Metal Roof and Wall Systems

SCAN

17-1539-DS-1-20

LETTER OF CERTIFICATION

June 1, 2018

Job No.: 23-1811-17

Building Identification: Banner Hosford Storage, Portland, OR

To Whom It May Concern:

This letter certifies the above referenced METAL COMPONENT SYSTEM was designed and fabricated by Metal Building Components. This project was designed with the code and criteria listed below, in general accordance with the 2012 Edition of the **AISI** STANDARD - *North American Specification for the Design of Cold-Formed Steel Structural Members* and with good engineering practice.

Governing Code:	OR 2014 (IBC 2012)
Exposure Category:	C
Occupancy Category:	II
DEAD LOAD	1.54/0.94/1.06-PSF (weight wall panel)
ROOF LIVE LOAD	20.00-PSF
COLLATERAL LOAD	00.00-PSF
GROUND SNOW LOAD	10.00-PSF
WIND SPEED	120.00-MPH
SEISMIC DATA	N/A
Deflection	L/180 (cladding)
Temperature Differential:	N/A

MARTIN/MARTIN, INC
REVIEWED & FOUND TO BE IN GENERAL CONFORMANCE WITH THE STRUCTURAL DESIGN INTENT OF THE BUILDING. REVIEWED FOR CONFORMANCE WITH REQUIRED DESIGN LOADS & CRITERIA AND FOR LOADS IMPOSED ON THE PRIMARY STRUCTURAL FRAME/FOUNDATIONS.
REVIEWED
Date Received: 6/4/2018
Reviewer: gmartin
Date Returned: 06/04/2018

This Letter of Certification applies solely to the METAL COMPONENT SYSTEM as furnished by Metal Building Components, and, specifically excludes any metal decking, foundation, masonry, existing structures or general contract work. All certification is null and void if the COMPONENT SYSTEM is not installed in accordance with the most current MBCI Installation Manual, standard MBCI details.

Sincerely,

Engineering Services

REGISTERED PROFESSIONAL ENGINEER
71240PE
OREGON
JULY 9, 2002
LIDER LIANG

EXPIRES: 12/31/2018

Metal Roof and Wall Systems
ENGINEERING REPORT

Banner Hosford Storage

Portland, OR.
(Multnomah-County)

Engineering Calculations

MARTIN/MARTIN, INC

REVIEWED & FOUND TO BE IN GENERAL CONFORMANCE WITH THE STRUCTURAL DESIGN INTENT OF THE BUILDING. REVIEWED FOR CONFORMANCE WITH REQUIRED DESIGN LOADS & CRITERIA AND FOR LOADS IMPOSED ON THE PRIMARY STRUCTURAL FRAME/FOUNDATIONS.

REVIEWED

Date Received: 6/4/2018
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MANUFACTURER'S DISCLAIMER

It is the roofing contractor's responsibility to ensure that the Component System is installed per the manufacturer's standard details and erection practices listed in the MBCI Technical Installation Manual, latest edition. Any special flashing requirements falling outside the parameters of MBCI's standard details must be pre-approved by MBCI's Engineering Department. If required, the use of any field-seaming machine, other than that provided by MBCI, may damage panels, void all warranties and will void engineering data. All engineering test data becomes null and void if the component system does not meet the aforementioned criteria and/or the specific instructions defined in this engineering analysis. MBCI takes no responsibility for the adequacy of any structural framing/substrate not provided by MBCI on this project.

MBCI®

Metal Roof and Wall Systems

Engineering Services

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Metal Roof and Wall Systems

ENGINEERING DESIGN SUMMARY

Job Number:	23-1811-17	Exposure Category	C
Job Name:	Banner Hosford Storage	Ground Snow:	10-psf
Location:	Portland, OR	Wind Velocity:	120-mph
Building Code:	OR 2014 (IBC 2012)		
Occupancy	Category II	Deflection:	L/180

NOTES:

1. Substrate thickness is Min. 20 ga. Studs (studs not by MBCI) / Min. 18 ga. Members (members not by MBCI)
2. Clip is N/A
3. Given dimensions are worst case.
4. Wind speed per code
5. Exposure C
6. Enclosed building
7. Risk category II – general
8. All panel endlaps must occur over a structural support.
9. Design based per information provided by customer

EXCLUSIONS:

1. FM design and certification.
2. Gutter and Downspout design.
3. Valley design.
4. Roof panel design. Fascia panel design. Soffit panel design.
5. Framing design.
6. Design of Materials not supplied by MBCI
7. Any project specifications (none provided)

A

Roof Type:	Gable (Wall)		
Building Length:	214-ft	Live Load:	20-psf
Building Width:	184-ft	Dead Load:	1.54-psf / 0.94-psf / 1.06-psf (Wall)
Roof Slope:	0.25:12	Collateral Load:	0

WALL SPACING DESIGN-HORIZONTAL (1H)

Panel Profile: FW Width: 12 Gage: 24 Clip: N/A

Use (1) #12-14 HWH NW Fastening To Min. 20 ga. Studs (studs not by MBCI)

Stitch Panels at each support with (1) 1/4-14 x 7/8" LapTek [#4]

Panel Attachment Spacing: Corners (5) 2.66-ft

Main (4) 4.00-ft

Metal Roof and Wall Systems

WALL SPACING DESIGN-VERTICAL (3V)

