

EVALUATION SUBJECT: MITSUBISHI M-SERIES SYSTEMS**TER-20-34959****REPORT HOLDER:**MITSUBISHI ELECTRIC TRANE US HVAC LLC
1340 SATELLITE BLVD
SUWANEE, GA 30024, USA
678-376-2912 | METAHVAC.COMFlorida Building Code Seventh Edition (2020)
International Building Code (2012, 2015 & 2018)**SCOPE OF EVALUATION (compliance with the following codes):****THIS IS A STRUCTURAL (WIND) PERFORMANCE EVALUATION ONLY.
NO ELECTRICAL OR TEMPERATURE PERFORMANCE RATINGS OR
CERTIFICATIONS ARE OFFERED OR IMPLIED HEREIN.**

This Product Evaluation Report is being issued in accordance with the requirements of the **Florida Building Code Seventh Edition (2020)** per ASCE 7, FBC Building Ch. 16, FBC Building Sections 104.11 & 1522.2, FBC Existing Building Sections 707.1 & 707.2, FBC Mechanical 301.15, FBC Residential M1202.1 & M1301.1, FS 471.025, and Broward County Administrative Provisions 107.3.4. This report is also in accordance with the **International Building Code (2012, 2015, & 2018)**. The product noted on this report has been tested and/or evaluated as summarized herein.

**IN ACCORDANCE WITH THESE CODES EACH OF THESE
REPORTS MUST BEAR THE ORIGINAL SIGNATURE & RAISED
SEAL OR DIGITAL SEAL OF THE EVALUATING ENGINEER.****SUBSTANTIATING DATA:****• Product Evaluation Documents**

Substantiating documentation has been submitted to provide this TER and is summarized in the sections below.

• Structural Engineering Calculations

Structural engineering calculations have been prepared which evaluate the product based on comparative and/or rational analysis to qualify the following design criteria:

- Max. allowable lateral & uplift wind pressures certified herein
- Max. allowable sliding forces, uplift forces, & overturning moments (see Unit Reactions from Wind Guide on last page)
- Tie-down configuration and anchor capacity for various substrates
- Unit panel wind pressure connection integrity

Calculation summary is included in this TER and appears herein.

NOTE: No 33% increase in allowable stress has been used in the design of this product.

LIMITATIONS & CONDITIONS OF USE:

Use of the product(s) listed herein shall be in strict accordance with this TER as noted herein and manufacturer-provided model specifications. Installation shall conform to the minimum standards stated in the referenced building code(s) in addition to the specifications and limitations stated herein. See herein for complete limitations & conditions of use.

FINISH:

Baked enamel, casing color white ivory.

OPTIONS:

This evaluation is valid for the Mitsubishi models described herein. Any structural changes outside of the design as described herein would void this certification.

UNIT CASING MATERIAL:

25ga galv. sheet steel equivalent to ASTM A653 CS Cold Rolled Steels. Removable top & side covers secured with #8 SAE 1016 SMS screws. Knockouts provided for utility & control connections.

TERMINOLOGY:

See herein for definitions of terms and abbreviations used.

**NOTE: THE GRAPHICAL DEPICTIONS IN THIS REPORT ARE FOR
ILLUSTRATIVE PURPOSES ONLY AND MAY DIFFER IN APPEARANCE.****STRUCTURAL PERFORMANCE:**

Models referenced herein are subject to the following design limitations:

Maximum Rated Wind Pressures*:**± 119 psf Lateral, 94 psf Uplift**

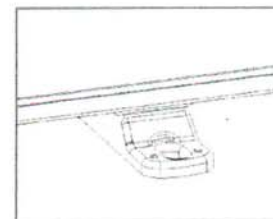
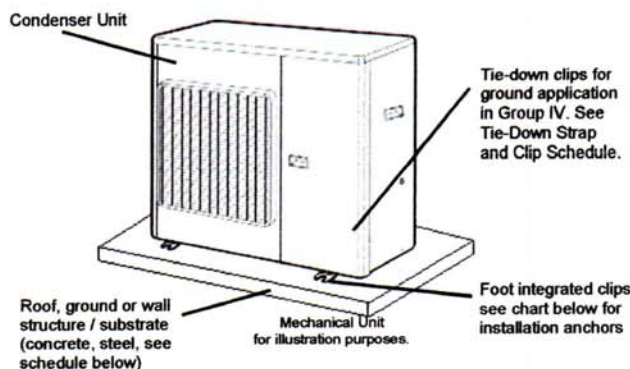
- Required design wind pressures shall be determined according to the guide provided in the Appendix (see last page of this report) or on a site-specific basis in accordance with ASCE 7 and applicable sections of the building code(s) being referenced in accordance with ASD methodology.
- Required design pressures shall be less than or equal to the maximum pressures listed herein.
- *Maximum Rated Wind Pressures indicate the maximum pressures that all units listed herein are approved for. Valid for at-grade and rooftop applications. See limitations herein.
- Valid for use inside and outside the High-Velocity Hurricane Zone (HVHZ).
- Site-specific wind analysis may produce alternate limitations provided maximum rated wind pressures stated herein are not exceeded.

VISIT [ECALC.IO/34959](https://ecalc.io/34959)FOR ENGINEER CERTIFIED ORIGINALS
& MORE INFORMATION ABOUT THIS DOCUMENT
OR SCAN THIS QR CODEVISIT [ENGINEERINGEXPRESS.COM/STORE](https://engineeringexpress.com/store) FOR
ADDITIONAL PLANS, REPORTS & RESOURCES**ORIGINAL SIGNATURE AND RAISED SEAL
OR DIGITAL SEAL REQUIRED TO BE VALID PER CODE:**Digitally signed by Richard Neet, PE
Reason: Printed copies of this document are
not considered signed and sealed and the
signature must be verified on any electronic
copies
Date: 2021.12.14 18:30:04 -05:00**DIGITAL SEAL NOTICE:** IF THIS DOCUMENT IS DIGITALLY SIGNED, THIS SHEET IS PART OF A
DIGITALLY SIGNED FILE. IT SHALL REMAIN IN DIGITAL FORMAT, SHALL BE VERIFIED BY
ELECTRONIC MEANS, & PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED
SIGNED AND SEALED. VISIT [ECALC.IO/DS](https://ecalc.io/ds) FOR MORE INFORMATION.**PRINTED DOCUMENT NOTICE:** IF THIS DOCUMENT IS PRINTED & DOES NOT CONTAIN AN
ENGINEER'S ORIGINAL SIGNATURE & SEAL, THIS DOCUMENT IS VOID & NOT VALID FOR
USE. PHOTOCOPIES ARE NOT PERMITTED FOR USE.

Copyright © Engineering Express®. All Rights Reserved

The FBC 7th Edition (2020) defines APPROVED SOURCE (Section 202) as: "An independent person, firm or corporation, approved by the building official, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses." Engineering Express® professionals meet the competency requirements as defined in the FBC and can seal their work. Engineering Express® is regularly engaged in conducting and providing engineering evaluations of single-element and full-scale building systems.

PRODUCT INSTALLATION



UNIT INTEGRATED FOOT

Equivalent to ASTM A653 galvanized cold rolled steel 0.039\"/>

Anchor to Host Structure Schedule					
Unit Model	Max Lateral Pressure	Max Uplift Pressure	Concrete 3,000 psi	1/8" Min A36 Steel	1/8" Min 6061-T6 Aluminum
Group I, II	43 psf	0 psf	A, C	N/A	N/A
	119 psf	94 psf	N/A	B	B
Group III, IV	43 psf	0 psf	C	N/A	N/A
	119 psf	94 psf	N/A	B	B

