def. Measurement:	Digital Readings
Calibration:	8/2/2017
Testing Location:	Bureau of Reclamation

Test Sample

Measurements:

Load (lbs)	Def (in)
0	0.000
20,000	0.016
40,000	0.033
60,000	0.048
80,000	0.062
100,000	0.074
120,000	0.087
140,000	0.101
160,000	0.115
180,000	0.131
200,000	0.148
220,000	0.170
230,000	0.183
240,000	0.200
250,000	0.225
260,625	0.317
250,000	0.494
245,000	0.541



Failure Mode:	Specimen Buckling
Yield Test Load (lbs.)	248,000
Max Test Load (lbs.):	260,625
Allowable Strength (lbs.)*:	130,313

**:per section 3.7.3 of AC358*

Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.06 inches. A line was plotted parallel to the elastic line and shifted 0.06 inches to the right to obtain the yielding Load. (Yield load = 250,000 lbs.)

Axial Compression Test

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Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested :	8/1/2018
Technician:	Moncef Souissi

Specimen Specification

Specimen Number:	STB 5
Number of Couplings:	2
Coupling Type:	Slip Fit
Outer Pier Segment Diameter (in)*:	2.880
Inner Pier Segment Diameter (in)*:	2.380
Outer Pier Segment Thickness (in)*:	0.219
Inner Pier Segment Thickness (in)*:	0.189
Specimen Length (in):	30

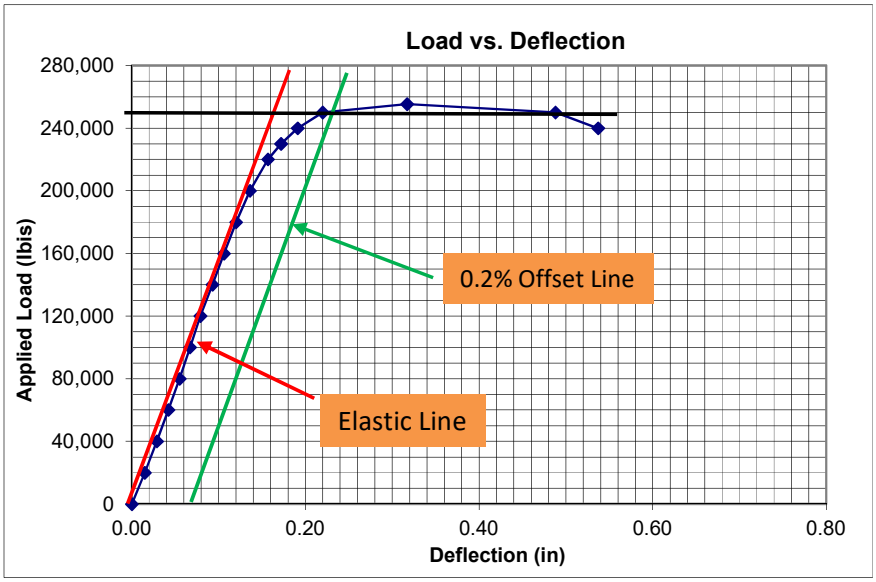
**Average of three measurements*

Load Frame ID:	59R5598Q9266
Loading Device:	Instron Machine
Load Measurement:	Digital Input
Calibration Date:	8/2/2017
Def. Measurement:	Digital Readings
Calibration:	8/2/2017
Testing Location:	Bureau of Reclamation

Test Sample

Measurements:

Load (lbs)	Def (in)
0	0.000
20,000	0.015
40,000	0.029
60,000	0.042
80,000	0.055
100,000	0.067
120,000	0.079
140,000	0.093
160,000	0.106
180,000	0.120
200,000	0.136
220,000	0.157
230,000	0.172
240,000	0.191
250,000	0.220
255,414	0.317
250,000	0.488
240,000	0.537



Failure Mode:	Specimen Buckling
Yield Test Load (lbs.)	250,000
Max Test Load (lbs.):	255,414
Allowable Strength (lbs.)*:	127,707

**:per section 3.7.3 of AC358*

Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.06 inches. A line was plotted parallel to the elastic line and shifted 0.06 inches to the right to obtain the yielding Load. (Yield load = 250,000 lbs.)

Pipe Corrosion Correction

CTL | THOMPSON INCORPORATED

Client:	Stabil-Loc Systems, LLC
Job Number:	FC08472
Date:	8/29/2018
By:	M.Souissi

Steel Type	
Zinc-Coated Steel	1
Bare Steel	2
Powder Coated Steel	3

Specimen Specification

Shaft Outside Diameter (in):	2.875	D_o
Shaft Thickness (in):	0.188	t
Shaft Inside Diameter (in):	2.499	D_i
Steel Type:	2	

Uncorrected Area

Outer Pier Segment Diameter (in)*:
Inner Pier Segment Diameter (in)*:
Outer Pier Segment Thickness (in)*:

A_u= 1.586 in^2

Inner Pier Segment Thickness (in)*:

$$A_u = A_o - A_i \qquad A_o = \left(\frac{D_o}{2}\right)^2 \pi \qquad A_i = \left(\frac{D_i}{2}\right)^2 \pi$$

Corrected Area

Sacrificial Thickness T_s 0.036 in

*Section 3.9 AC358

Corrected Outside Diameter (in):	2.839	D_{oc}
Corrected Inside Diameter (in):	2.535	D_{ic}

$$D_c = D - T_s$$

$$A_c = A_{oc} - A_{ic}$$

A_c= 1.282 in^2

$$A_{oc} = \left(\frac{D_{oc}}{2}\right)^2 \pi$$

$$A_{ic} = \left(\frac{D_{ic}}{2}\right)^2 \pi$$

$$\frac{A_c}{A_u} = \frac{1.282}{1.586} = \textbf{80.9\%}$$

Pipe Corrosion Correction

CTL | THOMPSON INCORPORATED

Client:	Stabil-Loc Systems, LLC
Job Number:	FC08472
Date:	11/5/2018
By:	C. Leadbetter

Steel Type	
Zinc-Coated Steel	1
Bare Steel	2
Powder Coated Steel	3

Specimen Specification

Shaft Outside Diameter (in):	2.875	D_o
Shaft Thickness (in):	0.180	t
Shaft Inside Diameter (in):	2.515	D_i
Steel Type:	1	

Uncorrected Area

Outer Pier Segment Diameter (in)*:
Inner Pier Segment Diameter (in)*:
Outer Pier Segment Thickness (in)*:

A_u= 1.523 in^2

Inner Pier Segment Thickness (in)*:

$$A_u = A_o - A_i \qquad A_o = \left(\frac{D_o}{2}\right)^2 \pi \qquad A_i = \left(\frac{D_i}{2}\right)^2 \pi$$

Corrected Area

Sacrificial Thickness T_s 0.013 in

*Section 3.9 AC358

Corrected Outside Diameter (in):	2.862	D_{oc}
Corrected Inside Diameter (in):	2.528	D_{ic}

$$D_c = D - T_s$$

$$A_c = A_{oc} - A_{ic}$$

A_c= 1.413 in^2

$$A_{oc} = \left(\frac{D_{oc}}{2}\right)^2 \pi$$

$$A_{ic} = \left(\frac{D_{ic}}{2}\right)^2 \pi$$

$$\frac{A_c}{A_u} = \frac{1.413}{1.523} = \textbf{92.8\%}$$

ADJUSTABLE HEAD ASSEMBLY (BRACKET) CAPACITY

ACCREDITED
Testing Laboratory

CTL | THOMPSON INCORPORATED

Client:	Stabil-Loc Systems, LLC
Job Number:	FC08472

Product:	Push Pier Foundation Systems
Bracket:	Adjustable Head Assembly
Shaft:	Round HSS 2.875 x 0.217 & 2.375 x 0.217
Concrete:	N/A

Reference Method

Tests were conducted in general accordance with ICC-ES AC358 (4.2.1) and CTL Thompson quality test method QTM 4.2.1.

Standard Procedure

Specimen's dimensions were taken for all test samples. Each specimen was then mounted in a vertical load frame with the sample between a fixed platform and a mobile platform with the capability to apply the load to the specimen in the axial direction (see Figure 1). Test samples were tested inverted for ease of setup. The real-time data for both load and deformation over the total length of the specimen was recorded by the computer. These data was used to plot load deformation curves for all specimens. Load was applied at moderate rate to simulate actual field loading conditions. Deformation was recorded at intervals of less than 10% of the anticipated ultimate capacity. The test was stopped when large deformations occurred with no increase in applied load.

Figure 1

Deviations from Standard Procedure

The adjustable head assembly samples were tested without a concrete feature (as described in AC358 4.2.1) due to practical testing setup limitations. It is understood that this testing program will require an associated calculation package submittal to meet the requirements of AC358. Two of the samples exhibited a failure prior to a defined yield point. Therefore, the maximum test load was taken as the ultimate capacity.

Specimen Description

The adjustable head assembly and the push pier sections are described in the attached shop drawings in Appendix A. All parts of each test assembly were measured before testing and found to be within the accepted tolerance and the design specification on the shop drawings provided by Stabil-Loc Systems, LLC. Each test sample has the following components: a 12" assembled inner & outer pier segment and 6" assembly inner & outer pier segment, a complete adjustable head assembly.

Summary of Results

Specimen Number	Specimen Type	Measured Ultimate Capacity (lbs)	Measured Allowable Capacity (lbs)	Deviation from Mean	Reported Allowable Capacity (lbs) *
BRKT1	Adjustable Head Assembly	192,141	96,071	-0.9%	96,903
BRKT2		190,730	95,365	-1.6%	
BRKT3		203,277	101,639	+4.9%	
BRKT4		193,342	96,671	-0.2%	
BRKT5		194,270	97,135	+0.2%	

* Per AC358. Sec 3.7.3, reported allowable capacity shall be the average of the five measurements if individual results are within 15% of the average of tests, otherwise allowable capacity shall be the least measured value.

