Farabaugh Engineering and Testing Inc.

Project No. T165-13
Report Date: April 16, 2013

No. Pages: 9 (inclusive)

PERFORMANCE TEST REPORT

ALUMINUM HANDRAIL SYSTEM

FOR

SHAPES UNLIMITED, INC.
590 E. WESTERN RESERVE RD.
YOUNGSTOWN, OH 44514

Prepared by:

Patrick J. Farabaugh

Approved by:

Daniel G. Farabaugh

ISO 17025

MIAMI-DADE COUNTY DADE COUNTY ACCREDITED LABORATORY

AAMA ACCREDITED LABORATORY

TDI TEXAS ACCREDITED LABORATORY

Community Affairs FLORIDA ACCREDITED LABORATORY & QC ENTITY

Purpose

This testing was performed to evaluate the referenced test specimens under various load conditions as provided herein.

Test Specimen

Manufacturer: Shapes Unlimited, Inc.
590 E. Western Reserve Rd.
Youngstown, OH 44514

Specimen: - 8' long – 2 Rail Aluminum Handrail System
- Continuous Top Rail with Rail Ends (attached to steel frame)
- 1" X 1" aluminum balusters (pickets) @ 4-3/4" oc

Testing Apparatus

The test apparatus consisted of a panel mock-up assembly and load applicator. The mock-up assembly was as shown on the attached detail drawings. The loads were measured with a calibrated load cell. The loads were applied to specific components as shown on the attached drawing.

Test Procedure

The specimen was loaded at a rate to achieve the specified loads between 10 seconds and 5 minutes. The specified test loads were held for one minute before the load was released.

In-fill Load Test

- A 50 lb load was applied to the mid-span of the balusters over a 1-square-foot area normal to the in-fill.

Uniform Load Tests

- A 50 lb/ft uniform load was applied across the top rail applied vertically in a downward direction and then applied separately in a horizontal direction.

Concentrated Load Tests

- Various loads were applied to the mid-span of the top rail applied vertically in a downward direction and then applied separately in a horizontal direction.

TEST DATA

Testing Date: 3-25-13

In-fill Load Test

MEMBER	LOCATION	TEST LOAD	LOAD DIRECTION
Balusters	Center Midspan (1 SF Area)	50 lb	Horizontal

Results:
As a result of the above loading, there were no noticeable failures of the specimen.

Uniform Load Test

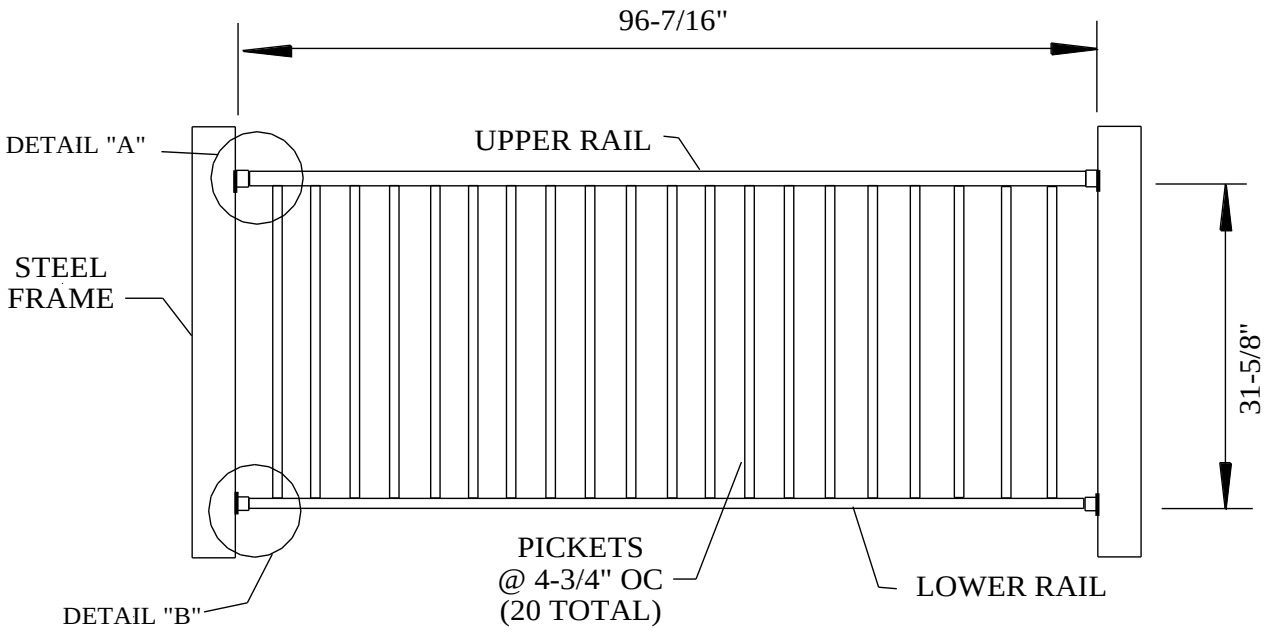
MEMBER	LOCATION	TEST LOAD	LOAD DIRECTION
Top Rail	Across Top Rail	50 lb/ft	Vertically Downward
Top Rail	Across Top Rail	50 lb/ft	Horizontal