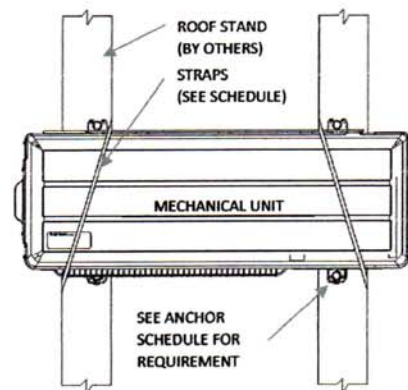
TIE-DOWN CLIP (GROUND APPLICATION)

Miami Tech CUTD 1\"/>



Anchor Types to Host Structure:

- A. - 1/4\"/>



Tie-Down Strap & Clip Schedule					
Unit Model	Max Lateral Pressure	Max Uplift Pressure	Tie-Down Strap (qty)	Minimum WLL (lbs)	Additional Tie-Down Clips Per Long Side
Group I, II	43 psf	0 psf	N/A	N/A	N/A
	89 psf	70 psf	2	500	N/A
	106 psf	84 psf	2	600	N/A
	119 psf	94 psf	2	700	N/A
Group III	43 psf	0 psf	N/A	N/A	N/A
	89 psf	70 psf	2	600	N/A
	106 psf	84 psf	2	800	N/A
	119 psf	94 psf	2	1000	N/A
Group IV	43 psf	0 psf	N/A	N/A	2
	89 psf	70 psf	2	1500	N/A
	106 psf	84 psf	2	2000	N/A
	119 psf	94 psf	2	2000	N/A

Tie-down Strap Type: (for roof applications)

Working Load Limit (WLL) is strap's manufacturer - specified per strap, strap length shall be verified on site for all cabinets.
NA. - No straps required

SUPPORTING STRUCTURES:

- METAL STAND.
- CONCRETE SLAB.
- WALL BRACKET.
- METAL CURB.

Note:
Tie-down straps shall be wrapped around unit and roof stand rail, and shall be tightened using the buckle. Provide two straps per unit.
Straps material shall be high strength webbing and shall be compliant for exterior grade use if they contain plastic components, per FBC chapter 26. Select strap from table based on WLL requirements