Type A Bracket Capacity Test

Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested:	10/26/2018
Technician:	Brandon Edwards

Specimen Specification

Specimen Number:	BRKT 1
Bracket Type:	Adj. Head Ass.
Outer Pier Segment Diameter (in)*:	2.876
Inner Pier Segment Diameter (in)*:	2.377
Outer Pier Segment Thickness (in)*:	0.218
Inner Pier Segment Thickness (in)*:	0.189
Shaft Length (in):	24
Inclination Angle of Shaft (deg):	N.A.
Test Site:	Bureau of Reclamation
Concrete Block Cast Date:	N.A.
Concrete Compressive Strength (psi):	N.A.
Date of Concrete Cylinder Break:	N.A.
Loading Device:	Instron Machine
Loading Device ID:	59R5598Q9266
Load & Def Measurements:	Digital Input
Calibration Date:	8/9/2018

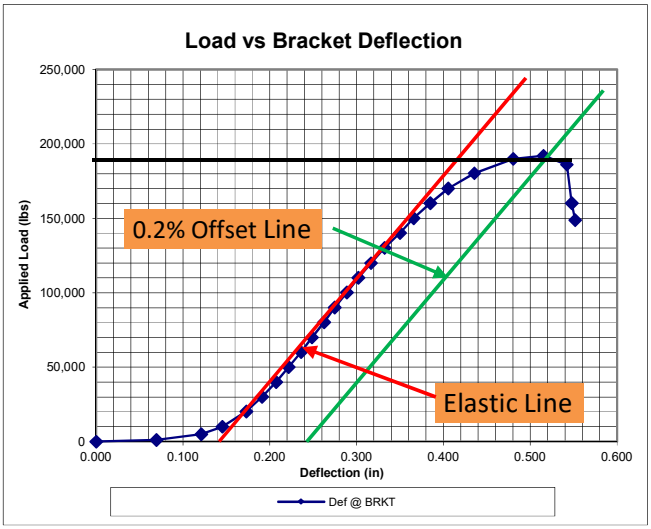
Test Sample

Failure Mode : Buckle

Test Method: AC358 Section 4.1.1

Measurements:

Load (lbs)	Def (in)	Load (lbs)	Def (in)
0	0.000	180,271	0.436
1,007	0.070	190,074	0.481
5,021	0.121	192,141	0.515
10,018	0.146	186,045	0.542
20,172	0.173	160,254	0.548
30,114	0.191	148,704	0.552
40,014	0.207		
50,059	0.222		
60,201	0.236		
70,055	0.249		
80,152	0.263		
90,156	0.275		
100,239	0.289		
110,105	0.302		
120,005	0.317		
130,089	0.332		
140,190	0.350		
150,119	0.366		
160,206	0.385		
170,100	0.406		



Yield Load Py (lb):	190,000
Ultimate Load P_u (lb):	192,141
Allowable Capacity of Bracket (lbs)[1]:	96,071

[1] *(Smallest of 0.6fy or 0.5fu per AC358;sec 3.7.3)*

Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.1 inches. A line was plotted parallel to the elastic line and shifted 0.1 inches to the right to obtain the yielding Load.

Type A Bracket Capacity Test

CTL | THOMPSON INCORPORATED — IAS ACCREDITED Testing Laboratory

Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested:	10/26/2018
Technician:	Brandon Edwards

Specimen Specification

Specimen Number:	BRKT 2
Bracket Type:	Adj. Head Ass.
Outer Pier Segment Diameter (in)*:	2.878
Inner Pier Segment Diameter (in)*:	2.377
Outer Pier Segment Thickness (in)*:	0.218
Inner Pier Segment Thickness (in)*:	0.188
Shaft Length (in):	24
Inclination Angle of Shaft (deg):	N.A.
Test Site:	Bureau of Reclamation
Concrete Block Cast Date:	N.A.
Concrete Compressive Strength (psi):	N.A.
Date of Concrete Cylinder Break:	N.A.
Loading Device:	Instron Machine
Loading Device ID:	59R5598Q9266
Load & Def Measurements:	Digital Input
Calibration Date:	8/9/2018

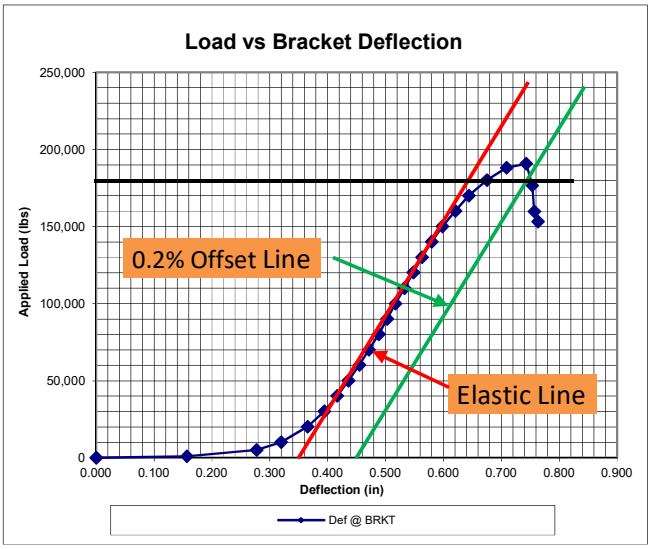
Test Sample

Failure Mode : Buckle

Test Method: AC358 Section 4.1.1

Measurements:

Load (lbs)	Def (in)	Load (lbs)	Def (in)
0	0.000	180,203	0.675
1,048	0.157	188,192	0.709
5,083	0.277	190,730	0.743
10,069	0.320	176,513	0.753
20,223	0.365	159,822	0.757
30,101	0.394	153,200	0.763
40,153	0.417		
50,136	0.436		
60,205	0.455		
70,139	0.472		
80,252	0.488		
90,130	0.503		
100,031	0.517		
110,105	0.532		
120,190	0.548		
130,077	0.563		
140,238	0.580		
150,119	0.598		
160,216	0.621		
170,104	0.644		



Yield Load Py (lb):	Not Reported
Ultimate Load P_u (lb):	190,730
Allowable Capacity of Bracket (lbs)[1]:	95,365

[1] *(Smallest of 0.6fy or 0.5fu per AC358;sec 3.7.3)*

Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.1 inches. A line was plotted parallel to the elastic line and shifted 0.1 inches to the right to obtain the yielding Load. The sample failed prior to the 0.2% offset, so 0.5*fu is reported.

Type A Bracket Capacity Test

CTL | THOMPSON INCORPORATED — IAS ACCREDITED Testing Laboratory

Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested:	10/26/2018
Technician:	Brandon Edwards

Specimen Specification

Specimen Number:	BRKT 3
Bracket Type:	Adj. Head Ass.
Outer Pier Segment Diameter (in)*:	2.878
Inner Pier Segment Diameter (in)*:	2.377
Outer Pier Segment Thickness (in)*:	0.218
Inner Pier Segment Thickness (in)*:	0.189
Shaft Length (in):	24
Inclination Angle of Shaft (deg):	N.A.
Test Site:	Bureau of Reclamation
Concrete Block Cast Date:	N.A.
Concrete Compressive Strength (psi):	N.A.
Date of Concrete Cylinder Break:	N.A.
Loading Device:	Instron Machine
Loading Device ID:	59R5598Q9266
Load & Def Measurements:	Digital Input
Calibration Date:	8/9/2018

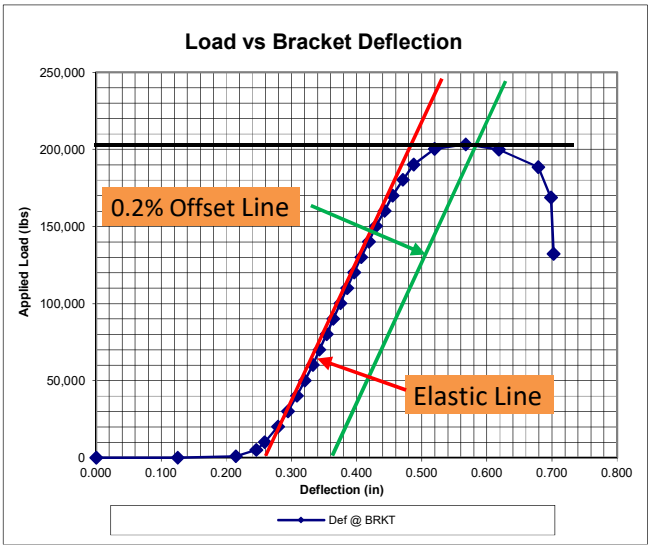
Test Sample

Failure Mode : Buckle

Test Method: AC358 Section 4.1.1

Measurements:

Load (lbs)	Def (in)	Load (lbs)	Def (in)
0	0.000	170,093	0.455
106	0.126	180,223	0.471
1,028	0.215	190,110	0.487
5,127	0.246	200,268	0.520
10,074	0.259	203,277	0.568
20,205	0.279	199,868	0.619
30,125	0.295	188,539	0.679
40,156	0.309	168,712	0.698
50,084	0.321	132,278	0.703
60,197	0.333		
70,146	0.343		
80,217	0.354		
90,109	0.364		
100,138	0.375		
110,120	0.385		
120,210	0.396		
130,102	0.407		
140,127	0.419		
150,136	0.430		
160,189	0.443		



Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.1 inches. A line was plotted parallel to the elastic line and shifted 0.1 inches to the right to obtain the yielding Load.

Yield Load Py (lb):	200,300
Ultimate Load P_u (lb):	203,277
Allowable Capacity of Bracket (lbs)[1]:	101,639

[1] *(Smallest of 0.6fy or 0.5fu per AC358;sec 3.7.3)*

Type A Bracket Capacity Test

Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested:	10/26/2018
Technician:	Brandon Edwards

Specimen Specification

Specimen Number:	BRKT 4
Bracket Type:	Adj. Head Ass.
Outer Pier Segment Diameter (in)*:	2.879
Inner Pier Segment Diameter (in)*:	2.377
Outer Pier Segment Thickness (in)*:	0.219
Inner Pier Segment Thickness (in)*:	0.189
Shaft Length (in):	24
Inclination Angle of Shaft (deg):	N.A.
Test Site:	Bureau of Reclamation
Concrete Block Cast Date:	N.A.
Concrete Compressive Strength (psi):	N.A.
Date of Concrete Cylinder Break:	N.A.
Loading Device:	Instron Machine
Loading Device ID:	59R5598Q9266
Load & Def Measurements:	Digital Input
Calibration Date:	8/9/2018