Panel Profile: PBR	Width: 36	Gage: 26	Clip: N/A
	Use (3) #12-14 HWH WW Fastening To Min. 18 ga. Members (members not by MBCI)		
Panel Attachment Spacing:	Corners (5)	5.00-ft	
	Main (4)	5.00-ft	

WALL SPACING DESIGN-HORIZONTAL (2H / 4H)

Panel Profile: 7.2 Series	Width: 36	Gage: 24	Clip: N/A
	Use (5) #12-14 HWH WW Fastening To Min. 20 ga. Studs (studs not by MBCI)		
Panel Attachment Spacing:	Corners (5)	4.00-ft	
	Main (4)	4.00-ft	

Metal Roof and Wall Systems
ENGINEERING REPORT

Project Number:	23-1811-17	**Page:**	
Project Name:	Banner Hosford Storage	**Engineered By:**	KP
City:	Portland	**For:**	Final Calculation
State:	OR	**Date:**	02/02/2018
Building:	A		

A

CODE DATA

Building Code: OR 2014 (IBC 2012)

Exposure Category: C

Open terrain with scattered obstructions having heights generally less than 30-ft This category includes flat open country, grasslands and shorelines in hurricane prone regions.

Risk Category: Category II

All buildings and other structures except those listed in Categories I, III, IV.

Enclosure: Enclosed

Load Combinations: D = dead load, Lr = roof live load, S = snow load, W = wind load.

1) 0.6 D + 0.6 W
2) D + L_r
3) D + S
4) D + 0.75 (0.6W + L_r)
5) D + 0.75 (0.6W + S)

BUILDING DATA

Building Length:	214-ft	**Building Width:**	184-ft
Mean Height:	51.33-ft	**Roof Slope:**	**0.25:12**
Edge Zone, a:	18.5 - ft	**Tributary Area:**	10-sqft
Roof Type:	Gable	**Max. Panel:**	-ft

DESIGN CRITERIA

Dead Load:	1.54-psf	**Collateral Load:**	0-psf
Live Load:	20-psf	**Wind Velocity (V):**	120-mph
Ground Snow Load:	10-psf		

CODE CRITERIA

qz = 34.5-psf

		Negative	Positive
Wall Panel Coefficients(-10%):	Corners (5)	-1.44	1.08
(GCp-GCpi)	Main (4)	-1.17	1.08
Wall Panel Design Loads:	Corners (5)	-29.78	22.33
P = qh(GCp-GCpi)	Main (4)	-24.19	22.33

Metal Roof and Wall Systems

ENGINEERING REPORT

Project Number:	23-1811-17	**Page:**	
Project Name:	Banner Hosford Storage	**Engineered By:**	KP
City:	Portland	**For:**	Final Calculation
State:	OR	**Date:**	02/02/2018
Building:	A		

CONTRACT DOCUMENT QUALIFICATIONS

Building Code:	OR 2014 (IBC 2012)	**Risk Category:**	Category II
Exposure:	C		
Live Load:	20-psf	**Wind Load:**	120-mph
Collateral Load:	0-psf	**Ground Snow:**	10-psf
Deflection:	L/180	**UL Construction:**	

Note: These calculations are preliminary. Calculations are not final unless affixed with an engineering seal and bears the signature of the said engineer. Additional costs may be associated with signing and sealing of calculations.

WALL SPACING DESIGN-HORIZONTAL (1H)

Panel Profile: FW	Width: 12	Gage: 24	Clip: N/A
Panel Attachment Spacing:	Corners (5)	2.66-ft	
	Main (4)	4.00-ft	

WALL SPACING DESIGN-VERTICAL (3V)

Panel Profile: PBR	Width: 36	Gage: 26	Clip: N/A
Panel Attachment Spacing:	Corners (5)	5.00-ft	
	Main (4)	5.00-ft	

WALL SPACING DESIGN-HORIZONTAL (2H / 4H)

Panel Profile: 7.2 Series	Width: 36	Gage: 24	Clip: N/A
Panel Attachment Spacing:	Corners (5)	4.00-ft	
	Main (4)	4.00-ft	

WALL CONNECTION DESIGN-HORIZONTAL (1H)

Maximum Attachment Load = P × Attachment Space × Panel Width × pry factor = 24.19-psf × 4-ft × 1-ft × 1 = 97-lbs
Try (1) #12-14 HWH NW Fastening To Min. 20 ga. Studs (studs not by MBCI)

Ultimate Pullout Per Fastener 344-lbs
Allowable Factor Of Safety 3
Factor Of Safety = 1 * 344 / 97 = 3.56 Therefore O.K.

Ultimate Pullover Per Fastener 819-lbs
Allowable Factor Of Safety 3
Factor Of Safety = 1 * 819 / 97 = 8.46 Therefore O.K.