Results:
As a result of the above loading, there were no noticeable failures of the specimen.

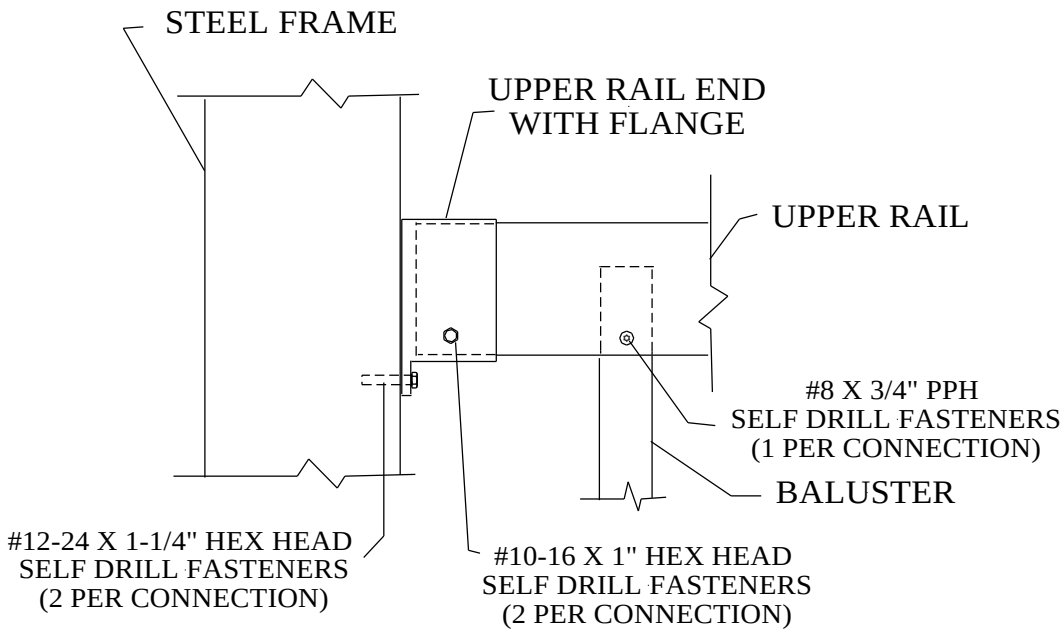
Concentrated Load Test

MEMBER	LOCATION	TEST LOAD	LOAD DIRECTION
Top Rail	Mid-span Between Posts	200 lb	Vertically Downward
Top Rail	Mid-span Between Posts	200 lb	Horizontal
Top Rail	Mid-span Between Posts	300 lb	Horizontal
Top Rail	Mid-span Between Posts	400 lb	Horizontal