ELEVATIONS & DIMENSIONS

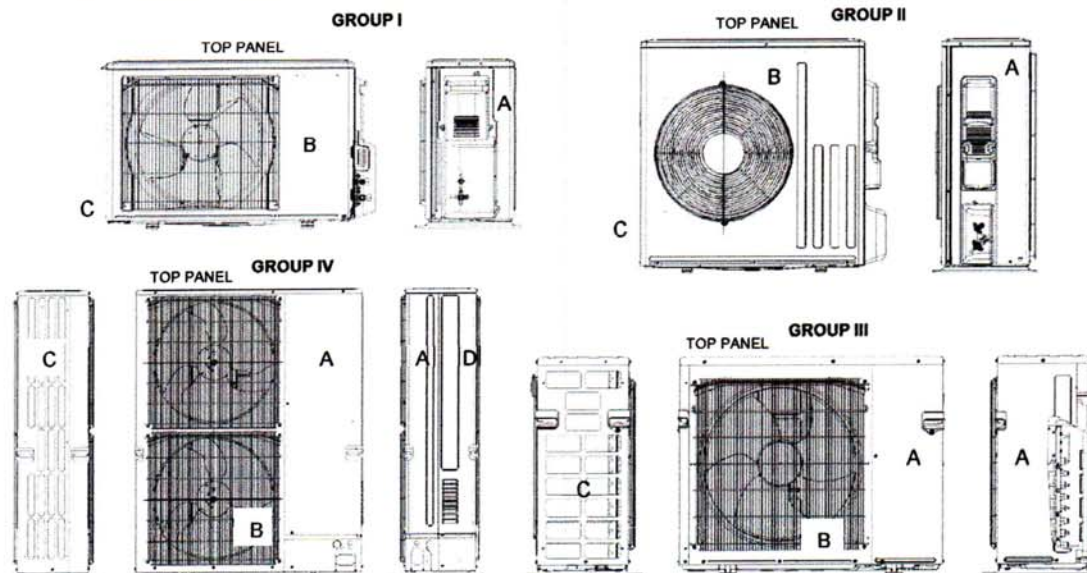
Cabinet	Model Number	Width (in)	Depth (in)	Height (in)	Weight (lbs.)
Group I	MUFZ-KJ09/12NAHZ-U*	31.5	11.25	21.63	83
	MUZ/Y-GL09/12/15NA-U*	31.5	11.25	21.63	81
	MUZ-HM09/12/15/18NA2-U1	31.5	11.25	21.63	73~81
	MUZ-FS06/09/12NA(H)	31.5	11.25	21.63	81~83
	SUZ-KA09/12/15NA2	31.5	11.25	21.63	66~80
	MUZ-JP09/12WA	31.5	11.25	21.63	73
Group II	MUZ-Y-GS30/36NA-U*	33.06	13	34.63	121
	SUZ-KA18/24/30/36NA2	33.06	13	33.44	129
	MUZ-Y-GL18/24NA-U1	33.06	13	34.63	119~121
	MUZ-HM24NA2-U1	33.06	13	34.63	121
	MUZ-FS15/18NA(H)	33.06	13	34.63	124
	MXZ-2C20NA2-U1	33.06	13	27.94	126
	MUFZ-KJ15/18NAHZ-U1	33.06	13	34.63	124
	MUZ-WR24NA	33.06	13	34.63	121
Group III	MXZ-3C24/30/36NA2-U1	37.41	13	31.34	137
	SUZ-KA09/12/15/18NAHZ	37.41	13	34.63	129~131
	SUZ-KA24NAHZ	37.41	13	37.13	190
	MXZ-5C42NA2-U1	37.41	13	41.27	189
	MXZ-2C20NAHZ2-U1	37.41	13	41.27	187
	MXZ-3C24NAHZ2-U1	37.41	13	41.27	189
	MXZ-3C30NAHZ2-U1	37.41	13	41.27	189
Group IV	SUZ-KA30/36NAHZ	41.34	13	52.69	261
	MXZ-8C48NAHZ-U1	41.34	13	52.69	276
	MXZ-8C48NA2-U1	41.34	13	52.69	269
	MXZ-8C60NA2-U1	41.34	13	52.69	309
	MXZ-4C36NAHZ-U1	41.34	13	52.69	276
	MXZ-5C42NAHZ-U1	41.34	13	52.69	276

Panel Integrity Summary				
Panel	Max Applied Wind Pressure	Pressure Direction	Additional Screws Needed (pcs)*	
			Groups I, II, III	Group IV
Top Panel	94 psf	Uplift	NONE	NONE
Panel C	119 psf	Lateral	NONE	NONE
Panel D	119 psf	Lateral	N/A	NONE
Panel A	0 psf	Lateral	NONE	NONE
Panel B	43 psf	Lateral	NONE	NONE
Panel A	89 psf	Lateral	NONE	1
Panel B	89 psf	Lateral	NONE	1
Panel A	119 psf	Lateral	NONE	2
Panel B	119 psf	Lateral	NONE	2

*Additional Screws are required beyond original manufactured cabinet. Calculations were performed according to the information provided by the Client. Screw quantities were checked to reinforce unit panels as needed. They shall be spaced evenly at the panel bottom, validating that the screw joins the panel with the panel and base pan. Panel integrity is optional and at discretion of AHJ.

UNIT GROUPINGS, PANEL DESIGNATIONS

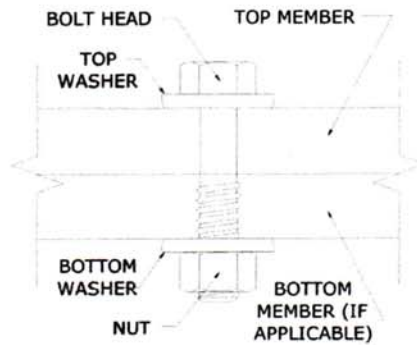
Images for illustration purposes, actual units may differ.