WALL CONNECTION SOLUTION-HORIZONTAL (1H)

Use (1) #12-14 HWH NW Fastening To Min. 20 ga. Studs (studs not by MBCI)
Stitch Panels at each support with (1) 1/4-14 x 7/8" LapTek [#4]

Metal Roof and Wall Systems
ENGINEERING REPORT

Project Number:	23-1811-17	**Page:**	
Project Name:	Banner Hosford Storage	**Engineered By:**	KP
City:	Portland	**For:**	Final Calculation
State:	OR	**Date:**	02/02/2018
Building:	A		

WALL CONNECTION DESIGN-VERTICAL (3V)

Maximum Attachment Load = P × Attachment Space × Panel Width × pry factor = 29.78-psf × 5-ft × 3-ft × 1 = 447-lbs
Try (3) #12-14 HWH WW Fastening To Min. 18 ga. Members (members not by MBCI)

Ultimate Pullout Per Fastener 554-lbs
Allowable Factor Of Safety 3
Factor Of Safety = 3 * 554 / 447 = 3.72 Therefore O.K.

Ultimate Pullover Per Fastener 794-lbs
Allowable Factor Of Safety 3
Factor Of Safety = 3 * 794 / 447 = 5.33 Therefore O.K.

WALL CONNECTION SOLUTION-VERTICAL (3V)

Use (3) #12-14 HWH WW Fastening To Min. 18 ga. Members (members not by MBCI)

FASCIA CONNECTION DESIGN-HORIZONTAL (2H / 4H)

Maximum Attachment Load = P × Attachment Space × Panel Width × pry factor = 29.78-psf × 4-ft × 3-ft × 1 = 357-lbs
Try (5) #12-14 HWH WW Fastening To Min. 20 ga. Studs (studs not by MBCI)

Ultimate Pullout Per Fastener 344-lbs
Allowable Factor Of Safety 3
Factor Of Safety = 5 * 344 / 357 = 4.81 Therefore O.K.

Ultimate Pullover Per Fastener 1299-lbs
Allowable Factor Of Safety 3
Factor Of Safety = 5 * 1299 / 357 = 18.17 Therefore O.K.

FASCIA CONNECTION SOLUTION-HORIZONTAL (2H / 4H)

Use (5) #12-14 HWH WW Fastening To Min. 20 ga. Studs (studs not by MBCI)

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APPENDIX

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CUSTOMER CHART

FW-120-0 24 Ga.

Negative Design Loads (psf)

Span	1592 Load	Design Load
3.00	110.93	63.75
3.50	99.23	57.03
4.00	87.53	50.30
4.50	75.83	43.58
5.00	64.13	36.86
5.50	58.50	33.62
6.00	52.87	30.39
6.50	47.24	27.15
7.00	41.60	23.91

Notes:

1) The above loads were derived from uplift tests done in accordance with ASTM E-1592
2) All values are interpolated from tests performed at spans of 3'-0", 5'-0" and 7'-0".
3) Test results are highlighted.
4) Design Load contains a 1.74 factor of safety.
7) These values do not consider fastener pullout or pullover, clip attachment must be designed separately.
8) This material is subject to change without notice. Please contact MBCI for most current data.

Effective Date: January 27, 2014

Metal Roof and Wall Systems

12" FW Panel

SECTION PROPERTIES								
			NEGATIVE BENDING			POSITIVE BENDING		
PANEL	Fy	WEIGHT	Ixe	Sxe	Maxo	Ixe	Sxe	Maxo
GAUGE	(KSI)	(PSF)	(IN.4/FT.)	(IN.3/FT.)	(KIP-IN.)	(IN.4/FT.)	(IN.3/FT.)	(KIP-IN.)
24	50	1.54	0.0987	0.0824	2.4685	0.0441	0.0511	1.5275
22	50	1.85	0.1316	0.1106	3.3125	0.0617	0.0738	2.2110

NOTES:

1. All calculations for the properties of NuWall panels are calculated in accordance with the 2007 edition of the North American Specification For Design Of Cold-Formed Steel Structural Members.
2. Ixe is for deflection determination.
3. Sxe is for bending.
4. Maxo is allowable bending moment.
5. All values are for one foot of panel width.

The Engineerigng data contained herein is for the expressed use of customers and design professionals. Along with this data, it is recommended that the design professional have a copy of the most current version of the North American Specification for the Design of Cold-Formed Steel Structural Members published by the American Iron and Steel Institute to facilitate design. This Specification contains the design criteria for cold-formed steel components. Along with the Specification, the designer should reference the most current building code applicable to the project jobsite in order to determine enviromental loads. If further information or guidance regarding cold-formed design practices is desired, please contact the manufacturer.

Metal Roof and Wall Systems

12" FW Panel

ALLOWABLE UNIFORM LOADS IN POUNDS PER SQUARE FOOT

24 Gauge (Fy = 50 KSI)							
SPAN TYPE	LOAD TYPE	SPAN IN FEET					
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
SINGLE	POSITIVE WIND LOAD	113.1	63.6	40.7	26.8	16.9	11.3	7.9
2-SPAN	POSITIVE WIND LOAD	106.8	61.5	39.9	27.9	20.6	15.8	12.5
3-SPAN	POSITIVE WIND LOAD	130.3	75.9	49.4	34.6	25.6	19.6	15.0
4-SPAN	POSITIVE WIND LOAD	122.7	71.2	46.2	32.4	23.9	18.4	14.5

22 Gauge (Fy = 50 KSI)							
SPAN TYPE	LOAD TYPE	SPAN IN FEET					
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
SINGLE	POSITIVE WIND LOAD	163.8	92.1	59.0	37.5	23.6	15.8	11.1
2-SPAN	POSITIVE WIND LOAD	152.3	88.3	57.4	40.2	29.7	22.8	18.0
3-SPAN	POSITIVE WIND LOAD	184.9	108.5	70.9	49.8	36.8	28.3	20.9
4-SPAN	POSITIVE WIND LOAD	174.4	101.9	66.4	46.6	34.5	26.5	21.0

NOTES:

1) Allowable loads are based on uniform span lengths and Fy = 50 ksi.
2) POSITIVE WIND LOAD is limited by bending, shear, combined shear & bending, and web crippling.
3) POSITIVE WIND LOAD is limited by a maximum deflection ratio of L/120.
4) The weight of the panel has not been deducted from the allowable loads.
5) THE ABOVE LOADS ARE NOT FOR USE WHEN DESIGNING PANELS TO RESIST WIND UPLIFT.
6) Please contact manufacturer or manufacturer's website for most current allowable negative wind loads.