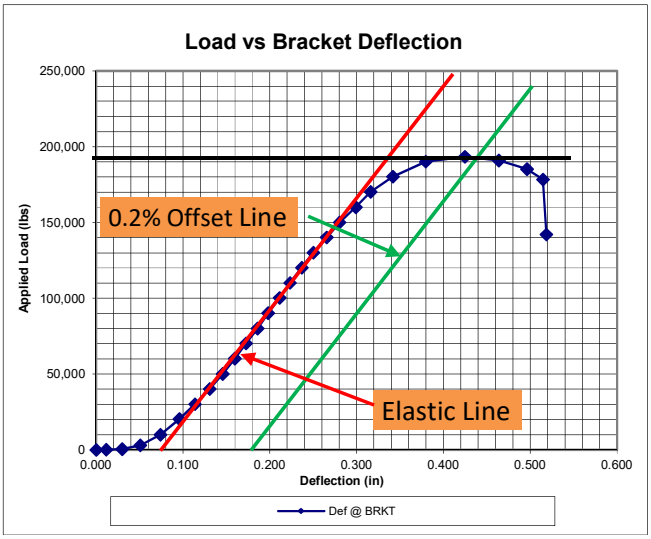
Test Sample

Failure Mode : Buckle

Test Method: AC358 Section 4.1.1

Measurements:

Load (lbs)	Def (in)	Load (lbs)	Def (in)
0	0.000	170,155	0.316
184	0.012	180,259	0.342
561	0.030	190,078	0.380
3,006	0.051	193,342	0.425
10,054	0.074	190,968	0.464
20,237	0.096	185,304	0.496
30,127	0.114	178,400	0.515
40,210	0.131	142,159	0.519
50,119	0.146		
60,178	0.160		
70,172	0.173		
80,196	0.186		
90,140	0.198		
100,170	0.212		
110,076	0.223		
120,209	0.237		
130,128	0.250		
140,217	0.266		
150,111	0.281		
160,152	0.299		



Yield Load Py (lb):	190,200
Ultimate Load P_u (lb):	193,342
Allowable Capacity of Bracket (lbs)[1]:	96,671

[1] *(Smallest of 0.6fy or 0.5fu per AC358;sec 3.7.3)*

Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.1 inches. A line was plotted parallel to the elastic line and shifted 0.1 inches to the right to obtain the yielding Load.

Type A Bracket Capacity Test

CTL | THOMPSON INCORPORATED — IAS ACCREDITED Testing Laboratory

Client:	Stabil-Loc Systems, LLC
Job Number :	FC08472
Date Tested:	10/26/2018
Technician:	Brandon Edwards

Specimen Specification

Specimen Number:	BRKT 5
Bracket Type:	Adj. Head Ass.
Outer Pier Segment Diameter (in)*:	2.875
Inner Pier Segment Diameter (in)*:	2.377
Outer Pier Segment Thickness (in)*:	0.217
Inner Pier Segment Thickness (in)*:	0.189
Shaft Length (in):	24
Inclination Angle of Shaft (deg):	N.A.
Test Site:	Bureau of Reclamation
Concrete Block Cast Date:	N.A.
Concrete Compressive Strength (psi):	N.A.
Date of Concrete Cylinder Break:	N.A.
Loading Device:	Instron Machine
Loading Device ID:	59R5598Q9266
Load & Def Measurements:	Digital Input
Calibration Date:	8/9/2018

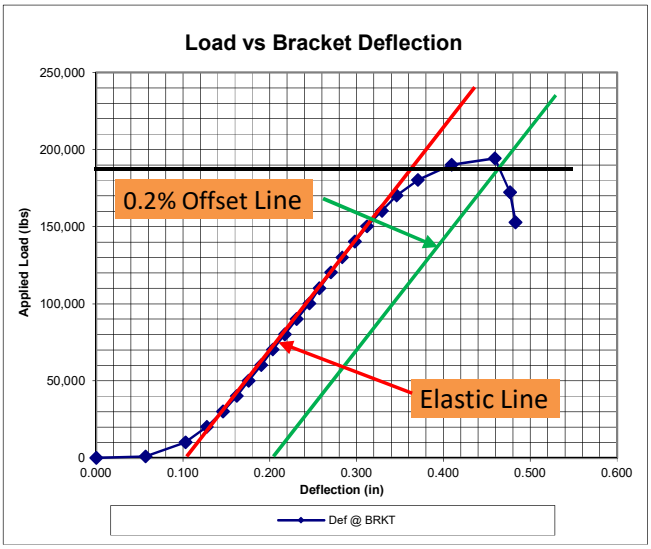
Test Sample

Failure Mode : Buckle

Test Method: AC358 Section 4.1.1

Measurements:

Load (lbs)	Def (in)	Load (lbs)	Def (in)
0	0.000	190,084	0.409
1,024	0.057	194,270	0.459
10,069	0.103	172,249	0.477
20,208	0.127	152,775	0.483
30,153	0.146		
40,253	0.162		
50,115	0.176		
60,172	0.190		
70,168	0.204		
80,223	0.218		
90,135	0.231		
100,191	0.246		
110,104	0.257		
120,226	0.271		
130,075	0.284		
140,259	0.298		
150,136	0.312		
160,220	0.329		
170,116	0.346		
180,247	0.371		



Yield Load Py (lb):	Not Reported
Ultimate Load P_u (lb):	194,270
Allowable Capacity of Bracket (lbs)[1]:	97,135

[1] *(Smallest of 0.6fy or 0.5fu per AC358;sec 3.7.3)*

Note: Based on the sample length, the 0.2% strain corresponds to a deflection of 0.1 inches. A line was plotted parallel to the elastic line and shifted 0.1 inches to the right to obtain the yielding Load. The sample failed prior to the 0.2% offset, so 0.5*fu is reported.

SECTION 2:

IAS ACCREDITATION CERTIFICATE

ACCREDITED
Testing
Laboratory

CTL | THOMPSON
INCORPORATED

INTERNATIONAL ACCREDITATION SERVICE®

CERTIFICATE OF ACCREDITATION

This is to attest that

CTL/THOMPSON, INC.

400 NORTH LINK LANE
FORT COLLINS, COLORADO 80524

Testing Laboratory TL-342

has met the requirements of AC89, *IAS Accreditation Criteria for Testing Laboratories,* and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories.* This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

This certificate is effective date and valid up to October 1, 2021.

This accreditation certificate supersedes any IAS accreditation bearing an earlier effective date. The certificate becomes invalid upon suspension, cancellation or revocation of accreditation. See www.iasonline.org for current accreditation information, or contact IAS at 562-364-8201.

INTERNATIONAL ACCREDITATION SERVICE®

ilac-MRA

Raj Nathan
President

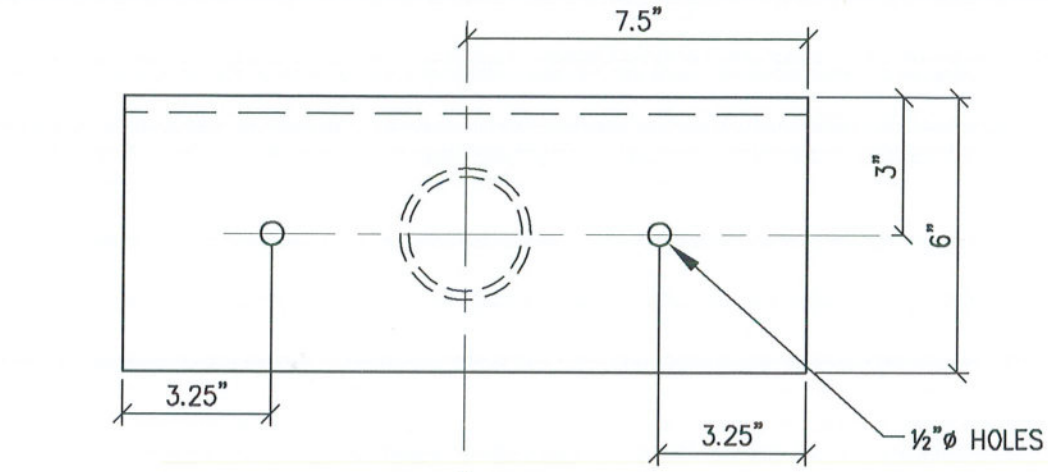
15-12065

APPENDIX A:

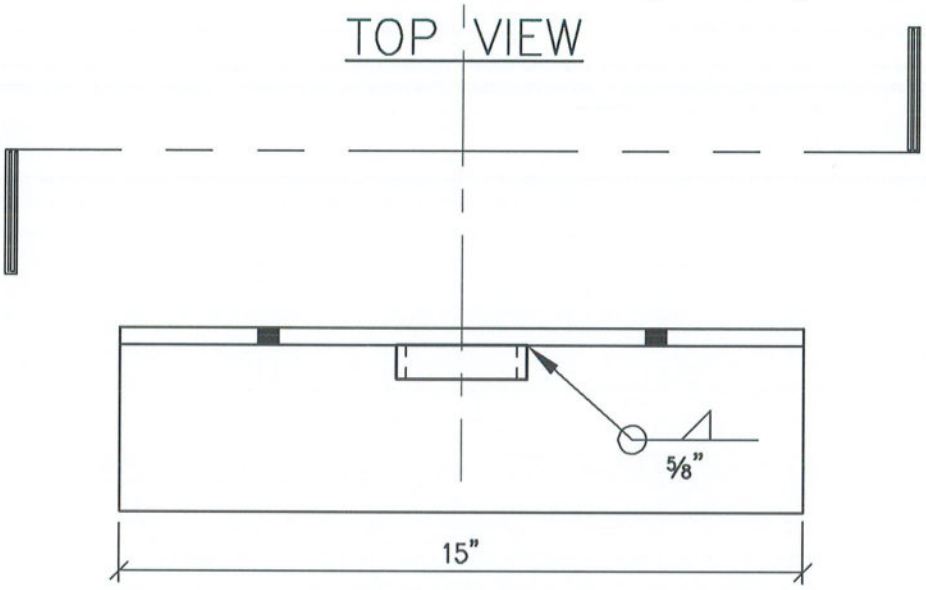
SHOP DRAWINGS & MATERIAL SPECIFICATIONS

ACCREDITED
Testing Laboratory

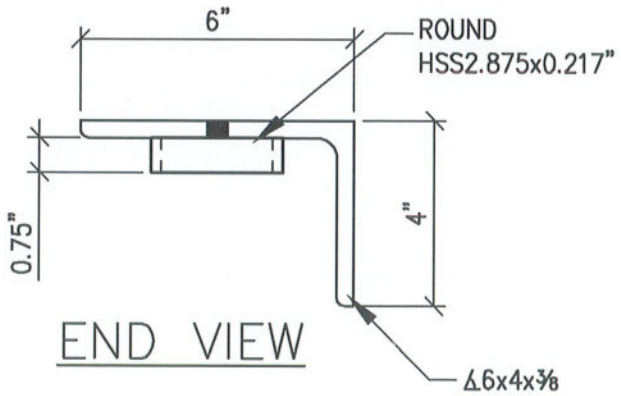
CTL | THOMPSON INCORPORATED



TOP VIEW



SIDE VIEW



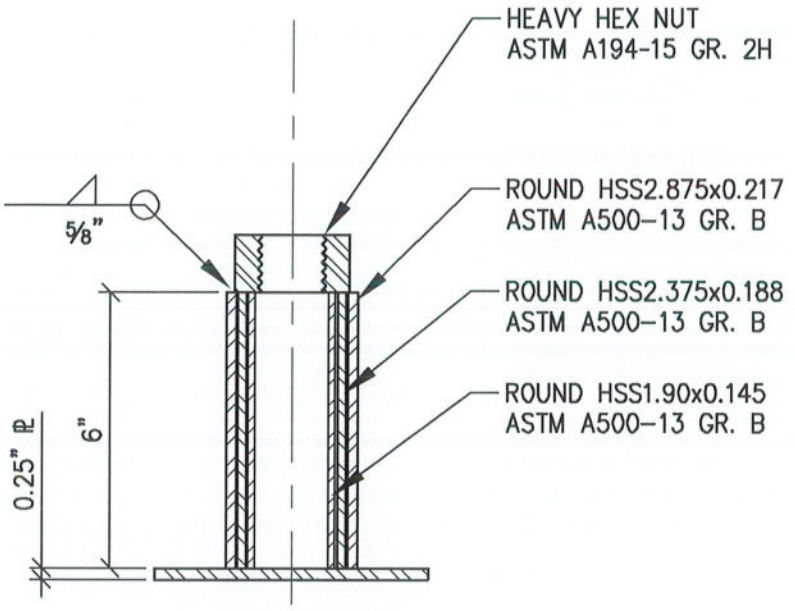
END VIEW

STEEL NOTES:

1. STEEL ANGLES: ASTM A36-14
2. ROUND HSS: ASTM A500-13 GR. B
3. WELDS: ER70S-6 FILLER METAL
4. TOLERANCE: ±1%

BEARING PLATE

STABIL-LOC, INC.
DATE: 6-12-18
REVISION 2



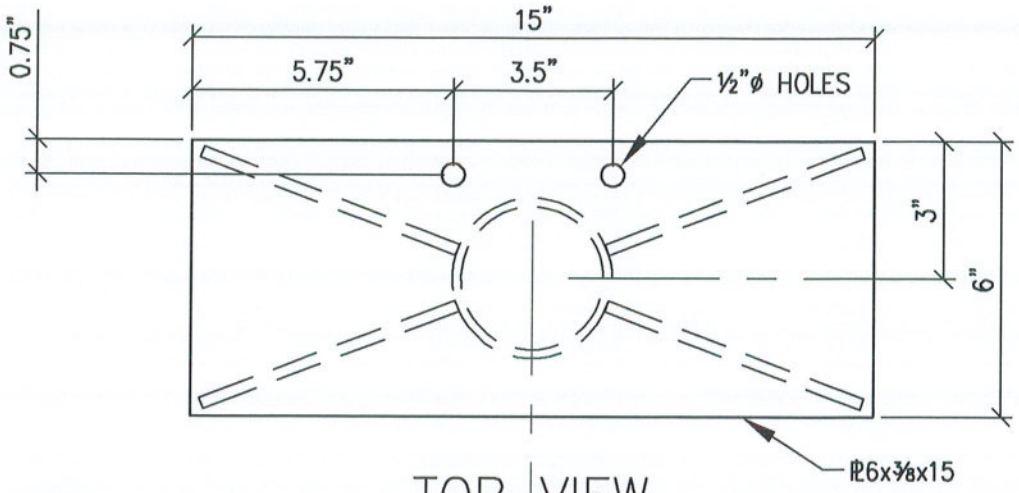
SECTION VIEW

STEEL NOTES:

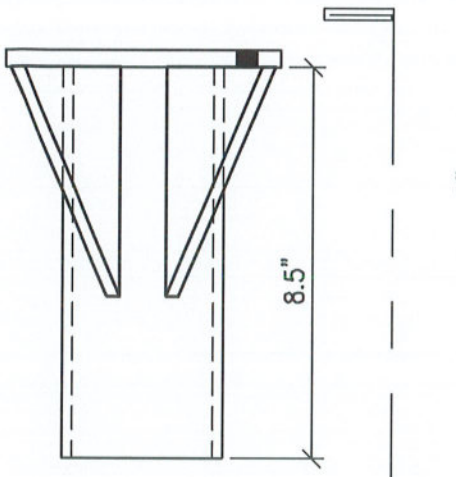
1. STEEL PLATES: ASTM A36
2. ROUND HSS: ASTM A500-13 GR. B
3. WELDS: ER70S-6 FILLER METAL
4. TOLERANCE: ±1%

SHIM BLOCK (2 of 2)

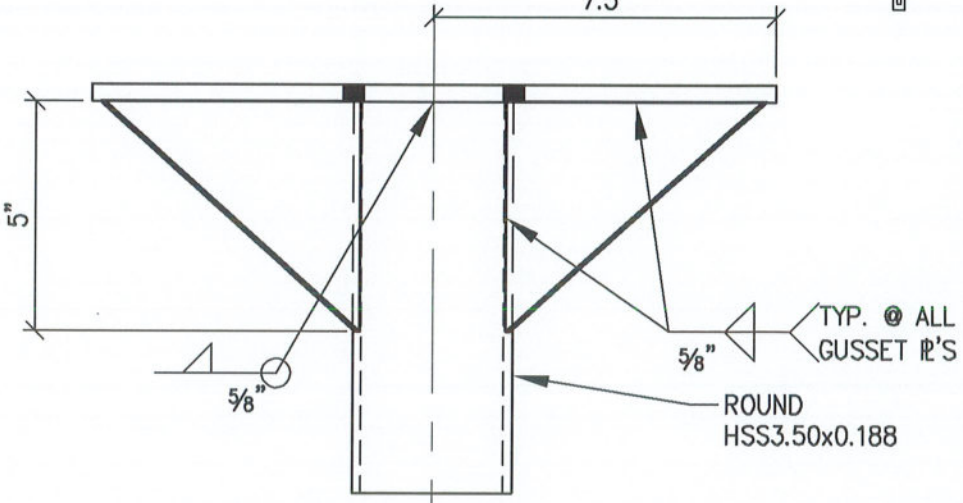
STABIL-LOC, INC.
DATE: 6-12-18
REVISION 2



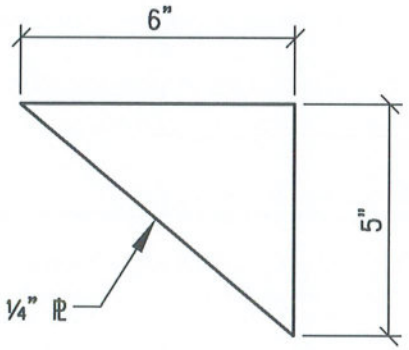
TOP VIEW



END VIEW



SIDE VIEW



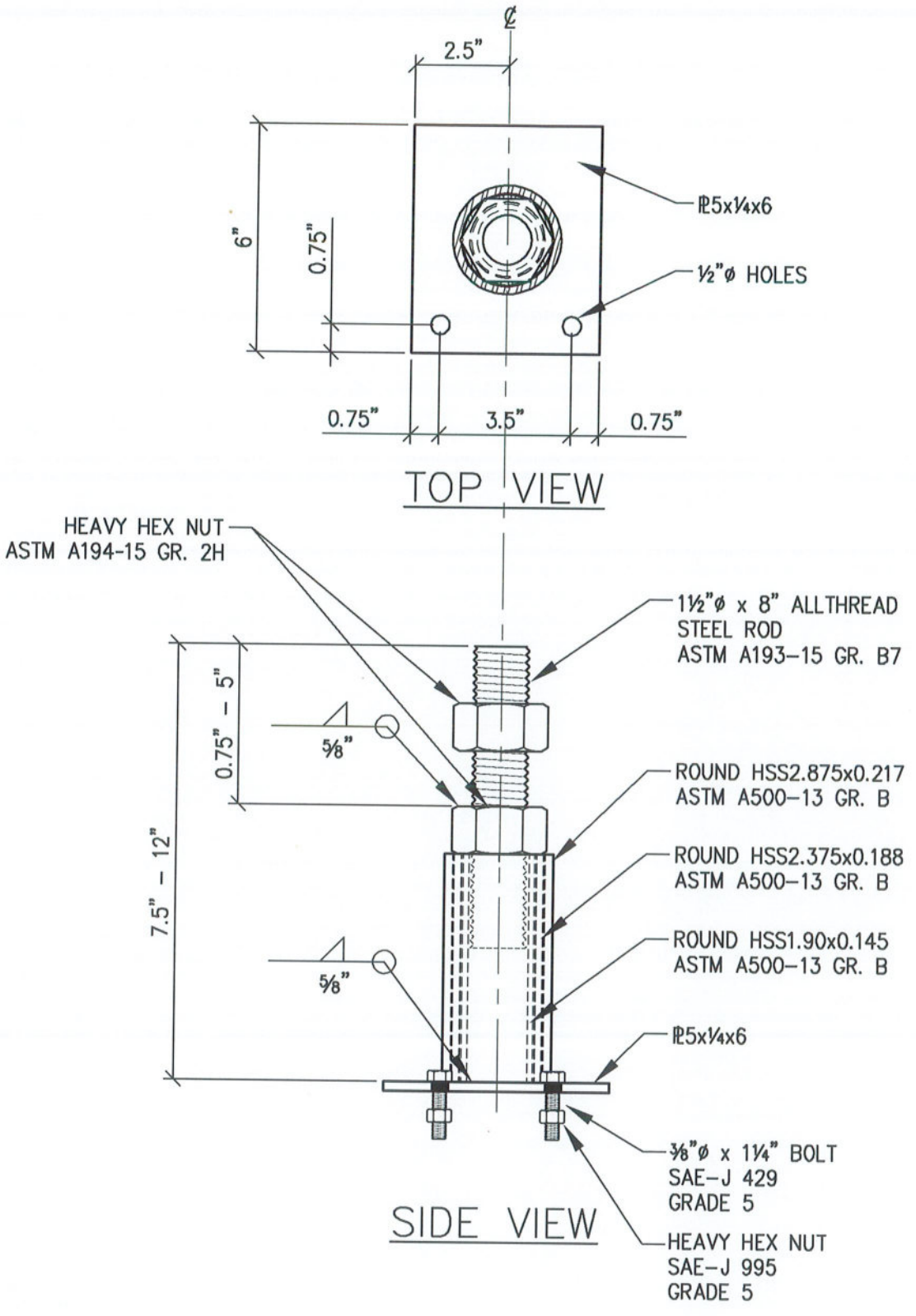
TYPICAL GUSSET PL

STEEL NOTES:

1. STEEL PL: ASTM A36-14
2. ROUND HSS: ASTM A500-13 GR. B
3. WELDS: ER70S-6 FILLER METAL
4. TOLERANCE: ±1%

HEAD PLATE

STABIL-LOC, INC.
DATE: 6-12-18
REVISION 2

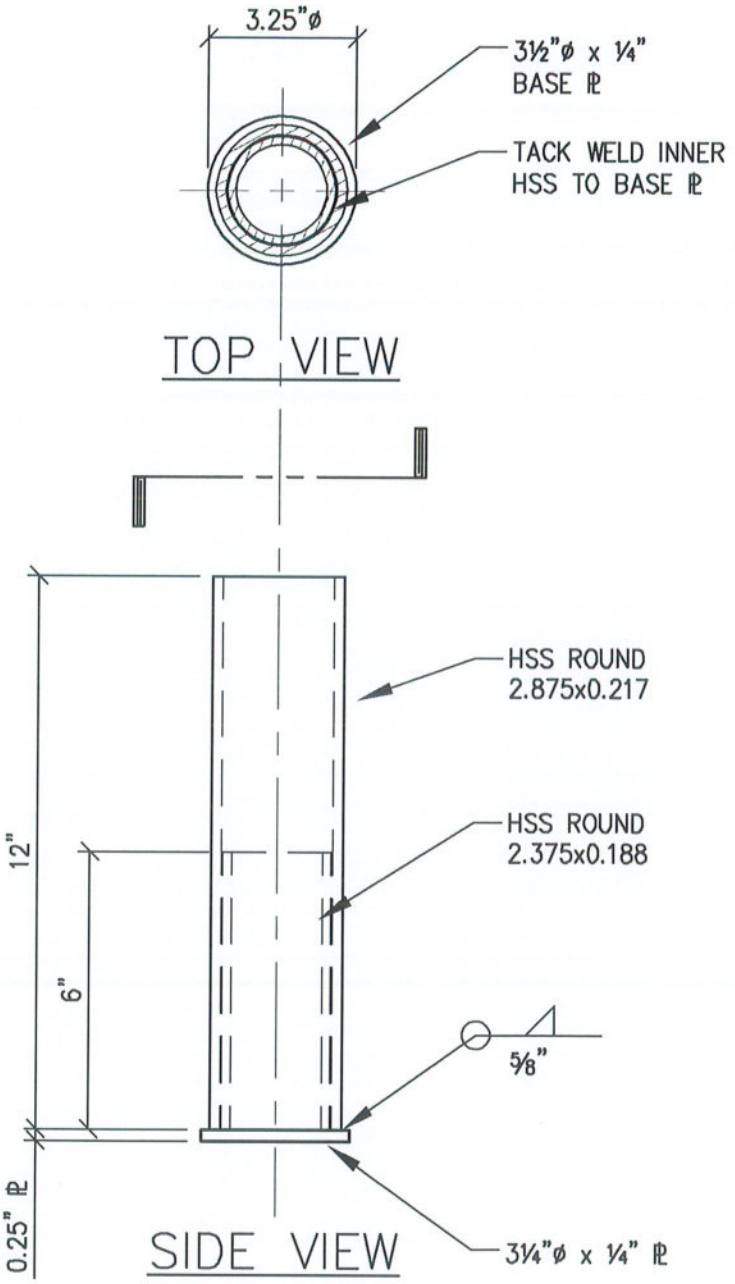


STEEL NOTES:

1. STEEL PLATES: ASTM A36
2. ROUND HSS: ASTM A500-13 GR. B
3. ALLTHREAD STEEL ROD: ASTM A193-15 GR. B7
4. WELDS: ER70S-6 FILLER METAL
5. TOLERANCE: ±1%

SHIM BLOCK (1 of 2)

STABIL-LOC, INC.
DATE: 6-12-18
REVISION 2



STEEL NOTES:

1. STEEL PLATE: ASTM A36-14
2. ROUND HSS: ASTM A500-13 GR. B
3. WELDS: ER70S-6 FILLER METAL
4. TOLERANCE: ±1%

STARTER ASSEMBLY

STABIL-LOC, INC.
DATE: 6-12-18
REVISION 2

Material Test Report

Customer
STABIL LOC INC.
1948 TURNBOW
SPRINGDAL , 5 72764
Fax

USA Fastener Group, Inc.
1300 Gazin St., Houston, Texas 77020
P: (866)546-5872 | F: (713)641-4655
sales@usafgrp.com

Specification	Year	Description	PO Number	Lot Number
A193	16	All Thread Stud	GINGER	106291-1

Heat Number	Grade	Size	TPI	Length	Finish
3070289	B7	1.3/8	8	8	

C	Si	S	P	Mn	Mo	Cr	Ni	Al	V	Fe	Ti	Cu
0.42	0.28	0.02	0.011	0.95	0.232	1.06	0	0	0	0	0	

Yield		Scale	Tensile		Scale
140820	0	psi	15020	0	psi

Elong %		R.A %	
23.51	0	60.46	0

Hardness		Scale
310	0	HB

Charpy Set 1			Scale	Temp	Macro Etch			Wedge Tensile	Proof Load
0	0	0			R	C	S		
Charpy Set 2					1	2	1		
0	0	0							

Quenched	Tempered	Stress Relieved
@ 0 ° in	1100 ° F	0 °

Remarks:
QUENCHED & TEMPERED

bolts from shimblock to head plate

Memo:
1 3/8-8 X 8 AT STUD A193-B7 PLAIN

The above described product was manufactured, sampled, tested and inspected in accordance with the required specification, including any supplementary requirements or other requirements designated in the purchase order or contract and were found to meet those requirements.

Quality Assurance
Laura Taylor

Customer
STABIL LOC INC.
1948 TURNBOW
SPRINGDALE , 5 72764
Fax

Material Test Report

USA Fastener Group, Inc.
1300 Gazin St., Houston, Texas 77020
P: (866)546-5872 | F: (713)641-4655
sales@usafgrp.com

Specification	Year	Description	PO Number	Lot Number
A194	06A	Heavy Hex Nuts	GINGER	108204-A

Grade	Size	TPI	Finish	Heat Number	Heat Code	Markings
2H	1.3/8	8	Plain	F6040302		

C	Si	S	P	Mn	Mo	Cr	Ni	Cu
0.440	0.240	0.003	0.021	0.570	0.000	0.000	0.000	

Hardness		Scale	Tempered Hardness		Tempered Hardness Scale
28	29	HRC	90		HRB

First Charpy Set		
0	0	0
Second Charpy Set		
0	0	0

Charpy Scale	Charpy Temp

Macro Etch		
S	C	R
2	2	2

Proofload
215800 LBF

Quenching	Tempering
@ 0 ° in	@ 968 ° F

Remarks

Memos:
1 3/8-8 HVY HEX NUT A194-2H PLAIN

Quality Assurance
Laura Taylor

The above described product was manufactured, sampled, tested and inspected in accordance with the required specification, including any supplementary requirements or other requirements designated in the purchase order or contract and were found to meet those requirements.

From bearing plate to concrete foundation

SIMPSON Strong-Tie ANCHOR SYSTEMS

WEDGE-ALL™ WEDGE ANCHORS

The Wedge-All is a non-bottom bearing, wedge style expansion anchor for use in solid concrete or grout filled masonry. A one-piece clip ensures uniform holding capacity that increases as tension is applied. A threaded stud version is available in nine diameters and several lengths. A single size tie-wire version is available for wire supported fixtures. Threaded studs are set by tightening the nut. Tie-wire anchors are set with the claw end of a hammer.

WEDGE-ALL SPECIAL FEATURES:

- One piece wrap around clip.
- Threaded end is chamfered for ease of starting nut.

MATERIAL: Carbon steel; stainless steel.

FINISH: Carbon steel anchors are available in zinc plated or mechanically galvanized.

INSTALLATION: • Hole in steel or metal fixtures to be mounted should exceed anchor diameter by 1/16" for 1/4" thru 5/8" diameter bolts, and 1/8" for all other diameters.

Caution: It is important to use the proper drill bit size. Oversized holes will make it difficult to set the anchor and will lower the anchor's load capacity.

Threaded studs:

- Drill a hole in the base material using a carbide tipped bit the same diameter as the anchor to be installed. The hole should be at least 1/2" deeper than the embedment required.
- Blow the hole clean using compressed air.
- Assemble the anchor with nut and washer so the top of the nut is flush with the top of the anchor. Place the anchor in the fixture and drive into the hole until washer and nut are tight against fixture.
- Tighten nut finger tight. Tighten to required torque setting.

Tie-Wire:

- Drill a hole at least 1 1/2" deep using a 1/4" carbide tipped bit.
- Drive the anchor into the hole until the head is seated against the base material.
- Set the anchor by prying/pulling with the claw end of the hammer.