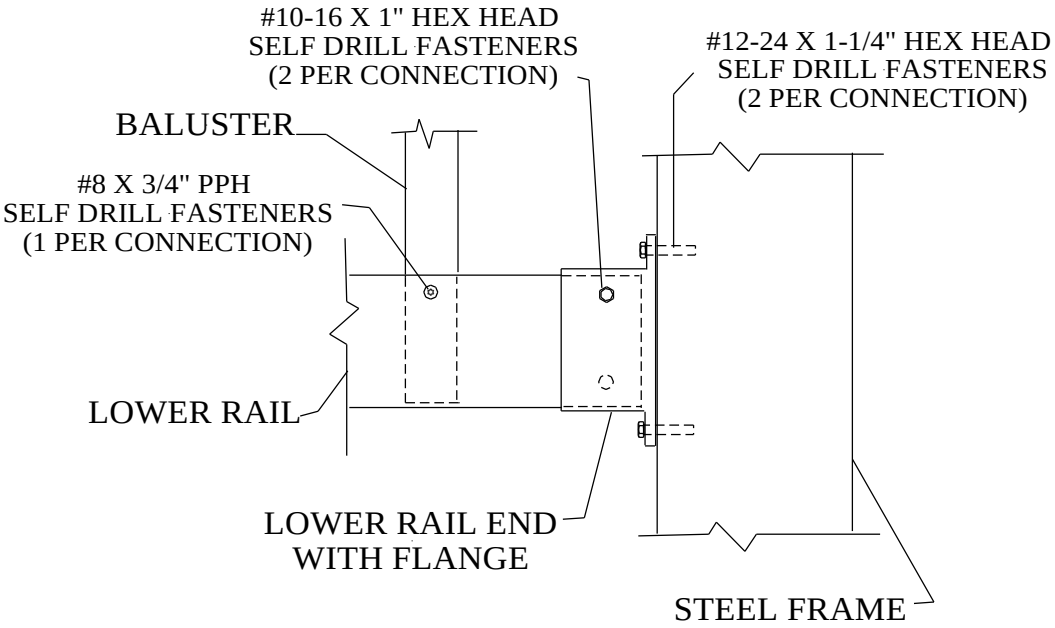
Results:
As a result of the above loading, there were no noticeable failures of the specimen.



ELEVATION VIEW


STEEL FRAME
UPPER RAIL END
WITH FLANGE
UPPER RAIL
#8 X 3/4" PPH
SELF DRILL FASTENERS
(1 PER CONNECTION)
BALUSTER
#12-24 X 1-1/4" HEX HEAD
SELF DRILL FASTENERS
(2 PER CONNECTION)
#10-16 X 1" HEX HEAD
SELF DRILL FASTENERS
(2 PER CONNECTION)

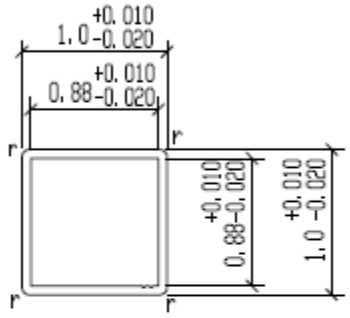
DETAIL "A"

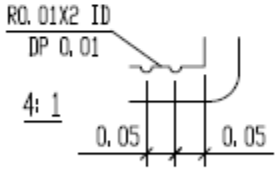

#10-16 X 1" HEX HEAD
SELF DRILL FASTENERS
(2 PER CONNECTION)
#12-24 X 1-1/4" HEX HEAD
SELF DRILL FASTENERS
(2 PER CONNECTION)
BALUSTER
#8 X 3/4" PPH
SELF DRILL FASTENERS
(1 PER CONNECTION)
LOWER RAIL
LOWER RAIL END
WITH FLANGE
STEEL FRAME

DETAIL "B"

	8370
Drawing No.	HJ0373

Unspicified Rad:0.015. Unspecified thickness:0.06"±0.006" Wall thickness can not below 0.055" Outside dimension can not exceed 1.01" after painting.