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PBR Panel

SECTION PROPERTIES								
			NEGATIVE BENDING			POSITIVE BENDING		
PANEL GAUGE	Fy (KSI)	WEIGHT (PSF)	Ixe (IN.4/FT.)	Sxe (IN.3/FT.)	Maxo (KIP-IN.)	Ixe (IN.4/FT.)	Sxe (IN.3/FT.)	Maxo (KIP-IN.)
29	60*	0.75	0.0215	0.0325	1.2656	0.0238	0.0230	0.9859
26	60*	0.94	0.0309	0.0449	1.8019	0.0382	0.0381	1.6759
24	50	1.14	0.0420	0.0570	1.7060	0.0551	0.0567	1.6968
22	50	1.44	0.0567	0.0739	2.2119	0.0754	0.0787	2.3553

* Panels are made from 80 ksi yield material. Flexural effective yield strengths vary by direction of bending. Shear and web crippling capacities have been determined using an effective yield strength of 60 ksi.

NOTES:

1. All calculations for the properties of PBR Roof panels are calculated in accordance with the 2012 edition of the North American Specification For Design Of Cold-Formed Steel Structural Members.
2. Ixe is for deflection determination.
3. Sxe is for bending.
4. Maxo is allowable bending moment.
5. All values are for one foot of panel width.

The Engineering data contained herein is for the expressed use of customers and design professionals. Along with this data, it is recommended that the design professional have a copy of the most current version of the *North American Specification for the Design of Cold-Formed Steel Structural Members* published by the American Iron and Steel Institute to facilitate design. This Specification contains the design criteria for cold-formed steel components. Along with the Specification, the designer should reference the most current building code applicable to the project jobsite in order to determine environmental loads. If further information or guidance regarding cold-formed design practices is desired, please contact the manufacturer.

Metal Roof and Wall Systems

ALLOWABLE UNIFORM LOADS IN POUNDS PER SQUARE FOOT

PBR Wall Panel

29 Gauge (0.0133"), Fy = 60 ksi, Fu = 61.5 ksi								
SPAN TYPE	LOAD TYPE	SPAN IN FEET						
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
1-span	NEGATIVE WIND LOAD	93.75	52.73	33.75	23.44	17.22	13.18	10.42
	LIVE LOAD/DEFLECTION	67.01	41.08	26.29	18.26	13.41	10.27	8.11
2-span	NEGATIVE WIND LOAD	61.91	37.19	24.61	17.42	12.96	10.00	7.94
	LIVE LOAD/DEFLECTION	70.40	45.18	30.41	21.75	16.28	12.62	10.06
3-span	NEGATIVE WIND LOAD	73.01	44.74	29.96	21.37	15.96	12.36	9.84
	LIVE LOAD/DEFLECTION	80.00	53.43	36.52	26.39	19.89	15.50	12.40
4-span	NEGATIVE WIND LOAD	69.51	42.31	28.22	20.08	14.97	11.58	9.21
	LIVE LOAD/DEFLECTION	77.00	50.82	34.56	24.89	18.72	14.56	11.63

26 Gauge (0.0181"), Fy = 60 ksi, Fu = 61.5 ksi								
SPAN TYPE	LOAD TYPE	SPAN IN FEET						
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
1-span	NEGATIVE WIND LOAD	133.48	75.08	48.05	33.37	24.52	18.77	14.83
	LIVE LOAD/DEFLECTION	119.08	69.83	44.69	31.04	22.80	17.46	13.79
2-span	NEGATIVE WIND LOAD	114.41	66.59	43.33	30.37	22.44	17.24	13.66
	LIVE LOAD/DEFLECTION	105.60	71.09	46.37	32.55	24.07	18.51	14.66
3-span	NEGATIVE WIND LOAD	138.49	81.62	53.46	37.61	27.86	21.44	17.00
	LIVE LOAD/DEFLECTION	120.00	86.91	57.11	40.25	29.85	22.99	18.24
4-span	NEGATIVE WIND LOAD	130.70	76.70	50.12	35.22	26.06	20.05	15.89
	LIVE LOAD/DEFLECTION	115.50	81.75	53.58	37.71	27.93	21.50	17.05

