

Wanessa-Sue, Inc.
5456 Inez Road
Kingman, AZ 86409

Report No: STQA50779.1R0
Date: July 31, 2020
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Axial & Transverse Load Tests of
10-ft Airlight Panels
Pursuant to ASTM E72

Prepared by:

Thomas A. Kolden, P.E.
Specialized Testing, Inc.

Rev. No.	Date	Description
R0	31 JUL 2020	Original Report

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Report No. STQA50779.1R0

INTRODUCTION:

The objective of the test program was to test the axial and transverse load strength of 10-ft Airlight Building Panels. The test program was performed in compliance with ASTM E72 *Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*, Sections 9 and 11. The test project was undertaken under contract with Wanessa-Sue, Inc. of Kingman, AZ.

Specialized Testing, Inc. (STI), dba Specialized Testing, was the laboratory of record for this test program. Specialized Testing, Inc. is accredited under ISO 17025 by the International Accreditation Service (IAS) as listed on IAS TL-228. STI is also accredited by the Miami-Dade Product Control Section as listed in Certification No. 19-0620.01 All testing was performed at the laboratory facilities of Specialized Testing located in Santa Fe Springs, CA.

PROJECT SCOPE:

Test three specimens of 5 1/2” thick by 4 foot wide by 10 foot tall steel-framed foam-filled wall Wanessa-Sue, Inc. Airlight brand panels for Axial Load strength and three of additional for Transverse Load strength.

SAMPLING AND SAMPLE IDENTIFICATION:

The tested panels were sampled from the client’s manufacturing facility in Kingman, Arizona. A representative from STI travelled to the client’s manufacturing facility at 5056 Ines Road, Kingman on 23 June 2020 and witnessed the fabrication of the panels. Each panel was 4 ft wide, 10 ft tall and 5 1/2 in. thick. The panels were made from 18 ga. bottom track, 18 ga. top track, 24 ga. studs studs and 20 ga trim. The representative also witnessed the injection process of all sampled panels. The foam was Styrochem, type MB500C (lot 6118), density measured at 1.64 lb/ft³. The adhesive used was Applichem, C130B, Lot 7119878100. The steel used is listed in Table 1, below. The screws used to attached the tracks and trim together were Simpson Strong-Tie FPHSD34B1016, Lot 7119878100; and the screws to fasten the frame together were Fastenal TEKDRWL K-LTH 8 x 1/2 z, part number 32123, Lot A-1908022.

The panels that the STI representative witnessed fabrication for were marked with identification number 06/23/20 and the initials VB. The sampled panels were subsequently transported to the STI facility in Santa Fe Springs CA by the client, where they were delivered on 07/13/2020.

Representative specimens of the steel material used were also selected and subsequently subjected to tensile testing pursuant to ASTM E8. Based on the tests, the steel properties were as shown in Table 1. Copies of the E8 Test reports are included on pages 11 to 13 of this report. Copies of Certificate of Conformance for each set of steel was also obtained and copies are included on pages 8 to 10 of this report.

Table 1: ASTM E8 Test Results for Steel Material

Steel Gage	Coil Width (in.)	Heat No.	Component	Steel Thickness (in.)	0.2% Offset Yield (ksi)	Tensile Strength (in.)	%Elongation
18	8	946012	Track	0.0442	52.6	73.6	30
20	3.217	C02687	Trim	0.0335	61.6	78.5	25
24	6	S11846	Studs	0.0222	58.0	75.9	26

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TEST EQUIPMENT:

The axial load test equipment consisted of the following primary components:

- A Tinius Olsen Universal Test Machine (UTM)
- Four Bei-Duncan deflection LVDTs (compressometers)
- Two Ametek string potentiometers (deflectometers)
- Proprietary data acquisition system

The Transverse test equipment consisted of the following primary components:

- Vacuum system
- 6-mil plastic membrane
- Digital Manometer
- Five linear variable differential transformers (LVDT).

All calibrations were current and are traceable to NIST. Copies of calibration certificates are available upon request.