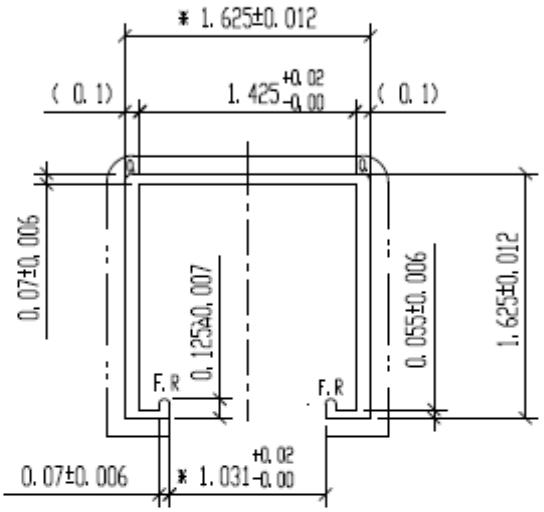


r=R0.05

Unspec. Radius: R0.015
Unspec. Thickness:

550 t	C				
				SHAPES UNLIMITED INC.	
Area (In²)	0.225	Alloy & Temper	6063-T5	Scale	1 :1
Unit Weight (Lbs/Ft)	0.265	Exterior Perimeter (In.)	4.00	Drawn By / Date	MTM 03-06-10
Standard	AA	Finish Perimeter (In.)		Checked By / Date	
Precision Grade		Circumscribed Circle ø(In.)	ø1.414	Approval By / Date	

Customer's Drawn No.	1334-S
Drawing No.	HJ9497



a=R0.060

FINISH: POWDER COAT

—— -- —— EXPOSED

*CRITICAL DIMENSION

0.5° DEGREE TWST PER, FT, OF LENGTH(MAX OF 7°)

FLATNESS: ±0.006

STRAIGHTNESS: 0.0125 DEV PER, FT, OF LENGTH

Unspec. Radius: R0.015

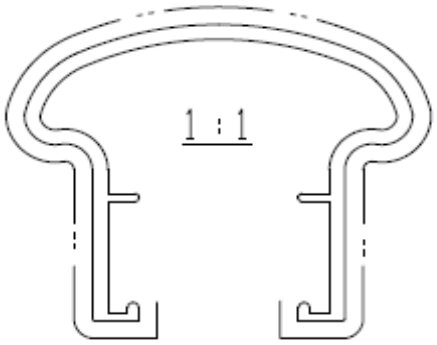
Unspec. Thickness:

1350 t	C+

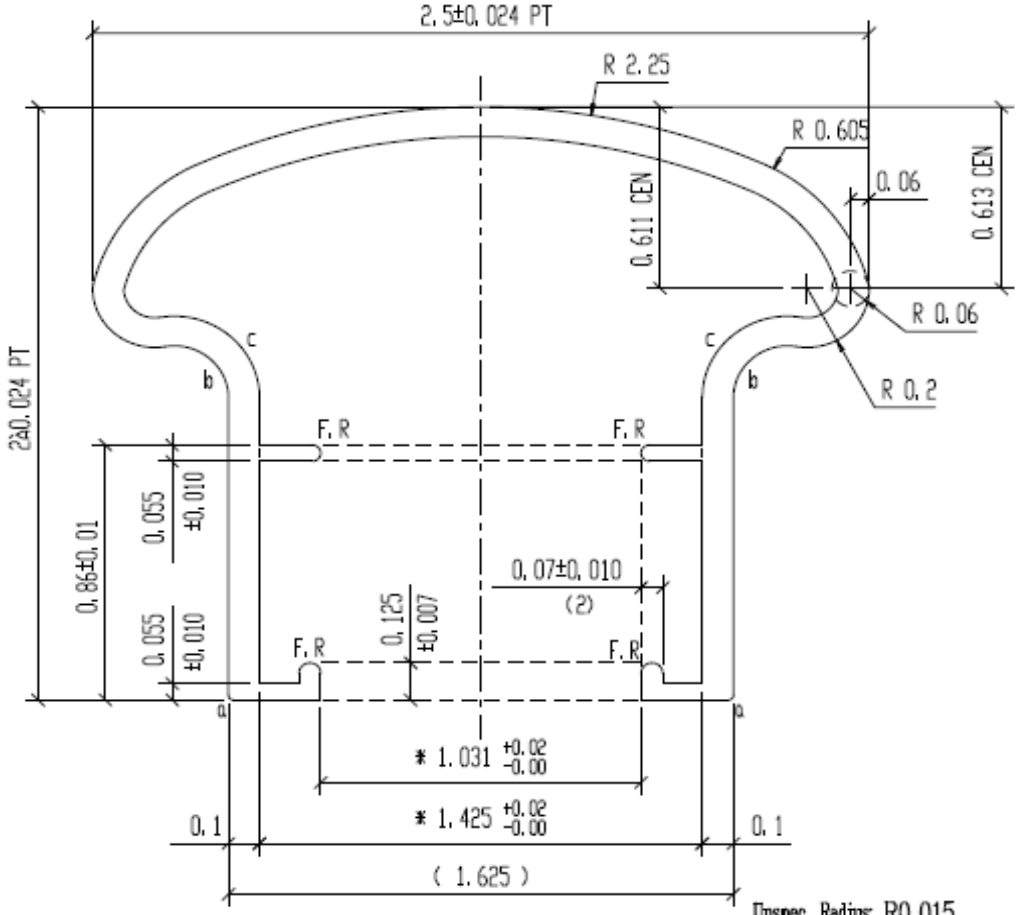
Shapes Unlimited

Area (In^2)	0.454	Alloy & Temper	(6005-T5)	Scale	1 : 1
Unit Weight (Lbs/Ft)	0.545	Exterior Perimeter (In)	10.567	Drawn By / Date	MTM 07-05-05
Standard	AA	Finish Perimeter (In)	6.340	Checked By / Date	
Precision Grade		Circumscribed Circle ø (In)	ø2.37	Approved By / Date	

Customer's Drawn No.	1340-S
Drawing No.	HJ9501



a=R0.015
b=R0.175
c=R0.275
FINISH: MILL/PAINTING
—— -- —— EXPOSED
* CRITICAL DIMENSION



Unspec. Radius: R0.015
Unspec. Thickness: 0.1±0.010

1350 t	B+

			Customer Name	SHAPES UNLIMITED	
Area (In²)	0.670.	Alloy & Temper	(6005-T5)	Scale	2 : 1
Unit Weight (Lbs/Ft)	0.804	Exterior Perimeter (In.)	14.305	Drawn By / Date	MTM 07-04-30
Standard	AA	Finish Perimeter (In.)	8.583	Checked By / Date	
Precision Grade		Circumscribed Circle Ø (In.)	Ø2.62	Approval By / Date	

Farabaugh Engineering and Testing Inc.

Project No. T177-13

Report Date: May 8, 2013

No. Pages: 5 (inclusive)

PERFORMANCE TEST REPORT

ALUMINUM U-SHAPE EXTRUSION

FOR

SHAPES UNLIMITED, INC.
590 E. WESTERN RESERVE RD.
YOUNGSTOWN, OH 44514

Prepared by:

Patrick J. Farabaugh

Approved by:

Daniel G. Farabaugh

ISO 17025

MIAMI-DADE COUNTY DADE COUNTY ACCREDITED LABORATORY

AAMA ACCREDITED LABORATORY

TDI TEXAS ACCREDITED LABORATORY

Community Affairs FLORIDA ACCREDITED LABORATORY & QC ENTITY

Purpose

This testing was performed to evaluate the referenced test specimens under concentrated load as provided herein.

Test Specimen

Manufacturer: Shapes Unlimited, Inc.
590 E. Western Reserve Rd.
Youngstown, OH 44514

Specimen: - (A) Aluminum U-Shape Extrusion – Marked #5050
- (B) Aluminum U-Shape Extrusion – Marked #6063

Testing Apparatus

The test apparatus consisted of a support assembly and load applicator. The assembly was as shown on the attached detail drawings. The loads were measured with a calibrated load cell. The loads were applied to specific components as shown on the attached drawing.