TERMINOLOGY, CONTINUED

The following abbreviations may appear in this report: "Addtl." for "additional", "AHJ" for "Authority Having Jurisdiction", "alum" for "aluminum", "ASCE" for "American Society of Civil Engineers", "ASD" for "Allowable Stress Design", "EA" for "each", "E.D." for "edge distance", "EDDS" for "extra deep drawing steel", "e.g." for "exempli gratia" or "for example", "equiv." for "equivalent", "FBC" for "Florida Building Code", "FEA" for "Finite Element Analysis", "FLCA" for "Florida Certificate of Authorization", "FS" for "Florida Statutes", "GA" for "gauge", "GR." or "Gr." for "grade", "HVAC" for "heating, ventilation, and air conditioning", "HVHZ" for "High-Velocity Hurricane Zone", "i.e." for "id est" or "in other words", "in" for "inch", "lb" for "pound (force)", "max." for "maximum", "min." for "minimum", "mm" for "millimeter", "NTS" for "not to scale", "O.C." for "on center", "OD" for "outer diameter", "PE" for "Professional Engineer", "qty" for "quantity", "SAE" for "Society of Automotive Engineering", "SECB" for "Structural Engineering Certification Board", "SMS" for "sheet metal screws", "SS" for "stainless steel", "TER" for "Technical Evaluation Report", "typ." for "typical", "U.N.O." for "unless noted otherwise", "UTS" for "ultimate tensile strength" or "ultimate tensile stress", "WLL" for "working load limit", "w/o" for "without", "YS" for "yield strength" or "yield stress", "Ø" for "diameter", and "Ø" for "diameter". For additional abbreviation/terminology clarifications, please contact this office.

Note: The term "Thru-Bolt" or through bolt, where used herein, refers to a bolt passing through the member(s) in contact and is fastened by a nut at the end opposite the screw head. Nut shall be equivalent to or exceed the strength of the bolt U.N.O. Nut shall be sized to accommodate the same nominal diameter as the bolt U.N.O. See diagram right for a sample thru-bolt configuration.



SAMPLE THRU-BOLT

SCALE: NTS SECTION VIEW

LIMITATIONS & CONDITIONS OF USE, CONTINUED

Use of this product shall be in strict accordance with this TER as noted herein. The supporting host structure shall be designed to resist all superimposed loads as determined by others on a site-specific basis as may be required by the authority having jurisdiction. Host structure conditions which are not accounted for in this product's respective anchor schedule shall be designed for on a site-specific basis by a registered Professional Engineer. No evaluation is offered for the host supporting structure by use of this document. Adjustment factors noted herein and the applicable building codes must be considered, where applicable. Product components shall be of the material specified in the manufacturer-provided product specifications. All supporting components which are permanently installed shall be protected against corrosion, contamination, and other such damage at all times. All fasteners and anchors shall be installed in accordance with the applicable provisions specified herein in addition to the anchor/fastener manufacturers' published installation instructions. Fasteners must penetrate the supporting members such that the full length of the threaded portion is embedded within the main member. This evaluation does not offer any evaluation to meet large missile impact debris requirements under any circumstances.

All of the wind-resisting exterior panels (with accompanying retrofits) individually meet or exceed their capacity to resist the design wind loads as stated in the calculations as required by the codes and standards stated herein. Due to the indeterminate nature of these units, distortion and deflection cannot be accurately evaluated, but with diaphragm action of external components and internal stiffeners, the base unit has the capacity to withstand these forces with individual external parts being contained. Inspections shall be implemented during annual equipment maintenance or after a named storm; all fasteners and cabinet components are to be verified, and all damaged, loose, corroded and/or broken fasteners and cabinet components shall be replaced to ensure structural integrity against hurricane wind forces. Contact this office for any reevaluation needs as designated by the Authority Having Jurisdiction.