24 Gauge (0.0223"), Fy = 50 ksi, Fu = 60 ksi								
SPAN TYPE	LOAD TYPE	SPAN IN FEET						
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
1-span	NEGATIVE WIND LOAD	126.37	71.08	45.49	31.59	23.21	17.77	14.04
	LIVE LOAD/DEFLECTION	125.69	70.70	45.25	31.42	23.09	17.68	13.97
2-span	NEGATIVE WIND LOAD	120.59	69.04	44.56	31.09	22.91	17.57	13.90
	LIVE LOAD/DEFLECTION	117.33	69.40	44.80	31.25	23.03	17.66	13.97
3-span	NEGATIVE WIND LOAD	148.17	85.44	55.34	38.68	28.53	21.90	17.34
	LIVE LOAD/DEFLECTION	133.33	85.87	55.62	38.89	28.68	22.02	17.43
4-span	NEGATIVE WIND LOAD	139.13	80.03	51.77	36.16	26.66	20.46	16.19
	LIVE LOAD/DEFLECTION	128.33	80.43	52.04	36.35	26.81	20.57	16.28

22 Gauge (0.0286"), Fy = 50 ksi, Fu = 60 ksi								
SPAN TYPE	LOAD TYPE	SPAN IN FEET						
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
1-span	NEGATIVE WIND LOAD	163.85	92.16	58.98	40.96	30.09	23.04	18.21
	LIVE LOAD/DEFLECTION	174.46	98.14	62.81	43.62	32.04	24.53	19.38
2-span	NEGATIVE WIND LOAD	168.30	96.14	61.98	43.21	31.83	24.41	19.31
	LIVE LOAD/DEFLECTION	158.71	90.50	58.30	40.63	29.91	22.94	18.14
3-span	NEGATIVE WIND LOAD	207.24	119.12	77.03	53.80	39.67	30.44	24.09
	LIVE LOAD/DEFLECTION	195.75	112.25	72.50	50.61	37.29	28.61	22.64
4-span	NEGATIVE WIND LOAD	194.44	111.53	72.04	50.29	37.06	28.43	22.50
	LIVE LOAD/DEFLECTION	183.56	105.06	67.79	47.29	34.84	26.72	21.14

Notes:

1. Strength calculations based on the 2012 AISI Standard "North American Specification for the Design of Cold-formed Steel Structural Members."
2. Allowable loads are applicable for uniform loading and spans without overhangs.
3. LIVE LOAD/DEFLECTION load capacities are for those loads that push the panel against its supports. The applicable limit states are flexure, shear, combined shear and flexure, web crippling at end and interior supports, and a deflection limit of L/60 under 10-year wind loading.
4. NEGATIVE WIND LOAD capacities are for those loads that pull the panel away from its supports. The applicable limit states are flexure, shear, combined shear and flexure, and a deflection limit of L/60 under 10-year wind loading.
5. Panel pullover and Screw pullout capacity must be checked separately using the screws employed for each particular application when utilizing this load chart.
6. Effective yield strength has been determined in accordance with section A2.3.2 of the 2012 NAS specification.
7. The use of any accessories other than those provided by the manufacturer may damage panels, void all warranties and will void all engineering data.
8. This material is subject to change without notice. Please contact MBCI for most current data.

The Engineering data contained herein is for the expressed use of customers and design professionals. Along with this data, it is recommended that the design professional have a copy of the most current version of the *North American Specification for the Design of Cold-Formed Steel Structural Members* published by the American Iron and Steel Institute to facilitate design. This Specification contains the design criteria for cold-formed steel components. Along with the Specification, the designer should reference the most current building code applicable to the project jobsite in order to determine environmental loads. If further information or guidance regarding cold-formed design practices is desired, please contact the manufacturer.

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Metal Roof and Wall Systems

7.2 Roof Panel

SECTION PROPERTIES								
			NEGATIVE BENDING			POSITIVE BENDING		
PANEL GAUGE	Fy (KSI)	WEIGHT (PSF)	Ixe (IN.4/FT.)	Sxe (IN.3/FT.)	Maxo (KIP-IN.)	Ixe (IN.4/FT.)	Sxe (IN.3/FT.)	Maxo (KIP-IN.)
29	60*	0.66	0.0476	0.0478	1.9277	0.0502	0.0563	2.2693
26	60*	0.86	0.0725	0.0774	3.2078	0.0754	0.0908	3.7590
24	50	1.06	0.0999	0.1134	3.3950	0.0994	0.1242	3.7193
22	50	1.36	0.1342	0.1562	4.6752	0.1329	0.1708	5.1137

* Panels are made from 80 ksi yield material. Flexural effective yield strengths vary by direction of bending. Shear and web crippling capacities have been determined using an effective yield strength of 60 ksi.

NOTES:

1. All calculations for the properties of 7.2 Roof panels are calculated in accordance with the 2012 edition of the North American Specification For Design Of Cold-Formed Steel Structural Members.
2. Ixe is for deflection determination.
3. Sxe is for bending.
4. Maxo is allowable bending moment.
5. All values are for one foot of panel width.

The Engineering data contained herein is for the expressed use of customers and design professionals. Along with this data, it is recommended that the design professional have a copy of the most current version of the *North American Specification for the Design of Cold-Formed Steel Structural Members* published by the American Iron and Steel Institute to facilitate design. This Specification contains the design criteria for cold-formed steel components. Along with the Specification, the designer should reference the most current building code applicable to the project jobsite in order to determine environmental loads. If further information or guidance regarding cold-formed design practices is desired, please contact the manufacturer.