Test Procedure

The specimen was loaded at a uniform rate with deflection data recorded at the loads indicated on the data table shown in this report. A concentrated load was applied at the center mid-span of each extrusion member.

TEST DATA

Testing Date: 5-8-13

Specimen: (A) – Aluminum U-Shape Extrusion – Marked #5050

Specimen: (B) – Aluminum U-Shape Extrusion – Marked #6063

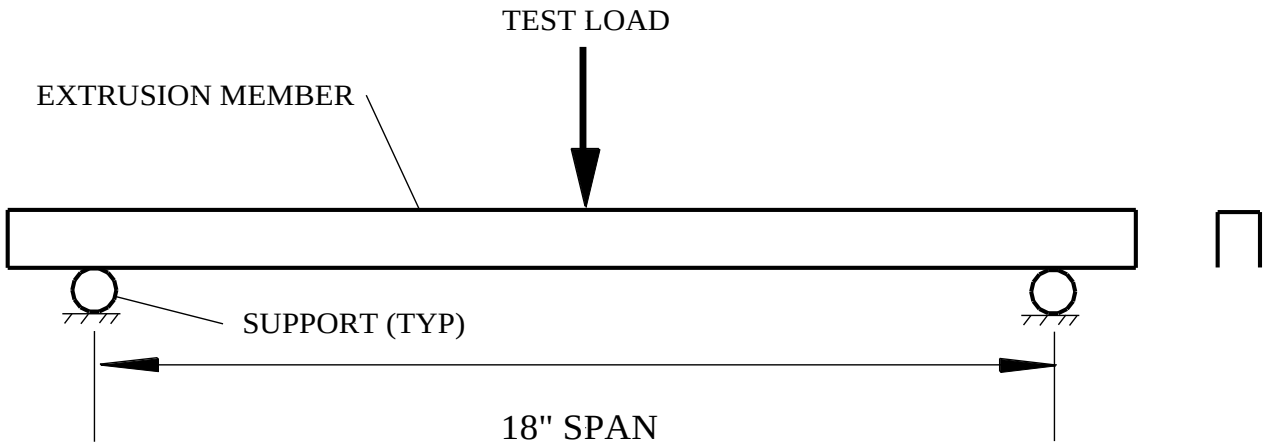
Concentrated l Load Test

TEST LOAD (lb)	SPECIMEN (A) DEFLECTION (in)	SPECIMEN (B) DEFLECTION (in)
0	0	0
10	0.001	0.007
20	0.010	0.010
30	0.014	0.016
40	0.021	0.023
50	0.028	0.030
60	0.035	0.037
70	0.042	0.043
80	0.049	0.050
90	0.057	0.057
100	0.065	0.064
120	0.081	0.077
140	0.096	0.094
160	0.113	0.108
180	0.134	0.122
200	0.150	0.136
240	0.198	0.166
280	0.313	0.200
320	0.830	0.238
360		0.303
400		0.543