TEST SET UP:

The axial load test was set up as follows: The test apparatus was set-up in general conformance with Section 9 and Figure 2 of ASTM E72. The test specimens were positioned onto the UTM for the compressive load tests as follows:

- A 3/8-in. thick x 5-in. wide x 5-ft. long "I" beam was placed on the bottom of the platen of the UTM. A 3/8-in. thick x 5-3/4-in. wide x 5-ft. long steel plate was placed on the top flange of the "I" beam. The test specimen was positioned on the steel plate. A 3/8-in. thick x 7-in. wide x 5-ft. long steel "C" channel was placed on top of the test specimen. The test specimen was positioned in the test fixture to support a uniform axial load applied with an eccentricity of one third the panel thickness.
- Four compressometers (LVDTs) were set-up per Figure 2 of ASTM E72 to measure compression of the test specimen. Two deflectometers (LVDTs) were set-up on an independent datum post adjacent to the UTM (this set-up deviated from the ASTM E72 set-up) to measure the out of plane deflection (referred to as lateral deflection in ASTM E72) of the test specimen. The deflectometers were positioned onto the test panel at mid-height

The transverse load test was set up as follows: The transverse load test apparatus was set-up in general conformance with the requirements delineated in Section 11 of ASTM E72. The vacuum bag method as described in Section 11.3.1.3 and Figure 4 of ASTM E72 was used, except that the panel was supported by fastening to the ends. Photographs of the test set up are shown below. Due to problems encountered with achieving an ultimate load using the vacuum method, the test apparatus was switched over to the bladder method and the panels were reloaded to failure.

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Photo 1: Axial Compression Load Test Set Up



Photo 2: Axial Compression Set Up



Photo 3: Transverse Load Set Up



Photo 4: Transverse Load Set Up

TEST PROCEDURE:

The axial and transverse load was applied incrementally with five (5) minute holds at predetermined values, starting at no load. At each load increment, the transverse pressure or axial load was added until the predetermined interval was achieved. The load was maintained at the target interval for five minutes, and then released back to zero before increasing again to the next higher target interval. The displacement data readings were recorded at the initial condition (i.e., at no load); immediately upon achieving each load increment; and then again after five minutes at the maintained load; and finally, upon release back to zero load. Testing continued until either ten increments were achieved, or failure occurred while loading to the next increment.

PERSONNEL:

The following STI personnel participated in this project are listed below.

Ricardo Flores: Senior Test Technician
Danny Moreno: Senior Test Technician
Kevin Kwan: Laboratory Supervisor
Tom Kolden: Report Author

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SUMMARY OF RESULTS:

Tables 2 and 3 provides a summary of the axial compression results, and the load-displacements are depicted graphically in Figures 1 and 2.

Table 2: Axial Compression Test, Vertical Deformation

Load (lbs.)	Vertical Deformation (in.)							
	Test 1 07/20/2020		Test 2 07/21/2020		Test 3 07/21/2020		Average	
	Initial	At 5 min.	Initial	At 5 min.	Initial	At 5 min.	Initial	At 5 min.
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2,500	0.008	0.009	0.005	0.005	0.005	0.005	0.006	0.006
5,000	0.015	0.015	0.014	0.014	0.012	0.013	0.014	0.014
7,500	0.021	0.020	0.021	0.021	0.019	0.020	0.020	0.020
10,000	0.026	0.026	0.028	0.028	0.026	0.025	0.027	0.026
12,500	0.032	0.032	0.034	0.035	0.031	0.031	0.032	0.033
15,000	0.044	0.044	0.042	0.042	0.038	0.037	0.041	0.041
17,500	0.047	0.047	0.049	0.049	0.044	0.045	0.047	0.047
20,000	0.049	0.054	0.053	0.054	0.055	0.058	0.052	0.055
22,500								
25,000								
Peak Load (lbs)	22,860		22,850		22,130		22,613	

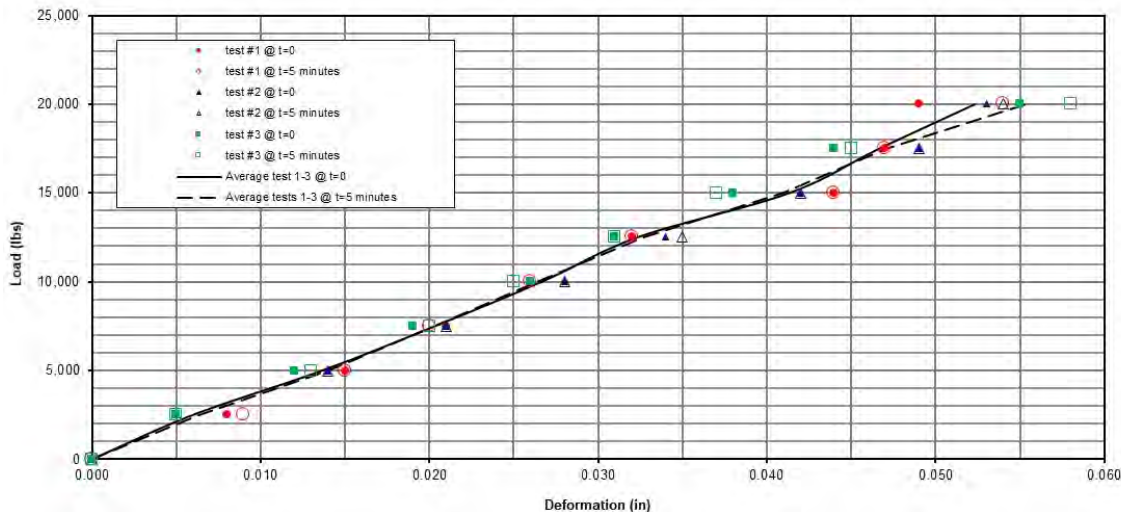
Notes to Table 2:

1. The ratio of specimen length (120 inches) to gauge length (106 inches) is 1.132
2. Failure was buckling of the studs and trim at both top and bottom connection to the track

Table 3: Axial Compression Test, Horizontal Displacement

Load (lbs.)	Lateral Deflection (in.)							
	Test 1 07/20/2020		Test 2 07/21/2020		Test 3 07/21/2020		Average	
	Initial	At 5 min.	Initial	At 5 min.	Initial	At 5 min.	Initial	At 5 min.
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2,500	0.008	0.008	0.007	0.007	0.007	0.007	0.007	0.007
5,000	0.017	0.017	0.015	0.015	0.015	0.016	0.016	0.016
7,500	0.030	0.030	0.024	0.024	0.023	0.023	0.026	0.026
10,000	0.041	0.041	0.037	0.038	0.039	0.039	0.039	0.039
12,500	0.053	0.054	0.052	0.055	0.051	0.051	0.052	0.053
15,000	0.066	0.066	0.067	0.067	0.064	0.065	0.066	0.066
17,500	0.080	0.082	0.081	0.084	0.078	0.079	0.080	0.082
20,000	0.096	0.099	0.095	0.097	0.089	0.092	0.093	0.096
22,500								
25,000								

Figure 1: Axial Compression Test, Vertical Deformation



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Figure 2: Axial Compression

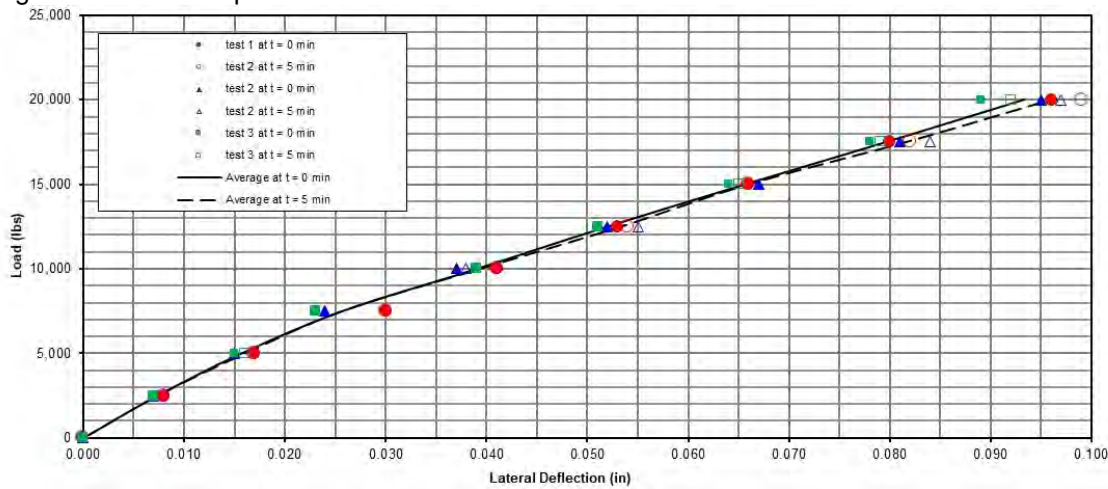


Table 4 provides a summary of the transverse load results, and the load-displacements are depicted graphically in Figure 3. Based on the data, and specifically on the average displacement after five-minute holds, the average pressure at a displacement of L/240 is 46.1 psf, and 59.3 psf at a displacement of L/180. The average ultimate load of three test panels was 313.7 psf.