Metal Roof and Wall Systems

ALLOWABLE UNIFORM LOADS IN POUNDS PER SQUARE FOOT

7.2 I I Panel

29 Gauge (0.0133"), Fy = 60 ksi, Fu = 61.5 ksi								
SPAN TYPE	LOAD TYPE	SPAN IN FEET						
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
1-span	NEGATIVE WIND LOAD	142.84	80.35	51.42	35.71	26.24	20.09	15.87
	LIVE LOAD/DEFLECTION	102.44	68.59	35.12	20.32	12.80	8.57	6.02
2-span	NEGATIVE WIND LOAD	110.34	71.62	49.82	36.44	27.70	21.71	17.44
	LIVE LOAD/DEFLECTION	102.19	64.82	44.37	32.09	24.20	18.86	15.09
3-span	NEGATIVE WIND LOAD	123.35	82.15	58.28	43.24	33.22	26.25	21.21
	LIVE LOAD/DEFLECTION	115.90	75.44	52.58	38.51	28.80	19.30	13.55
4-span	NEGATIVE WIND LOAD	119.43	78.91	55.63	41.08	31.45	24.78	19.99
	LIVE LOAD/DEFLECTION	111.72	72.13	49.98	36.45	27.66	20.76	14.58

26 Gauge (0.0181"), Fy = 60 ksi, Fu = 61.5 ksi								
SPAN TYPE	LOAD TYPE	SPAN IN FEET						
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
1-span	NEGATIVE WIND LOAD	237.61	133.66	85.54	59.40	43.64	33.41	26.40
	LIVE LOAD/DEFLECTION	162.95	103.02	52.75	30.53	19.22	12.88	9.04
2-span	NEGATIVE WIND LOAD	222.59	136.44	91.38	65.16	48.68	37.69	30.01
	LIVE LOAD/DEFLECTION	143.95	107.96	79.83	56.57	42.08	32.49	25.82
3-span	NEGATIVE WIND LOAD	258.47	162.17	110.20	79.32	59.63	46.36	37.03
	LIVE LOAD/DEFLECTION	163.58	122.69	97.08	64.84	40.83	27.35	19.21
4-span	NEGATIVE WIND LOAD	247.30	153.99	104.13	74.72	56.05	43.52	34.72
	LIVE LOAD/DEFLECTION	157.45	118.09	91.48	65.14	44.07	29.52	20.74

24 Gauge (0.0223"), Fy = 50 ksi, Fu = 60 ksi								
SPAN TYPE	LOAD TYPE	SPAN IN FEET						
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
1-span	NEGATIVE WIND LOAD	251.48	141.46	90.53	62.87	46.19	35.36	27.94
	LIVE LOAD/DEFLECTION	202.14	135.78	69.52	40.23	25.33	16.97	11.92
2-span	NEGATIVE WIND LOAD	253.79	147.73	96.14	67.39	49.79	38.27	30.31
	LIVE LOAD/DEFLECTION	156.28	117.21	88.20	61.73	45.57	35.00	27.71
3-span	NEGATIVE WIND LOAD	307.17	181.07	118.61	83.46	61.81	47.58	37.73
	LIVE LOAD/DEFLECTION	177.59	133.19	106.55	76.57	53.77	36.02	25.30
4-span	NEGATIVE WIND LOAD	289.91	170.16	111.21	78.15	57.83	44.49	35.27
	LIVE LOAD/DEFLECTION	170.93	128.19	102.17	71.66	52.97	38.84	27.28

22 Gauge (0.0286"), Fy = 50 ksi, Fu = 60 ksi								
SPAN TYPE	LOAD TYPE	SPAN IN FEET						
		3.0	4.0	5.0	6.0	7.0	8.0	9.0
1-span	NEGATIVE WIND LOAD	346.31	194.80	124.67	86.58	63.61	48.70	38.48
	LIVE LOAD/DEFLECTION	322.96	181.52	92.94	53.78	33.87	22.69	15.94
2-span	NEGATIVE WIND LOAD	357.18	205.97	133.40	93.26	68.79	52.81	41.80
	LIVE LOAD/DEFLECTION	199.38	149.54	119.63	85.47	63.01	48.35	38.26
3-span	NEGATIVE WIND LOAD	435.96	253.83	165.20	115.80	85.57	65.76	52.09
	LIVE LOAD/DEFLECTION	226.57	169.93	135.94	106.25	71.31	47.77	33.55
4-span	NEGATIVE WIND LOAD	410.29	238.09	154.70	108.33	80.00	61.46	48.67
	LIVE LOAD/DEFLECTION	218.07	163.56	130.84	99.36	73.31	51.25	35.99

Notes:

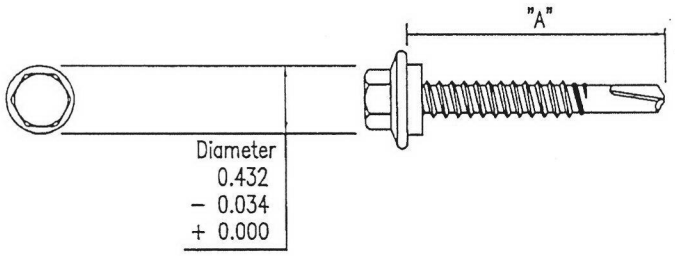
1. Strength calculations based on the 2012 AISI Standard "North American Specification for the Design of Cold-formed Steel Structural Members."
2. Allowable loads are applicable for uniform loading and spans without overhangs.
3. LIVE LOAD/DEFLECTION load capacities are for those loads that push the panel against its supports. The applicable limit states are flexure, shear, combined shear and flexure, web crippling at end and interior supports, and a deflection limit of L/180 under strength-level loads.
4. NEGATIVE WIND LOAD capacities are for those loads that pull the panel away from its supports. The applicable limit states are flexure, shear, combined shear and flexure, and a deflection limit of L/60 under 10-year wind loading.
5. Panel pullover and Screw pullout capacity must be checked separately using the screws employed for each particular application when utilizing this load chart.
6. Effective yield strength has been determined in accordance with section A2.3.2 of the 2012 NAS specification.
7. The use of any accessories other than those provided by the manufacturer may damage panels, void all warranties and will void all engineering data.
8. This material is subject to change without notice. Please contact MBCI for most current data.

The Engineering data contained herein is for the expressed use of customers and design professionals. Along with this data, it is recommended that the design professional have a copy of the most current version of the *North American Specification for the Design of Cold-Formed Steel Structural Members* published by the American Iron and Steel Institute to facilitate design. This Specification contains the design criteria for cold-formed steel components. Along with the Specification, the designer should reference the most current building code applicable to the project jobsite in order to determine environmental loads. If further information or guidance regarding cold-formed design practices is desired, please contact the manufacturer.

FASTENER SPECIFICATIONS

FASTENER # 3

Metal Roof and Wall Systems



12–14 TEK 2
LONG LIFE W WASHER

Point Diameter:	0.1675 ± 0.0025
Major Diameter:	0.2150 ± 0.0060
Minor Diameter:	0.1640 ± 0.0070
Head – Across Flats:	0.3050 ± 0.0060

Length "A" : $\frac{3}{4}$", 1", $1\frac{1}{4}$", $1\frac{1}{2}$", 2", $2\frac{1}{2}$", 3", 4"

Tensile Strength:	2778 lbs.
Min. Torsional Strength:	92 in–lbs.
Shear Strength:	2000 lbs.

PULL OUT STRENGTH

MATERIAL	HRS YIELD STRENGTH: 57 KSI MIN.			A36 HRS YIELD STRENGTH: 54 KSI		
Gauge	16	14	12	18	20	22
Thickness (in.)	0.059	0.070	0.105	0.0468	0.0352	0.0286
Value (lbs.)	724	1010	1539	605	341	286

PULL OVER STRENGTH

DESIGNATION	AZ55 GALVALUME			
Gauge	29	26	24	22
Thickness (in.)	.015	.019	.023	.031
Value (lbs.)	687	794	1299	1562

CURRENT SUPPLIERS:

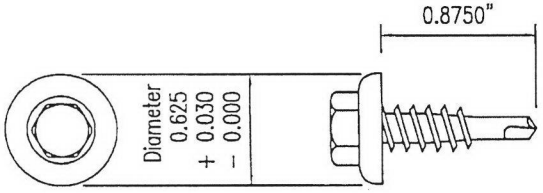
ATLAS, BUILDEX, SEALTITE, SFS INTEC

EFFECTIVE: SEPTEMBER 18, 2012

FASTENER SPECIFICATIONS

PART # 4

Metal Roof and Wall Systems



1/4–14 x 7/8 LONG–LIFE LAPTEK W/WASHER

Point Diameter:	0.1465 ± 0.0035
Major Diameter:	0.2430 ± 0.0030
Minor Diameter:	0.1885 ± 0.0035
Head – Across Flats:	0.3065 ± 0.0045

Tensile Strength:	2240 lbs.
Min. Torsional Strength:	150 in–lbs.
Shear Strength:	2600 lbs.

PULL OUT STRENGTH

MATERIAL	HRS YIELD STRENGTH: 57 KSI MIN.				
Gauge	26	24	22	20	18
Thickness (in.)	0.019	0.023	0.031	0.035	0.049
Value (lbs.)	161	264	241	393	652

PULL OVER STRENGTH

DESIGNATION	AZ55 GALVALUME			
Gauge	29	26	24	22
Thickness (in.)	0.015	0.019	0.023	0.031
Value (lbs.)	387	526	820	1037

CURRENT SUPPLIERS:

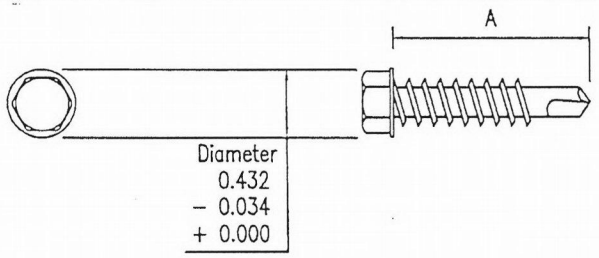
ATLAS, BUILDEX, SEALTITE, SFS INTEC

EFFECTIVE: NOVEMBER 2, 2012

FASTENER SPECIFICATIONS

FASTENER # 1A

MBCI® Metal Roof and Wall Systems



12–14 TEK 2
SELF–DRILLER W/O WASHER

Point Diameter:	0.1675 ± 0.0025
Major Diameter:	0.2150 ± 0.0060
Minor Diameter:	0.1640 ± 0.0070
Head – Across Flats:	0.3050 ± 0.0060

Length "A" : $\frac{3}{4}$", 1", $1\frac{1}{4}$", $1\frac{1}{2}$", 2", $2\frac{1}{2}$", 3", 4"

Tensile Strength:	2778 lbs.
Min. Torsional Strength:	92 in–lbs.
Shear Strength:	2000 lbs.

