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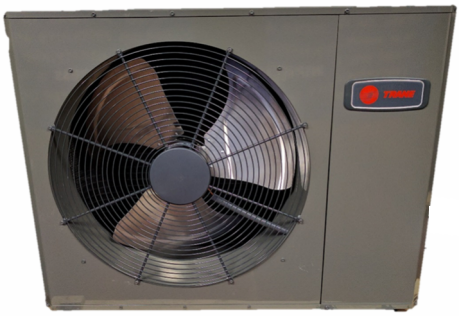
Performance Evaluation

FL 19588.6
THIS DOCUMENT CONTAINS (6) PAGES.

EVALUATION SUBJECT: **TRANE UNITS** 26-101052

REPORT HOLDER:
TRANE TECHNOLOGIES
6200 TROUP HIGHWAY
TYLER, TX 75707 USA
(888) 234-8586 | TRANE.COM



NOTE: THE GRAPHICAL DEPICTIONS IN THIS EVALUATION ARE FOR ILLUSTRATIVE PURPOSES ONLY AND MAY DIFFER IN APPEARANCE.

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.
UNDER NO CIRCUMSTANCE DOES THIS PERFORMANCE EVALUATION GUARANTEE, IMPLY, OR STATE PERFORMANCE OF THE UNIT IS MAINTAINED DURING OR AFTER A DESIGN EVENT.

This Performance Evaluation is being issued in accordance with the requirements of the **Florida Building Code Nineth Edition (2026)** 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, and FS 471.025. The product noted in this performance evaluation has been tested and/or evaluated as summarized herein.

SUBSTANTIATING DATA:
• Product Evaluation Documents
Substantiating documentation has been submitted to provide this performance evaluation 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 concrete, aluminum, and steel host substrates (host by others).
- Unit panel wind pressure connection integrity

Calculation summary is included in this product evaluation and appears herein.

LIMITATIONS & CONDITIONS OF USE:
Use of the product(s) listed herein shall be in strict accordance with this product evaluation 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.

OPTIONS:
This evaluation is valid for the models described herein. The critical unit designs have been determined and used in this evaluation. Any structural changes outside of the design as described herein would void this certification.

UNIT CASING MATERIALS:
0.05" galvanized steel sheet ASTM A653 EDDS cold rolled steel for removable top panel. 0.05" galvanized steel sheet ASTM A653 EDDS cold rolled steel for base pan. 0.034" galvanized steel sheet ASTM A653 for side protector panels, secured with #12-18 sheet metal screws into top and base pan. Contact Report Holder for further unit construction information.

TERMINOLOGY:
See herein for definitions of terms and abbreviations used in this evaluation.

STRUCTURAL PERFORMANCE:
Models referenced herein are subject to the following design limitations:

Maximum Rated Wind Pressures*:
± 200 psf Lateral, 100 psf Uplift

- Required design wind pressures shall be determined according to the guide provided in the Appendix (see last page of this document) 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/TRANE
FOR MORE INFORMATION AND DEVIATIONS TO THIS EVALUATION OR SCAN THE QR CODE TO THE RIGHT >

Engineer Signature & Seal:

FRANK L. BENNARDO LICENSE No 0046549 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally signed by Frank Bennardo
Date: 2026.08.18 15:29:02 -04'00'

August 17, 2026

Frank Bennardo, P.E.
ENGINEERING EXPRESS®
FL PE #0046549 FLCA #9885

MODEL INFORMATION

Model Directive: Installer or end user of this document shall verify the unit dimensions of the model(s) for installation separately. Installer/end user shall match the model's size to the Cabinet Group sizes shown below, and shall follow the corresponding Cabinet Group's specifications listed in the report.

Unit dimensions must correspond to one of the below sizes; contact Engineering Express if the unit model size does not correspond to one of the listed unit sizes below.

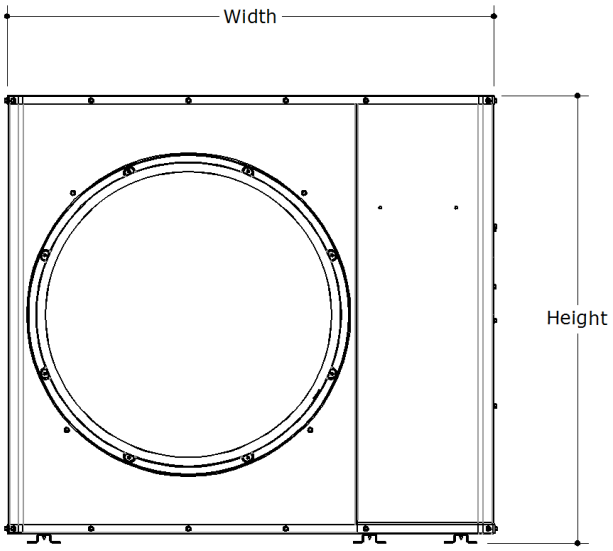
Cabinet Group	Unit Dimensions (in)		
	Width	Depth	Height
A	40.00	14.50	30.75
	40.00	14.50	36.75
B	47.00	17.50	36.75
C	47.00	17.50	42.75