SEE APPENDIX ON NEXT PAGE

Proj. #	Remarks	By	Checked	Date	Proj. #	Remarks	By	Checked	Date
17 5131.1	Initial Issue	LAO	FLB	7/30/19	20-34959	Update Model Numbers	EPR	EPR	7/14/21
20-34959	2020 FBC	CCB	RWN	1/25/21					

CORP. OFC: 160 SW 12TH AVENUE SUITE 106, DEERFIELD BEACH, FLORIDA 33442
(954) 354-0660 | (866) 396-9999 | TEAM@ENGINEERINGEXPRESS.COM | ENGINEERINGEXPRESS.COM

Page 4 of 5

Copyright © Engineering Express® All Rights Reserved

APPENDIX A: DESIGN WIND PRESSURE GUIDE

Max. Ult. Wind Speed (V _w)	Max. MRH (Roof Height)	Exposure Category	Required Design Wind Pressures (ASD)	
			Lateral Pressure	Uplift Pressure
140 mph	At-Grade (0 ft)	C	± 26 psf	21* psf
		D	± 31 psf	25* psf
	100 ft	C	± 63 psf	50 psf
		D	± 71 psf	56 psf
	200 ft	C	± 72 psf	57 psf
		D	± 80 psf	63 psf
175 mph	At-Grade (0 ft)	C	± 40 psf	32* psf
		D	± 49 psf	39* psf
	100 ft	C	± 98 psf	77 psf
		D	± 111 psf	87 psf
	200 ft	C	± 113 psf	89 psf
		D	± 124 psf	98 psf
186 mph	At-Grade (0 ft)	C	± 46 psf	36* psf
		D	± 55 psf	44* psf
	100 ft	C	± 111 psf	87 psf
		D	± 125 psf	99 psf
	200 ft	C	± 132 psf	100 psf
		D	± 140 psf	111 psf

100 psf

Note: Any table values with the format shown left, if present, indicate design wind pressures and site conditions that are **not approved for use** by this evaluation. Seek additional engineering or contact this office for design solutions.

DIRECTIVE: This design pressure guide is for reference only and shall be approved for use by the Authority Having Jurisdiction (AHJ). If the design pressures listed in this guide are not used, required design pressures shall be calculated separately. For site-specific scenarios classified as Exposure Category B, the required design pressures stated for Exposure Category C in the above guide shall be used or design pressures shall be calculated separately. For heights and parameters beyond the parameters listed in this guide, visit our Online Calculator via the website link (<https://ecalc.io/forces>) or QR Code below, or obtain calculations separately by others.

The required ASD design pressures listed in this guide were calculated per the table's listed corresponding site conditions. The project design professional or permitting contractor shall verify that the site-specific conditions are equal to or less than the approved design parameters listed in the guide. Per the note below table: any values shown as "XX psf", indicate wind pressures and corresponding site conditions that are **not valid for use** with this evaluation (exceeds the max. rated pressures).

*Note: Per the codes and standards referenced herein, uplift is optional for mechanical equipment at-grade. At the discretion of the AHJ, uplift may be taken as 0 psf or as the value listed in the guide.

At-Grade (0 ft MRH) Required Design Pressures:

- o ASCE 7 "Design Wind Loads: Other Structures"
- o Structure Shape = Square, flat terrain
- o Height of structure (unit + stand or curb, if used) = 6 ft max.
- o Width of unit = 1 ft min., Depth of unit = 1 ft min.
- o Uplift Pressure = Lateral Pressure x 1.5 / 1.9 (if considered)

Rooftop (>15 ft MRH) Required Design Pressures:

- o ASCE 7 "Design Wind Loads: Other Structures: Rooftop Structures and Equipment for Buildings"
- o Structure Shape = Square, flat terrain
- o z = up to 7 ft, where z = height of stand or curb + ½ unit height
- o Lateral GC_f = 1.90; Uplift GC_f = 1.50