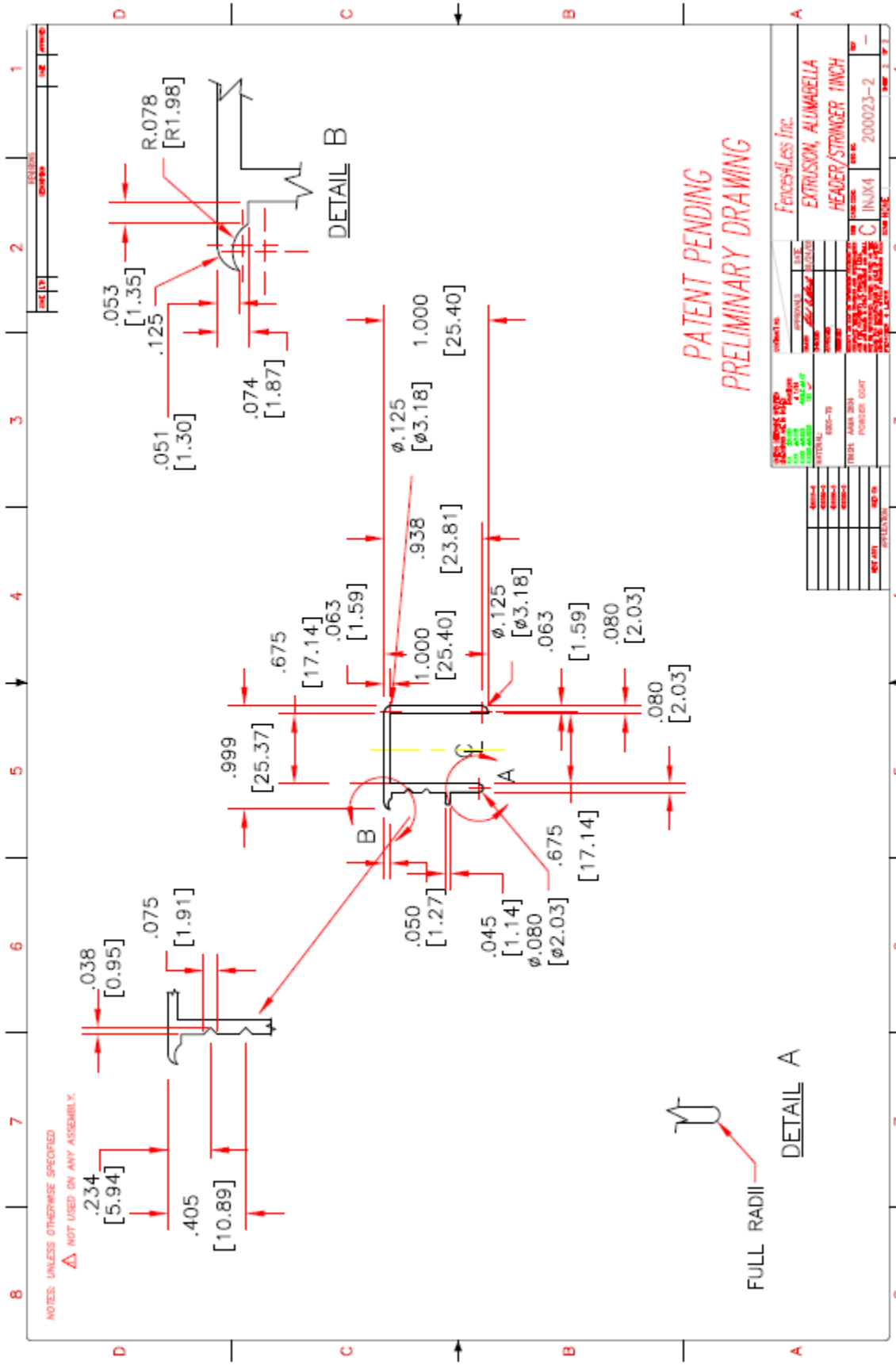
Results:

Specimen (A) yielded at a test load of 325 lb

Specimen (B) yielded at a test load of 415 lb



ELEVATION VIEW


PATENT PENDING
PRELIMINARY DRAWING
FencesLess Inc.
EXTRUSION, ALUMADELLA
HEADER/STRINGER INCH
200023-2
DETAIL B
DETAIL A
FULL RADII
NOTES: UNLESS OTHERWISE SPECIFIED
NOT USED ON ANY ASSEMBLY.
R.078 [R1.98]
.053 [1.35]
.125
.051 [1.30]
.074 [1.87]
1.000 [25.40]
ø.125 [ø3.18]
.938 [23.81]
.675 [17.14]
.063 [1.59]
.999 [25.37]
.080 [2.03]
.038 [0.95]
.075 [1.91]
.234 [5.94]
.405 [10.89]
.050 [1.27]
.045 [1.14]
ø.080 [ø2.03]