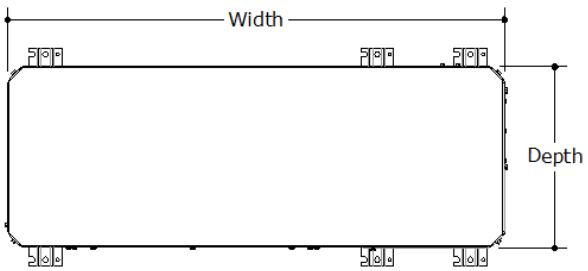
Model Number	
4TTL5024*	4TWL5036*
4TTL5030*	4TWL5042*
4TTL5036*	4TWL5048*
4TTL5042*	4TWL6018*
4TTL5048*	4TWL6024*
4TTL6018*	4TWL6030*
4TTL6024*	4TWL6036*
4TTL6030*	4TWL6042*
4TTL6036*	4TWL6048*
4TTL6042*	4TWL6060*
4TTL6048*	4TWL9024*
4TTL6060*	4TWL9036*
4TWL5024*	4TWL9048*
4TWL5030*	4TWL9060*

MODEL INFORMATION NOTES

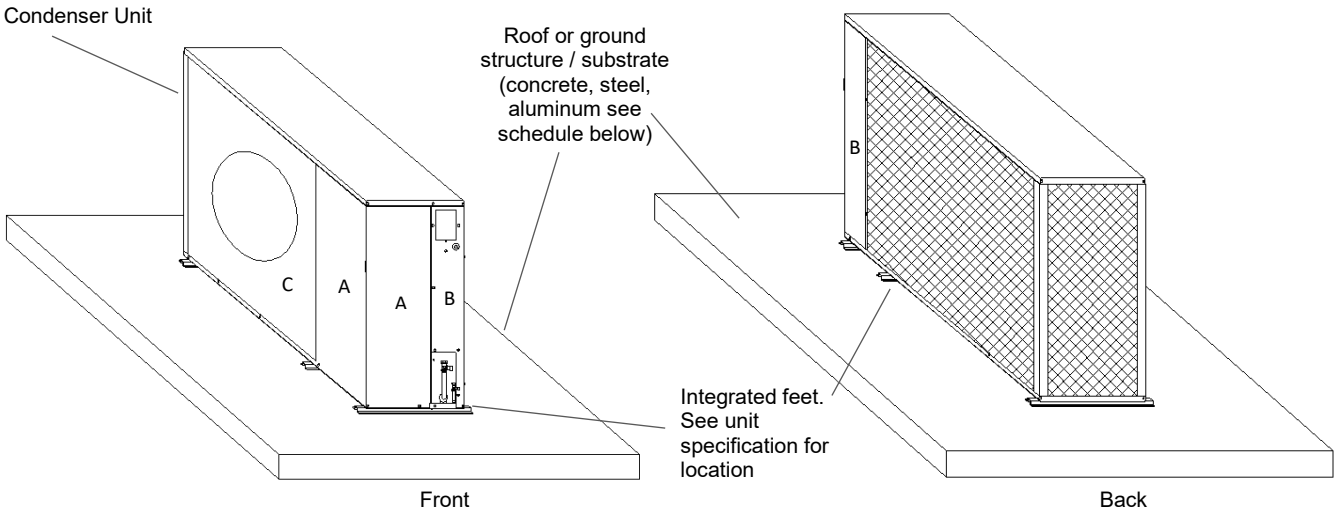
Model number characters marked by an asterisk (*) do not pertain to this structural certification and may be any combination of number and/or letters.

Unit dimensions listed above are unit net dimensions (as opposed to packing/shipping dimensions). Unit net weights shall be between 120 lb and 270 lb, typ. Model information listed herein is based on information provided by the client. See Details below for definitions of unit dimensions. Unit appearance may vary. Please contact Report Holder for more information.





PRODUCT INSTALLATION



Note: Unit shown for illustration purposes only.