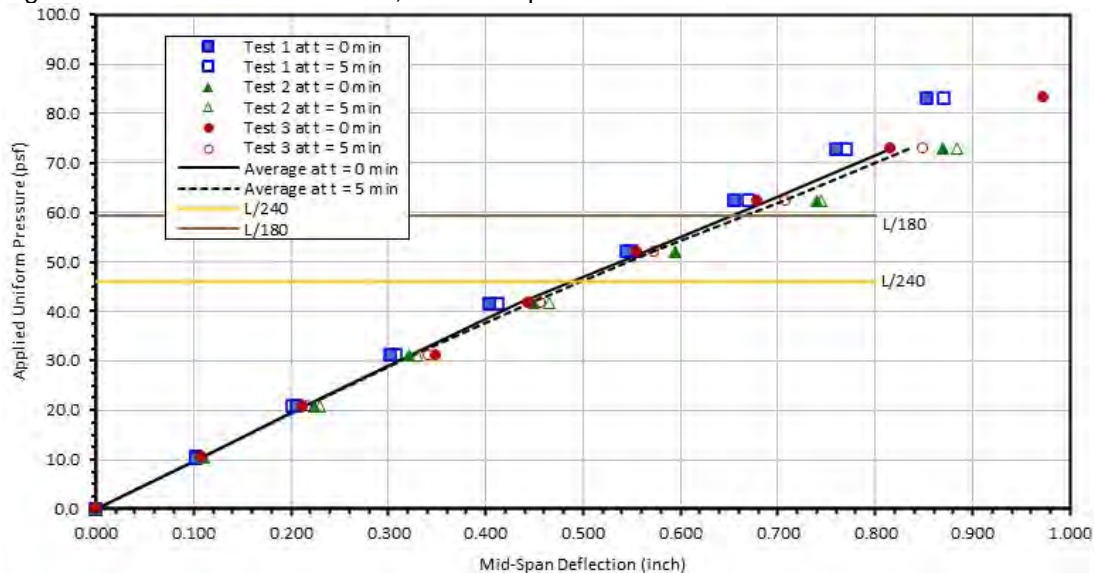
Table 4: Transverse Load Test Displacement

Applied Load (psf)	Midspan Deflection (in.)							
	Test 1		Test 2		Test 3		Average	
	t = 0 min	t = 5 min	t = 0 min	t = 5 min	t = 0 min	t = 5 min	t = 0 min	t = 5 min
0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10.4	0.102	0.103	0.110	0.110	0.109	0.107	0.107	0.107
20.8	0.206	0.202	0.224	0.230	0.213	0.217	0.214	0.216
31.2	0.301	0.307	0.321	0.330	0.349	0.341	0.324	0.326
41.6	0.404	0.412	0.449	0.465	0.444	0.456	0.432	0.444
52.0	0.545	0.551	0.594	0.594	0.555	0.573	0.565	0.573
62.4	0.655	0.669	0.740	0.745	0.679	0.708	0.691	0.707
72.8	0.760	0.770	0.869	0.884	0.816	0.849	0.815	0.834
83.2	0.852	0.870			0.973	1.298		
Ult Load (psf)	178.4		159.2		138.4		158.7	

Notes to Table 4:

1. The panels for Tests 1 and 2 eventually would not sustain additional loading; and the panel for test 3 buckled

Figure 3: Transverse Load Tests, Net Mid-Span Deformation



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FAILURE PHOTOS:



Photo 5: Typical Failure, Axial Load Test



Photo 6: Typical Failure, Transverse Load Test

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CERTIFICATES OF CONFORMANCE:

The following certificates of conformance were obtained from the client at the time of sampling.

18 Ga. x 8" Coil Steel: Top Track/Bottom Track:



CERTIFICATE OF CONFORMANCE¹

CUSTOMER: Wanessa-Sue Inc.	CUSTOMER PO #: G-8
SIZE(s): 18ga x 8"	SPECIFICATION²: ASTM A 653 SS GR. 50
BILL OF LADING #: 078201	COATING: CTD G90
Date: 7/11/2019	

CHEMICAL ANALYSIS

MC #	HEAT#	C	Mn	P	S	Si	Ni	Al
15224596	946012	0.21	0.80	0.013	0.006	0.01	0.01	0.05

PHYSICAL ANALYSIS

HEAT#	YIELD (ksi)	TENSILE (ksi)	ELONGATION
946012	54.7	74.5	34%

This shipment is³ May Not Be
Comprised of materials containing substances in quantities that do not exceed maximum
concentration values stipulated by RoHS Directive 2002/95/EC

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² If the phrase "(USA)" appears, Performance Steel declares that product contained in this shipment was manufactured in the USA.