CODES: ICBO ER 3631; SBCCI 9706; City of L.A. RR24682; Dade County 95-0511.04; Factory Mutual 1M6AO.AH; Underwriters Laboratories File Ex3605; Meets requirements of Federal Specifications A-A-1923A, Type 4. **The Load Tables list values based upon results from the most recent testing and may not reflect those in the current ICBO and City of L.A. reports. Where these code jurisdictions apply, consult the current reports for applicable load values.**

Wedge-All Product Data

Size (in)	Model No.	Thread Length (in)	Quantity	
			Box	Ctn
1/4 x 1 1/2	TWD25112	Eye dia is 9/32	100	500
1/4 x 1 3/4	WA25134	15/16	100	500
1/4 x 2 1/4	WA25214	1 7/16	100	500
1/4 x 3 1/4	WA25314	2 7/16	100	500
3/8 x 2 1/4	WA37214	1 1/8	50	250
3/8 x 2 3/4	WA37234	1 5/8	50	250
3/8 x 3	WA37300	1 1/8	50	250
3/8 x 3 3/4	WA37334	2 5/8	50	250
3/8 x 5	WA37500	3 5/8	50	200
3/8 x 7	WA37700	1 1/4	50	200
1/2 x 2 3/4	WA50234	1 5/16	25	125
1/2 x 3 1/4	WA50334	2 5/16	25	125
1/2 x 4 1/4	WA50414	2 13/16	25	100
1/2 x 5 1/2	WA50512	4 1/16	25	100
1/2 x 7	WA50700	5 9/16	25	100
1/2 x 8 1/2	WA50812	6	25	50
1/2 x 10	WA50100	6	25	50
1/2 x 12	WA50120	6	25	50
5/8 x 3 1/2	WA62312	1 1/8	20	80
5/8 x 4 1/2	WA62412	2 1/8	20	80
5/8 x 5	WA62500	3 1/8	20	80
5/8 x 6	WA62600	4 1/8	20	80
5/8 x 7	WA62700	5 1/8	20	80
5/8 x 8 1/2	WA62812	6	20	40
5/8 x 10	WA62100	6	10	20
5/8 x 12	WA62120	6	10	20
3/4 x 4 1/4	WA75414	2 1/8	10	40
3/4 x 4 3/4	WA75434	2 7/8	10	40
3/4 x 5 1/2	WA75512	3 5/8	10	40
3/4 x 6 1/4	WA75614	4 3/8	10	40
3/4 x 7	WA75700	5 1/8	10	40
3/4 x 8 1/2	WA75812	6	10	20
3/4 x 10	WA75100	6	10	20
3/4 x 12	WA75120	6	5	10
7/8 x 6	WA87600	2 1/8	5	20
7/8 x 8	WA87800	2 1/8	5	10
7/8 x 10	WA87100	2 1/8	5	10
7/8 x 12	WA87120	2 1/8	5	10
1 x 6	WA16000	2 1/4	5	20
1 x 9	WA19000	2 1/4	5	10
1 x 12	WA11200	2 1/4	5	10
1 1/4 x 9	WA12590	2 3/4	5	10
1 1/4 x 12	WA12512	2 3/4	5	10
1 1/2 x 12	WA15012	3 1/4	5	10

1. The published length is the overall length of the anchor. Allow one anchor diameter for the nut and washer thickness plus the fixture thickness when selecting a length.
2. Some anchors shown are also available in mechanically galvanized, 303, 304 and 316 stainless steel. Call for availability.
3. Special lengths are available on request. Load values apply as long as minimum embedment depths are satisfied.

Material Specifications

Anchor Component	Component Material			
	Zinc Plated Carbon Steel[1]	Mechanically Galvanized[2]	Stainless Steel	Stainless Steel
Anchor Body	Material meets minimum 70,000 psi tensile	Material meets minimum 70,000 psi tensile	Type 303/304	Type 316
Nut	Carbon Steel, ASTM A 563, Grade A	Carbon Steel, ASTM A 563, Grade A	Type 18-8	Type 316
Washer	Carbon Steel	Carbon Steel	Type 18-8	Type 316
Clip	Carbon Steel	Carbon Steel	Type 304	Type 304

1. Zinc Plated meets ASTM B 633, Class SC 1 (Fe / Zn 5), Type III.
2. Mechanically galvanized meets ASTM B, Class 65, Type I.

Length Identification Head Marks on Wedge-Alls (corresponds to length of anchor – inches).

Mark	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
From	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10	11	12	13	14	15	16	17	18
UpTo But Not Including	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10	11	12	13	14	15	16	17	18	19

Example Calculation for a Group of two (2) Wedge-All Anchors:

Design a connection comprised of two (2) ¾" diameter Wedge-All WA75614 anchors installed in f'_c = 2000 psi normal weight concrete as shown. The anchor group has an applied tension load of 1500 lbs. and an applied shear load of 2400 lbs. acting simultaneously.

Additional Data:

- Embedment depth = 5" (medium embedment).
- Spacing = S_{act} = S1 = 10".
- Critical spacing for ¾" dia. anchor at medium embedment = S_{cr} = 20".
- $S_{act} < S_{cr}$ (reduction for spacing must be applied).
- Critical edge distance for ¾" dia. anchor = C_{cr} = 7 ½".
- Edge distance = C_{act} = C1 = C2 = 6".
- $C_{act} < C_{cr}$ (reduction for edge distance must be applied).

SOLUTION:

TENSION: Determine Uninfluenced Allowable Tension load in f'_c = 2000 psi normal wt. concrete:

Uninfluenced Allowable Tension = 2510 lbs.

Determine tension load adjustment factor for Spacing at medium embedment:

Embedment = 5"

S_{act} = S1 = 10"

f_{sS1} = 0.95 = Load Adjustment Factor

Determine tension load adjustment factor for Edge Distance:

C_{act} = C1 = C2 = 6"

f_{cC1} = 0.90 = Load Adjustment Factor

f_{cC2} = 0.90 = Load Adjustment Factor

Calculate Allowable Tension load per anchor:

Allowable Tension=(Uninfluenced Allowable Tension) $(f_{sS1})(f_{cC1})(f_{cC2})$

Allowable Tension=(2510 lbs.)(0.95)(0.90)(0.90)=1931 lbs per anchor

SHEAR: Determine Uninfluenced Allowable Shear load in f'_c = 2000 psi normal wt. concrete:

Uninfluenced Allowable Shear = 4605 lbs.

Determine shear load adjustment factor for Spacing at medium embedment:

Embedment = 5"

S_{act} = S1 = 10"

f_{sS1} = 1.00 = Load Adjustment Factor

Determine shear load adjustment factor for Edge Distance:

C_{act} = C1 = C2 = 6"

f_{cC1} = 0.77 = Load Adjustment Factor

f_{cC2} = 0.77 = Load Adjustment Factor

Calculate Allowable Shear load per anchor:

Allowable Shear = (Uninfluenced Allowable Shear)$(f_{sS1})(f_{cC1})(f_{cC2})$

Allowable Shear = (4605 lbs.)(1.00)(0.77)(0.77) = 2730 lbs. per anchor

Check Anchor for Combined Tension and Shear:

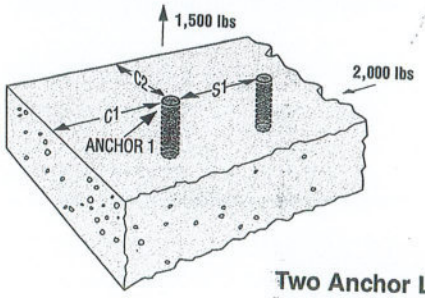
Unity Check:

(Applied Tension/Allowable Tension)+(Applied Shear/Allowable Shear)<=1.00

Allowable Tension = 1931 lbs. x 2 = 3862 lbs. (two (2) anchors)

Allowable Shear = 2730 lbs. x 2 = 5460 lbs. (two (2) anchors)

(1500 / 3862) + (2400 / 5460) = 0.83 <= 1.00 ok



Two Anchor Layout

The allowable tension (or shear) value for a group of anchors is equal to the lowest (minimum) tension (or shear) value for a single anchor within the group multiplied by the number of anchors within the group.

Load Adjustment Factors

Load Adjustment Factors for minimum spacing have been determined by testing for shallow and deep embedment and by linear interpolation for medium embedment.

How to use these charts:

1. Locate the anchor size to be used for either a tension and/or shear load application.
2. Locate the edge distance and/or spacing at which the anchor is to be installed.
3. The load adjustment factor(s) will be the intersection of the row and column.
4. Multiply allowable load by applicable load adjustment factor(s).
5. Multiple adjustment factors for reduced edges and/or reduced spacing are multiplied together.

Load Adjustment Factors for Reduced Edge Distance for Wedge-All Anchors in Concrete

f_c – Edge Distance Tension

Edge Dist. C_{act} (in)	Size	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2
	C_{cr}	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	12 1/2	15
	C_{min}	1	1 1/2	2	2 1/2	3	3 1/2	4	5	6
	f_{cmin}	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
1		0.70								
1 1/2		0.80	0.70							
2		0.90	0.77	0.70						
2 1/2		1.00	0.83	0.75	0.70					
3			0.90	0.80	0.74	0.70				
3 1/2			0.97	0.85	0.78	0.73	0.70			
3 3/4			1.00	0.88	0.80	0.75	0.71			
4				0.90	0.82	0.77	0.73	0.70		
4 1/2				0.95	0.86	0.80	0.76	0.73		
5				1.00	0.90	0.83	0.79	0.75	0.70	
5 1/2					0.94	0.87	0.81	0.78	0.72	
6					0.98	0.90	0.84	0.80	0.74	0.70
6 1/4					1.00	0.92	0.86	0.81	0.75	0.71
6 1/2						0.93	0.87	0.83	0.76	0.72
7						0.97	0.90	0.85	0.78	0.73
7 1/2						1.00	0.93	0.88	0.80	0.75
8							0.96	0.90	0.82	0.77
8 1/2							0.99	0.93	0.84	0.78
8 3/4							1.00	0.94	0.85	0.79
10								1.00	0.90	0.83
12 1/2									1.00	0.92
15										1.00

f_c – Edge Distance Shear

Edge Dist. C_{act} (in)	Size	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2
	C_{cr}	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	12 1/2	15
	C_{min}	1	1 1/2	2	2 1/2	3	3 1/2	4	5	6
	f_{cmin}	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
1		0.30								
1 1/2		0.53	0.30							
2		0.77	0.46	0.30						
2 1/2		1.00	0.61	0.42	0.30					
3			0.77	0.53	0.39	0.30				
3 1/2			0.92	0.65	0.49	0.38	0.30			
3 3/4			1.00	0.71	0.53	0.42	0.33			
4				0.77	0.58	0.46	0.37	0.30		
4 1/2				0.88	0.67	0.53	0.43	0.36		
5				1.00	0.77	0.61	0.50	0.42	0.30	
5 1/2					0.86	0.69	0.57	0.48	0.35	
6					0.95	0.77	0.63	0.53	0.39	0.30
6 1/4					1.00	0.81	0.67	0.56	0.42	0.32
6 1/2						0.84	0.70	0.59	0.44	0.34
7						0.92	0.77	0.65	0.49	0.38
7 1/2						1.00	0.83	0.71	0.53	0.42
8							0.90	0.77	0.58	0.46
8 1/2							0.97	0.83	0.63	0.49
8 3/4							1.00	0.85	0.65	0.51
10								1.00	0.77	0.61
12 1/2									1.00	0.81
15										1.00

1. C_{act} = actual edge distance at which anchor is installed.
2. C_{cr} = critical edge distance for 100% load.
3. C_{min} = minimum edge distance for reduced load.
4. f_c = percent of allowable load at actual edge distance.
5. f_{ccr} = percent of allowable load at critical edge distance. f_{ccr} is always = 1.00.
6. f_{cmin} = percent of allowable load at minimum edge distance.
7. $f_c = f_{cmin} + [(1 - f_{cmin})(C_{act} - C_{min}) / (C_{cr} - C_{min})]$.