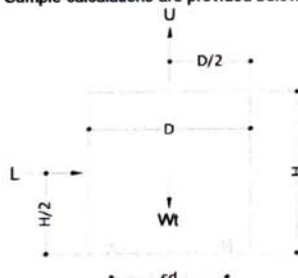
VISIT [ECALC.IO/FORCES](https://ecalc.io/forces)

FOR DESIGN AID CALCULATORS AND RESOURCES RELATED TO THIS TER & GUIDES HEREIN, OR SCAN THE QR CODE RIGHT >



UNIT REACTIONS FROM WIND GUIDE

DIRECTIVE: This guide is intended for use by a design professional. Design parameters shall abide all specifications and limitations stated in this report. Design professional shall consider all forces, including seismic and snow loads, per the governing building code. Unit reactions obtained from this guide shall be verified by a registered Professional Engineer. Reactions are applicable for unit-to-host connections only. Sample calculations are provided below.



- Lateral Wind Pressure, P_{lat}
- Unit Height, H
- Unit Width, W
- Support Spacing across Depth, sd
- Uplift Wind Pressure, P_{up}
- Unit Depth, D
- Unit Weight, Wt
- Support Spacing across Width, sw

Unit Reaction Equations:

- Long Side (Width x Height):**
- Sliding Force, L = P_{lat} x W x H
 - Uplift Force, U = P_{up} x W x D
 - Total Tension per Long Side = (L x H/2 + U x sd/2 - Wt x 0.6 x sd/2) / sd
- Short Side (Depth x Height):**
- Sliding Force, L = P_{lat} x D x H
 - Uplift Force, U = P_{up} x W x D
 - Total Tension per Short Side = (L x H/2 + U x sw/2 - Wt x 0.6 x sw/2) / sw

Example: A (48" W x 36" D x 42" H), 250 lb net weight unit at wind pressures of 120 psf lateral and 95 psf uplift, on a 24" wide roof stand, shall have the following unit reactions:

Long Side (Width x Height):

1. Sliding Force, L = P_{lat} x W x H
= (120 psf) x (48 in) x (42 in) x (1 in² / 144 ft²) = **1680 lb**
2. Uplift Force, U = P_{up} x W x D
= (95 psf) x (48 in) x (36 in) x (1 in² / 144 ft²) = **1140 lb**
3. Total Tension per Long Side =
= (L x H/2 + U x sd/2 - Wt x 0.6 x sd/2) / sd
= ((1680 lb x 42/2 in) + (1140 lb x 24/2 in) - (250 lb x 0.6 x 24/2 in)) / 24 in = **1965 lb**

Short Side (Depth x Height):

1. Sliding Force, L = P_{lat} x D x H
= (120 psf) x (36 in) x (42 in) x (1 in² / 144 ft²) = **1260 lb**
2. Uplift Force, U = P_{up} x W x D
= (95 psf) x (48 in) x (36 in) x (1 in² / 144 ft²) = **1140 lb**
3. Total Tension per Short Side =
= (L x H/2 + U x sw/2 - Wt x 0.6 x sw/2) / sw
= ((1260 lb x 42/2 in) + (1140 lb x 48/2 in) - (250 lb x 0.6 x 48/2 in)) / 48 in = **1046 lb**

IN ALL CONDITIONS IT IS THE RESPONSIBILITY OF THE PERMIT HOLDER TO ENSURE THE HOST STRUCTURE IS CAPABLE OF WITHSTANDING THE RATED GRAVITY, LATERAL, AND UPLIFT FORCES BY SITE-SPECIFIC DESIGN. NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, IS OFFERED BY ENGINEERING EXPRESS AS TO THE INTEGRITY OF THE HOST STRUCTURE TO CARRY DESIGN FORCE LOADS INCURRED BY THIS UNIT.

CORP. OFC: 160 SW 12TH AVENUE SUITE 106, DEERFIELD BEACH, FLORIDA 33442
(954) 354-0660 | (866) 396-9999 | TEAM@ENGINEERINGEXPRESS.COM | ENGINEERINGEXPRESS.COM

Page 5 of 5

Copyright © Engineering Express® All Rights Reserved