³ Performance Steel and its suppliers declare that product contained in this shipment complies with RoHS Directive 2002/95/EC restricting the use of specific hazardous materials found in various products containing lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (CrVI), polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE). If your P.O. has required it, a test report containing measured values of RoHS substances traceable to this shipment is attached.

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24 Ga. x 3.217" Coil Steel: Studs



CERTIFICATE OF CONFORMANCE¹

CUSTOMER: Wanessa-Sue Inc.	CUSTOMER PO #: J3
SIZE(s): 24ga x 6"	SPECIFICATION²: ASTM A653 SS GR. 50
BILL OF LADING #: 078623	COATING: CTD G90
Date: 9/6/19	

CHEMICAL ANALYSIS

MC #	HEAT#	C	Mn	P	S	Si	Ni	Al
6095183	S11846	0.18	1.15	0.010	0.008	0.012	0.01	0.041

PHYSICAL ANALYSIS

HEAT#	YIELD (ksi)	TENSILE (ksi)	ELONGATION
S11846	59.9	77.3	28%

This shipment is³ May Not Be
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concentration values stipulated by RoHS Directive 2002/95/EC

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Report No. STQA50779.1R0

20 Ga. x 3.217" Coil Steel: Trim



CERTIFICATE OF CONFORMANCE¹

CUSTOMER: Wanessa-Sue Inc.	CUSTOMER PO #: F17
SIZE(s): 20ga x 3.217"	SPECIFICATION²: ASTM A 653 SS GR. 50
BILL OF LADING #: 078055	COATING: CTD G90
Date: 6/20/2019	

CHEMICAL ANALYSIS

MC #	HEAT#	C	Mn	P	S	Si	Ni	Al
6052961	C02687	0.16	1.08	0.014	0.005	0.020	0.00	0.038

PHYSICAL ANALYSIS

HEAT#	YIELD (ksi)	TENSILE (ksi)	ELONGATION
C02687	54.8	72.1	32%

This shipment is³ May Not Be
Comprised of materials containing substances in quantities that do not exceed maximum
concentration values stipulated by RoHS Directive 2002/95/EC

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Report No. STQA50779.1R0

ASTM E8 Data for 20 Ga. Steel: Trim

"Sample (s): Customer Supplied"

TEST REPORT



ATLAS TESTING LABORATORIES, INC.

9820 6th Street, Rancho Cucamonga, CA 91730 909-373-4130 FAX 909-373-4132

IG

PO# 2836

DATE: 07/13/2020
ATL# 058036

CLIENT: SPECIALIZED TESTING
ATTN: THOMAS KOLDEN
10600 S. PIONEER BLVD. STE. G
SANTA FE SPRINGS, CA 90670

QTY: 3
WORK ORDER# STQA50779
ID 927039

ALLOY: 20Ga STEEL

SPEC: CUSTOMER REQUIREMENTS

MECHANICAL TEST, METHOD ASTM-E8/16A^{e1}

SPECIMEN ID	TEMP	INSPECTION			YIELD		ULTIMATE		ELONGATION			RDX OF AREA		LOC. OF FRACTURE (A)	
		VISUAL INSPECT OK?	ORIG. THICK	ORIG. WIDTH	ORIG. AREA	ACTUAL LOAD IN LBS	KSI	ACTUAL LOAD IN LBS	KSI	ORIG. GAGE LENGTH	ACTUAL ELONG	PER CENT	FINAL DIA.		% RoFA
1	RT	OK	0.0326	0.498	0.0162	1019	62.8	1293	79.6	2.00	0.54	27	.0235/.391	43	1
2	RT	OK	0.0333	0.499	0.0166	1033	62.2	1309	78.8	2.00	0.50	25	.0240/.399	42	1
3	RT	OK	0.0345	0.499	0.0172	1031	59.9	1329	77.2	2.00	0.48	24	.0250/.402	42	1

Strain Rate: 0.005 inch per inch per minute; Yield determined at 0.2% Offset; Elongation calculated after fracture. ATE# 508

(A) 1 = Center Fracture; 2 = Outer Quarter Fracture; 3 = Fractured @ Gage Mark; 4 = Fractured @ Radius; 5 = Material Flaw/Defect

REMARKS; Results provided for information only.

respectfully Submitted:


Wendy P. Franco, Quality Assurance

Date: 7/13/2020

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Report No. STQA50779.1R0

ASTM E8 Data for 18 Ga. Steel: Top & Bottom Track

"Sample (s): Customer Supplied"

TEST REPORT



ATLAS TESTING LABORATORIES, INC.