PULL OUT STRENGTH

MATERIAL	HRS YIELD STRENGTH: 57 KSI MIN.			A36 HRS YIELD STRENGTH: 54 KSI		
Gauge	16	14	12	18	20	22
Thickness (in.)	0.059	0.070	0.105	0.0468	0.0352	0.0286
Value (lbs.)	724	1010	1539	605	341	286

PULL OVER STRENGTH

DESIGNATION	AZ55 GALVALUME			
Gauge	26	24	22	20
Thickness (in.)	.019	.023	.031	.035
Value (lbs.)	544	819	1107	1247

CURRENT SUPPLIERS:

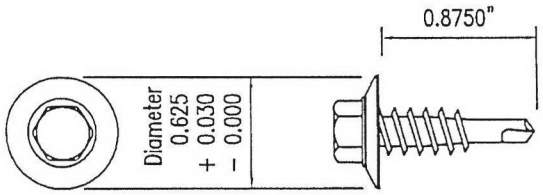
ATLAS, BUILDEX, SEALTITE, SFS INTEC

EFFECTIVE: OCTOBER 31, 2012

FASTENER SPECIFICATIONS

FASTENER # 4A

Metal Roof and Wall Systems



1/4–14 x 7/8 LAPTEK
W/WASHER

Point Diameter:	0.1465 ± 0.0035
Major Diameter:	0.2430 ± 0.0030
Minor Diameter:	0.1885 ± 0.0035
Head – Across Flats:	0.3065 ± 0.0045

Tensile Strength:	2240 lbs.
Min. Torsional Strength:	150 in–lbs.
Shear Strength:	2600 lbs.

PULL OUT STRENGTH

MATERIAL	HRS YIELD STRENGTH: 57 KSI MIN.				
Gauge	29	26	24	22	18
Thickness (in.)	0.015	0.019	0.023	0.031	0.049
Value (lbs.)	198	204	304	379	690

PULL OVER STRENGTH

DESIGNATION	AZ55 GALVALUME			
Gauge	29	26	24	22
Thickness (in.)	0.015	0.019	0.023	0.031
Value (lbs.)	387	526	820	1037

CURRENT SUPPLIERS:

ATLAS, BUILDEX, SEALTITE, SFS INTEC

EFFECTIVE: NOVEMBER 2, 2012

Metal Roof and Wall Systems

Engineering Technical Bulletin

No. 004-11-02 November 13, 2002

R-Panel
Air Leakage and Water Penetration Test Data

PRODUCT

MBCI R-Panel 24-ga. with stitch screws at 20" o/c, and continuous ½" x 3/32" tape sealer at panel side-lap.

TEST PROCEDURES

ASTM E 1680-95: Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

ASTM E 1646-95: Standard Test Method Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

TEST RESULTS

Air Leakage was conducted with a uniform static air pressure differential of +/- 1.57 *psf* & +/- 6.24 *psf*.
Water Penetration was conducted with a uniform static air pressure differential of 20.00 *psf*.

Water Penetration Test Results: No uncontrollable water leakage at 20 *psf* when five gallons per hour of water were sprayed per square foot of roof area.

The following are the test results:

SUMMARY

	ASTM E 1680-95 Air Leakage		ASTM E 1646-95 Water Penetration	
Profile	Pressure Differential	Leakage Rate	Pressure Differential	Infiltration Rate
R-Panel 24 Ga.	+ 1.57 *psf*	0.005 *cfm / sq. ft.*	20 *psf*	None
R-Panel 24 Ga.	- 1.57 *psf*	0.004 *cfm / sq. ft.*	20 *psf*	None
R-Panel 24 Ga.	+/- 6.24 *psf*	0.006 *cfm / sq. ft.*	20 *psf*	None

Copies of the independent test laboratory reports are available upon request.

Test Report No. T250-02 Dated: 9/16/2002

MBCI®
Metal Roof and Wall Systems

Engineering Technical Bulletin

No. 204-01-00 January 26, 2000

Air Leakage and Water Penetration Test Data

PRODUCT
MBCI FW Panel

TEST PROCEDURES

1. ASTM E 283-84: Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
2. ASTM E 331-86: Standard Test Method Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

TEST RESULTS
This test specimen meets the performance level requested.

Detailed drawings were available for laboratory records and compared to the test specimen at the time of this report.

The above test results were obtained by using the designated test methods, and the results obtained Apply only to the specimen tested. This report does not constitute an endorsement of or recommendation for this product or material tested.

Paragraph No.	Title of Test	CFM/Sq. Ft.	CFM/LF Seam
ASTM 283-84	Rate of Air Leakage		
	At 4.00 psf	0.000	0.000
	At 6.24 psf	0.000	0.000
	At 10.00 psf	0.013	0.286
	At 15.00 psf	0.000	0.000
	At 20.00 psf	0.113	0.226
ASTM 331-86	Water Penetration	Measured	Allowed
	At 8.99 psf	No Leakage	½-Oz. @
	At 13.24 psf	No Leakage	2.86 psf

This test specimen meets the performance level requested.