How to use these charts:

1. Locate the anchor size to be used for either a tension and/or shear load application.
2. Locate the edge distance and/or spacing at which the anchor is to be installed.
3. The load adjustment factor(s) will be the intersection of the row and column.
4. Multiply allowable load by applicable load adjustment factor(s).
5. Multiple adjustment factors for reduced edge and/or reduced spacing are multiplied together.

Load Adjustment Factors for Reduced Spacing for Wedge-All Anchors in Concrete

f_s – Spacing Tension Shallow Embedment

S_{act} (in)	Size	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2
	Embed	1 1/8	1 3/4	2 1/4	2 3/4	3 3/8	3 7/8	4 1/2	5 5/8	6 3/4
	S_{cr}	4 1/2	7	9	11	13 1/2	15 1/2	18	22 1/2	27
	S_{min}	1 5/8	2 1/2	3 1/4	3 7/8	4 3/4	5 1/2	6 3/8	7 3/4	7 7/8
	f_{smin}	1.00	0.86	0.86	0.86	0.86	0.84	0.84	0.84	0.84
1 5/8		1.00								
2		1.00								
2 1/2		1.00	0.86							
3		1.00	0.88							
3 1/2		1.00	0.89	0.86						
4		1.00	0.91	0.87	0.86					
4 1/2		1.00	0.92	0.89	0.87					
5			0.94	0.90	0.88	0.86				
5 1/2			0.95	0.91	0.89	0.87	0.84			
6			0.97	0.92	0.90	0.88	0.85			
6 1/2			0.98	0.94	0.91	0.88	0.86	0.84		
7			1.00	0.95	0.92	0.89	0.86	0.85		
7 1/2				0.96	0.93	0.90	0.87	0.85		
8				0.97	0.94	0.91	0.88	0.86	0.84	0.84
9				1.00	0.96	0.92	0.89	0.87	0.85	0.85
10					0.98	0.94	0.91	0.89	0.86	0.86
11					1.00	0.95	0.92	0.90	0.87	0.87
12						0.97	0.94	0.92	0.88	0.87
14						1.00	0.97	0.94	0.91	0.89
16							1.00	0.97	0.93	0.91
18								1.00	0.95	0.92
20									0.97	0.94
22 1/2									1.00	0.96
24										0.97
27										1.00

f_s – Spacing Tension Medium Embedment

S_{act} (in)	Size	3/8	1/2	5/8	3/4
	Embed	2 5/8	3 3/8	4 1/2	5
	S_{cr}	10 1/2	13 1/2	18	20
	S_{min}	3 3/4	4 3/4	6 3/8	7
	f_{smin}	0.93	0.93	0.93	0.93
3 3/4		0.93			
4		0.93			
4 1/2		0.94			
5		0.94	0.93		
5 1/2		0.95	0.93		
6		0.95	0.94		
6 1/2		0.96	0.94	0.93	
7		0.96	0.95	0.93	0.93
8		0.97	0.95	0.94	0.94
9		0.98	0.96	0.95	0.94
10		0.99	0.97	0.95	0.95
11		1.00	0.98	0.96	0.95
12			0.98	0.96	0.96
13			0.99	0.97	0.96
14			1.00	0.98	0.97
16				0.99	0.98
18				1.00	0.99
20					1.00

f_s – Spacing Tension Deep Embedment

S_{act} (in)	Size	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2
	Embed	2 1/4	3 3/8	4 1/2	5 1/2	6 3/4	7 7/8	9	9 1/2	13 1/2
	S_{cr}	9	13 1/2	18	22	27	31 1/2	36	38	54
	S_{min}	3 1/4	4 3/4	6 3/8	7 3/4	9 5/8	11 1/8	12 5/8	13 1/2	19
	f_{smin}	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96	0.96
3 1/4		1.00								
4		1.00								
5		1.00	1.00							
6		1.00	1.00							
7		1.00	1.00	1.00						
8		1.00	1.00	1.00	1.00					
9		1.00	1.00	1.00	1.00					
10			1.00	1.00	1.00	1.00				
11			1.00	1.00	1.00	1.00				
12			1.00	1.00	1.00	1.00	0.96			
13			1.00	1.00	1.00	1.00	0.96	0.96		
14			1.00	1.00	1.00	1.00	0.96	0.96	0.96	
16				1.00	1.00	1.00	0.97	0.97	0.96	
18				1.00	1.00	1.00	0.97	0.97	0.97	
20					1.00	1.00	0.98	0.97	0.97	0.96
24					1.00	1.00	0.98	0.98	0.98	0.96
28						1.00	0.99	0.99	0.98	0.97
32							1.00	0.99	0.99	0.97
36								1.00	1.00	0.98
38									1.00	0.98
54										1.00

1. S_{act} = actual spacing at which anchors are installed.
2. S_{cr} = critical spacing for 100% load.
3. S_{min} = minimum spacing for reduced load.
4. f_s = percent of allowable load at actual spacing.
5. f_{scr} = percent of allowable load at critical spacing. f_{scr} is always = 1.00.
6. f_{smin} = percent of allowable load at minimum spacing.
7. $f_s = f_{smin} + [(1 - f_{smin}) (S_{act} - S_{min}) / (S_{cr} - S_{min})]$.
8. f_s = 1.00 for shear (shallow, medium and deep embedments).

Atlas Tube (Alabama), Inc.
1.71 Clegge Dr
Birmingham, Alabama, USA
35217
Tel:
Fax:

Atlas Tube
A DIVISION OF ZEKELMAN INDUSTRIES

Ref.B/L: 80812598
Date: 03.29.2018
Customer: 436

MATERIAL TEST REPORT

Sold to

Boyd Metals
PO Box 819
FORT SMITH AR 72902
USA

Shipped to

Boyd Metals
600 South 7th Street
FORT SMITH AR 72902
USA

Material: 2.375x154x21'0"0(37x1). Material No: R023761642100-B Made in: USA
Melted in: USA
Sales order: 1263134 Purchase Order: 243274 Cust Material #: PSTB240JV

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802283	0.210	0.470	0.015	0.001	0.020	0.025	0.080	0.002	0.010	0.030	0.060	0.001	0.001	0.000	0.007

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.31
MC00020777	37	071439 Psi	096090 Psi	23 %	93	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Material: 2.375x154x21'0"0(37x1). Material No: R023761642100-B Made in: USA
Melted in: USA
Sales order: 1263134 Purchase Order: 243274 Cust Material #: PSTB240JV

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802236	0.220	0.450	0.018	0.005	0.020	0.030	0.100	0.001	0.020	0.030	0.030	0.001	0.000	0.000	0.007

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.32
MC00020774	37	073975 Psi	096288 Psi	23 %	91	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Material: 2.375x154x21'0"0(37x1). Material No: R023761642100-B Made in: USA
Melted in: USA
Sales order: 1264510 Purchase Order: 243349

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802238	0.220	0.450	0.018	0.005	0.020	0.030	0.100	0.001	0.020	0.030	0.030	0.001	0.000	0.000	0.007

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.32
MC00020771	37	073975 Psi	096288 Psi	23 %	91	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Authorized by Quality Assurance:

The results reported on this report represent the actual attributes of the material furnished and indicate full compliance with all applicable specification and contract requirements.

Steel Tube Institute OF NORTH AMERICA

Metals Service Center Institute

Atlas Tube (Alabama), Inc.
L71 Cleage Dr
Birmingham, Alabama, USA
35217
Tel:
Fax:

Atlas Tube
A DIVISION OF ZEKELMAN INDUSTRIES

Ref.B/L: 80812598
Date: 03.29.2018
Customer: 436

MATERIAL TEST REPORT

Sold to

Boyd Metals
PO Box 819
FORT SMITH AR 72902
USA

Shipped to

Boyd Metals
600 South 7th Street
FORT SMITH AR 72902
USA

Material: 2.375x154x42°0°0(37x1), Material No: R023751544200-B

Sales order: 1263188 Purchase Order: 243294 Cust Material #: PST8240

Made In: USA
Melted In: USA

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802238	0.220	0.470	0.019	0.005	0.030	0.032	0.100	0.001	0.020	0.030	0.050	0.001	0.000	0.000	0.006

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.33
MC00020688	37	071264 Psi	089039 Psi	23 %	92	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Authorized by Quality Assurance:

The results reported on this report represent the actual attributes of the material furnished and indicate full compliance with all applicable specification and contract requirements.
Certified per the laws DT.1 method.

Steel Tube Institute OF NORTH AMERICA

Metals Service Center Institute

CERTIFIED MATERIAL TEST REPORT

GERDAU

US-ML-JACKSON TN
801 GERDAU AMERISTEEL ROAD
JACKSON, TN 38305
USA

CUSTOMER SHIP TO	CUSTOMER BILL TO
BOYD METALS 600 S 7TH ST FORT SMITH,AR 72901-4455 USA	BOYD METALS FORT SMITH, AR 72902-0819 USA

GRADE	SHAPE / SIZE	DOCUMENT ID:
GGMULTI	Flat Bar / 3/8 X 6	0000160172

LENGTH	WEIGHT	HEAT / BATCH
20'00"	4,896 LB	GJ182109/02

SALES ORDER	CUSTOMER MATERIAL N°
6612965/000010	

SPECIFICATION / DATE or REVISION
ASTM A529-14; A572-15
ASTM A6-17,A36-14, ASME SA-36
ASTM A709-17, AASHTO M270-15
CSA G40.20-13/G40.21-13

CUSTOMER PURCHASE ORDER NUMBER	BILL OF LADING	DATE
246745 VMI	1333-0000109965	06/21/2018

CHEMICAL COMPOSITION

C %	Mn %	P %	S %	Si %	Cu %	Ni %	Cr %	Mo %	Sn %	V %	Nb %	Al %
0.16	0.74	0.012	0.035	0.22	0.32	0.08	0.11	0.019	0.011	0.021	0.001	0.001

CHEMICAL COMPOSITION

CEqvA529 %
0.38

MECHANICAL PROPERTIES

YS PSI	UTS PSI	YS MPa	UTS MPa	G/L Inch	G/L mm
52820	72100	364	497	8.000	200.0
53550	72110	369	497	8.000	200.0

MECHANICAL PROPERTIES

Elong. %
30.00
30.00

COMMENTS / NOTES

This grade meets the requirements for the following grades:
ASTM Grades: A36; A529-50; A572-50; A709-36; A709-50
CSA Grades: 44W; 50W
AASHTO Grades: M270-36; M270-50
ASME Grades: SA36

The above figures are certified chemical and physical test records as contained in the permanent records of company. We certify that these data are correct and in compliance with specified requirements. This material, including the billets, was melted and manufactured in the USA. CMTR complies with EN 10204 3.1.