9820 6th Street, Rancho Cucamonga, CA 91730 909-373-4130 FAX 909-373-4132

IG

PO# 2836

DATE: 07/13/2020
ATL# 058036

CLIENT: SPECIALIZED TESTING
ATTN: THOMAS KOLDEN
10600 S. PIONEER BLVD. STE. G
SANTA FE SPRINGS, CA 90670

QTY: 3
WORK ORDER# STQA50779
ID 928015

ALLOY: 18Ga STEEL

SPEC: CUSTOMER REQUIREMENTS

MECHANICAL TEST, METHOD ASTM-E8/16A^{e1}

SPECIMEN ID	INSPECTION					YIELD		ULTIMATE		ELONGATION			RDX OF AREA		LOC. OF FRACTURE (A)
	TEMP	VISUAL INSPECT OK?	ORIG. THICK	ORIG. WIDTH	ORIG. AREA	ACTUAL LOAD IN LBS	KSI	ACTUAL LOAD IN LBS	KSI	ORIG. GAGE LENGTH	ACTUAL ELONG	%	FINAL DIA.	% RofA	
1	RT	OK	0.0443	0.498	0.0221	1177	53.4	1648	74.7	2.00	0.60	30	.0321/.374	46	1
2	RT	OK	0.0448	0.502	0.0225	1173	52.2	1637	72.8	2.00	0.60	30	.315/.368	48	1
3	RT	OK	0.0445	0.502	0.0223	1166	52.2	1640	73.4	2.00	0.62	31	.0310/.368	49	1

Strain Rate: 0.005 inch per inch per minute; Yield determined at 0.2% Offset; Elongation calculated after fracture. ATE# 508

(A) 1 = Center Fracture; 2 = Outer Quarter Fracture; 3 = Fractured @ Gage Mark; 4 = Fractured @ Radius; 5 = Material Flaw/Defect

REMARKS: Results provided for information only.

respectfully Submitted:


Wendy P. Franco, Quality Assurance

Date: 7/13/2020

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Report No. STQA50779.1R0

ASTM E8 Data for 24 Ga. Steel: Studs

"Sample (s): Customer Supplied"

TEST REPORT



ATLAS TESTING LABORATORIES, INC.

9820 6th Street, Rancho Cucamonga, CA 91730 909-373-4130 FAX 909-373-4132

IG

PO# 2836

DATE: 07/13/2020
ATL# 058036

CLIENT: SPECIALIZED TESTING
ATTN: THOMAS KOLDEN
10600 S. PIONEER BLVD. STE. G
SANTA FE SPRINGS, CA 90670

QTY: 3
WORK ORDER# STQA50779
ID 930295

ALLOY: 24Ga STEEL

SPEC: CUSTOMER REQUIREMENTS

MECHANICAL TEST, METHOD ASTM-E8/16A^{e1}

SPECIMEN ID	TEMP	VISUAL INSPECT OK?	INSPECTION			YIELD		ULTIMATE		ELONGATION			RDX OF AREA		LOC. OF FRACTURE (A)
			ORIG. THICK	ORIG. WIDTH	ORIG. AREA	ACTUAL LOAD IN LBS	KSI	ACTUAL LOAD IN LBS	KSI	ORIG. GAGE LENGTH	ACTUAL ELONG	PER CENT	FINAL DIA.	% RoFA	
1	RT	OK	0.0223	0.499	0.0111	637	57.2	856	76.9	2.00	0.50	25	.0155/386	46	1
2	RT	OK	0.0221	0.503	0.0111	646	58.1	835	75.1	2.00	0.50	25	.0160/396	43	1
3	RT	OK	0.0221	0.501	0.0111	649	58.6	838	75.7	2.00	0.54	27	.0160/394	43	1

Strain Rate: 0.005 inch per inch per minute; Yield determined at 0.2% Offset; Elongation calculated after fracture. ATE# 508

(A) 1 = Center Fracture; 2 = Outer Quarter Fracture; 3 = Fractured @ Gage Mark; 4 = Fractured @ Radius; 5 = Material Flaw/Defect

REMARKS; Results provided for information only.

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