BHASKAR YALAMANCHILI
QUALITY DIRECTOR
Phone: (409) 267-1071 Email: Bhaskar.Yalamanchili@gerdau.com

BEN LOVELL
QUALITY ASSURANCE MGR.
Phone: (731) 423-5213 Email: benjamin.lovell@gerdau.com

HT# B69836

PO034132

0.375" x 1845

DOM

INNOVENTIVE INDUSTRIES

TEST CERTIFICATE

CUSTOMER NAME :
ADDRESS :
PURCHASE
ORDER NO & DATE : AR11017 DATED 04 MAY 2011

T.C. No. EXP/2997
DATE :-31.05.2011

HEAT NO : B69836

PRODUCT :ELECTRIC RESISTANCE WELDED CARBON STEEL MECHANICAL ROUND TUBING

COIL NO : U1E007

SIZE (INCH) :- 2.375" x 2.000"
O.D. I.D.

Outer Diameter (Inch)	2.375"	Specification : AS PER ASTM A513-T5, 1026 Stress Relieved (2009)
Inside Diameter (Inch)	2.000"	Grade :- 1026
Thickness (Inch)	.....	Total Feets : 492.33'
Length (Feet)	17'-19'	NO. Of Tubes : 25 Nos.

Chemical Analysis		% C		% Mn		% Si	% S		% P		% Al
Specification	1026	Min.	Max	Min.	Max	.....	Min.	Max	Min.	Max	
		0.22	0.28	0.6	0.9	....		0.035		0.035	....
AS per Spectro Analysis		0.265		0.650		0.190	0.004		0.010		0.032

Mechanical Properties :

	Flaring Test	Flattening Test	Reverse Flattening Test	Yield Strength In PSI		Tensile Strength In PSI		% Elongation At G.L. = 50.8 mm	Hardness HRB
				Min.	Max.	Min.	Max.	Min.	Min.
Specification (Clause No.or Value)	S6.3 A513 08 a	S6.2 A513 08 a	N.A	65000		75000		10	80
Observed	OK as per Spec.	OK as per Spec.	N.A	83198		93488		18	82

Diamensional Report

Parameter (Unit)		Outer Diameter in Inch		Inside Diameter In Inch	
		Min	Max	Min	Max
Specification		2.375	2.382	1.993	2.000
Observed	Sample 1	2.376	2.377	1.994	1.995
	Sample 2	2.377	2.378	1.995	1.996
	Sample 3	2.378	2.379	1.997	1.998

100% ECT Done As per S8.2.1 - A513 08 a: Tubes conforms to specification

Packing Details : AR11017 -9 - 8

Prepared By
Sign
Name : Suhas

Verified By :
Sign
Name : Sandip

Innoventive Industries Limited

Regd. Office : Gat No. 1261, Sanaswadi, Pune- Nagar Road, Tal- Shirur, Dist- Pune 412 208
Maharashtra(India) Tel. :+91-2137-669001/669002 Fax: +91 2137 669014
Mega Project : Gat No.56/3, 4, 5, Village Pimple Jagtap, Tal. Shirur, Dist. Pune- 412 208
Maharashtra (India) Tel.:+91 2137 617042

WEBCO MATERIAL TEST REPORT 2,875x.219

Purchase Order:	121674
Sales Order:	227712
Material:	A695287521904170 ASTM A513-5 2875OD 2437ID NATIONAL TUBE
Delivery / File Nbr:	80392108

Description: ASTM A513-5-15 DOM GRADE C1026
CARBON STEEL TUBING.

Test: NDT ELECTRIC TESTED TO ASTM A450 OR A1016 & APPLICABLE TEST METHOD E309 OR E426. SRA. . NO MERCURY IS INTENTIONALLY ADDED TO OUR RAW MATERIAL

Heat Number: NN1175251

		%
CARBON	LDL	0.240
MANGANESE	LDL	0.680
PHOSPHORUS	LDL	0.006
SULFUR	LDL	0.0003
SILICON	LDL	0.040
NICKEL	LDL	0.030
CHROMIUM	LDL	0.050
MOLYBDENUM	LDL	0.010
COPPER	LDL	0.070
ALUMINUM	LDL	0.03
CALCIUM	LDL	0.002
NITROGEN	LDL	0.009
TIN	LDL	0.002
TITANIUM	LDL	0.002
VANADIUM	LDL	0.002

** Not Reported

MTR# 125535
PO/Line# 121674-4
Heat# NN1175251

Ultimate (PSI)	96,748 / 96,748
Yield (PSI)	83,779 / 83,779
Elongation (%)	18 / 18
Hardness (RB)	94 / 94
Origin of Melt	USA
Origin of Raw Material	USA
Manufactured In	USA

WEBCO

MATERIAL TEST REPORT

Purchase Order: 121674
Sales Order: 227712
Material: A695287521904170 ASTM A513-5 2875OD 2437ID NATIONAL TUBE
Delivery / File Nbr: 80392108

Webco Industries, Inc. certifies that the material described was manufactured and tested and/or inspected in accordance with the specification and fulfills requirements in such respect.
This document conforms to the requirements of Specification EN 10204 Inspection Document Type 3.1.
This document was prepared by means of electronic processing and is valid without signature.

Date: 03/14/2018

Tony Stubblefield
Quality Manager
TSTUBBLE@WEBCOTUBE.COM

201 S. Woodland Dr.
Sand Springs OK 74063

Atlas Tube (Alabama), Inc.
171 Cleage Dr
Birmingham, Alabama, USA
35217
Tel:
Fax:

Atlas Tube
A DIVISION OF ZEKELMAN INDUSTRIES

Ref.B/L: 80812598
Date: 03.29.2018
Customer: 436

MATERIAL TEST REPORT

Sold to

Boyd Metals
PO Box 819
FORT SMITH AR 72902
USA

Shipped to

Boyd Metals
600 South 7th Street
FORT SMITH AR 72902
USA

Material: 2.375x154x21'0"0(37x1). Material No: R023751542100-B Made in: USA
Melted in: USA
Sales order: 1264610 Purchase Order: 243349

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802236	0.220	0.450	0.018	0.005	0.020	0.030	0.100	0.001	0.020	0.030	0.030	0.001	0.000	0.000	0.007

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.32
MC00020768	37	073975 Psi	096288 Psi	23 %	91	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Material: 2.375x154x21'0"0(37x1). Material No: R023751542100-B Made in: USA
Melted in: USA
Sales order: 1263134 Purchase Order: 243274 Cust Material #: PSTB240JV

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802236	0.220	0.450	0.018	0.005	0.020	0.030	0.100	0.001	0.020	0.030	0.030	0.001	0.000	0.000	0.007

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.32
MC00020767	37	073975 Psi	096288 Psi	23 %	91	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Material: 2.375x154x21'0"0(37x1). Material No: R023751542100-B Made in: USA
Melted in: USA
Sales order: 1263134 Purchase Order: 243274 Cust Material #: PSTB240JV

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802236	0.220	0.450	0.018	0.005	0.020	0.030	0.100	0.001	0.020	0.030	0.030	0.001	0.000	0.000	0.007

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.32
MC00020764	37	073975 Psi	096288 Psi	23 %	91	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Authorized by Quality Assurance:
The results reported on this report represent the actual attributes of the material furnished and indicate full compliance with all applicable specification and contract requirements.
Chemical analysis per AWS D1.1 method.

Steel Tube Institute OF NORTH AMERICA

Metals Service Center Institute

Atlas Tube (Alabama), Inc.
1.71 Cleage Dr
Birmingham, Alabama, USA
35217
Tel:
Fax:

Atlas Tube
A DIVISION OF ZEKELMAN INDUSTRIES

Ref.B/L: 80812598
Date: 03.29.2018
Customer: 436

MATERIAL TEST REPORT

Sold to

Boyd Metals
PO Box 819
FORT SMITH AR 72902
USA

Shipped to

Boyd Metals
600 South 7th Street
FORT SMITH AR 72902
USA

Material: 2.375x154x21'0"0(37x1). Material No: R023751542100-B Made in: USA
Melted in: USA
Sales order: 1263134 Purchase Order: 243274 Cust Material #: PSTB240JV

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802236	0.220	0.450	0.018	0.005	0.020	0.030	0.100	0.001	0.020	0.030	0.030	0.001	0.000	0.000	0.007

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.32
MC00020763	37	073975 Psi	096288 Psi	23 %	91	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Material: 2.375x154x21'0"0(37x1). Material No: R023751542100-B Made in: USA
Melted in: USA
Sales order: 1263134 Purchase Order: 243274 Cust Material #: PSTB240JV

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802236	0.220	0.450	0.018	0.005	0.020	0.030	0.100	0.001	0.020	0.030	0.030	0.001	0.000	0.000	0.007

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.32
MC00020762	37	073975 Psi	096288 Psi	23 %	91	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Material: 2.375x154x21'0"0(37x1). Material No: R023751542100-B Made in: USA
Melted in: USA
Sales order: 1263134 Purchase Order: 243274 Cust Material #: PSTB240JV

Heat No	C	Mn	P	S	Si	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
A802283	0.210	0.470	0.015	0.001	0.020	0.025	0.080	0.002	0.010	0.030	0.050	0.001	0.001	0.000	0.007

Bundle No	PCs	Yield	Tensile	Eln.2in	Rb	Certification	CE: 0.31
MC00020776	37	071439 Psi	096090 Psi	23 %	93	ASTM A500-13 GRADE B&C	

Material Note:
Sales Or.Note:

Authorized by Quality Assurance:
The results reported on this report represent the actual attributes of the material furnished and indicate full compliance with all applicable specification and contract requirements.
C[illegible] tested using the AWS D1.1 method.

Steel Tube Institute OF NORTH AMERICA

Metals Service Center Institute