TIE-DOWN STRAP SCHEDULE

Cabinet	Pressure Lateral / Uplift (PSF)		Number of Metal Straps	Number of Webbing Straps (optional)	Minimum WLL (Lbs)
Cabinet A	Ground		NA	NA	NA
	130	65	2	2	600
	200	100	5	2	1800
Cabinet B	Ground		NA	NA	NA
	130	65	2	2	600
	200	100	5	2	1800
Cabinet C	Ground		NA	NA	NA
	130	65	2	2	600
	200	100	5	2	1800

Tie-down Strap:
(for roof applications, only)

- Minimum edge distance 2” from the unit corners.

- Use a minimum of (2) tie-down straps per side, straps might be overlaid, as needed.

- Straps shall be wrapped as shown in the details herein. The straps shall be tightened to a snug fit around the unit. Metal Straps shall be 1” width and 22ga galvanized metal.

- Values shown in table are minimum specified. Using stronger straps per each height is allowed at installer’s discretion.

ANCHOR TO HOST STRUCTURE SCHEDULE

Cabinet	Pressure Lateral / Uplift (PSF)		Anchor Type		
			Concrete 3,000 Psi	1/8" Min A36 Steel	1/8" Min 6061-T6 Aluminum
Cabinet A	Ground		A	NA	NA
	130	65	B	B	B
	200	100	B	B	B
Cabinet B	Ground		A	NA	NA
	130	65	B	B	B
	200	100	B	B	B
Cabinet C	Ground		A	NA	NA
	130	65	B	B	B
	200	100	B	B	B

Anchor Types to Host Structure:

A. – 3/8” Ø DeWalt (formerly Powers) Wedge-Bolt or equivalent with 1-1/2” embedment, 6” min. edge distance to any edge of concrete, and 6” min. spacing, typ.

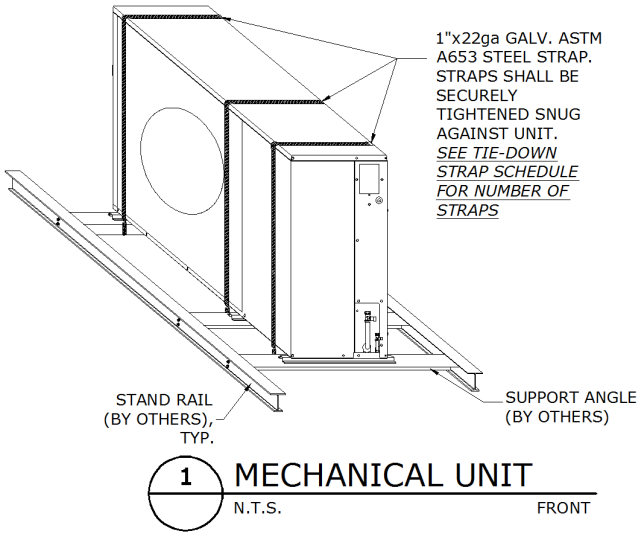
B. – 3/8" Ø, SAE Gr. 5 min. thru-bolt with 1” OD washers top and bottom and locking nut, typ. Provide 1/2" min. edge distance, typ.

NA. - No anchors apply.

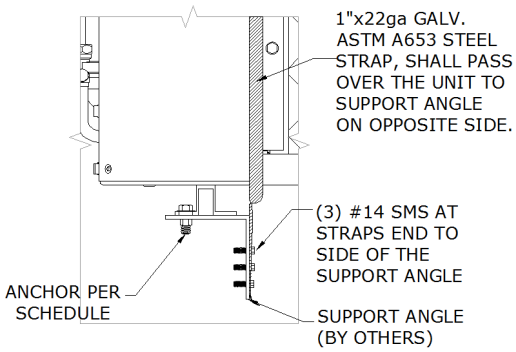
PANEL INTEGRITY SUMMARY

Cabinet	Lateral Pressure (Psf)	Uplift Pressure (Psf)	Panel Name	Force on Panel (lbs)	Additional Screw Qty Needed (pcs)	Additional screws required beyond original manufactured cabinet
Cabinet A Cabinet B Cabinet C	Ground		TOP PANEL	0.0	-	No
			PANEL A	365.0	-	
			PANEL B	148.8	-	
			PANEL C	108.7	-	
	130	65	TOP PANEL	0.0	-	No
			PANEL A	1129.6	-	
			PANEL B	460.7	-	
			PANEL C	336.4	-	
	200	100	TOP PANEL	0.0	-	No
			PANEL A	1737.9	-	
			PANEL B	708.8	-	
			PANEL C	517.5	-	

DETAILS



1 MECHANICAL UNIT
N.T.S. FRONT



2 TIE-DOWN STRAP & ANCHOR
N.T.S. DETAILS

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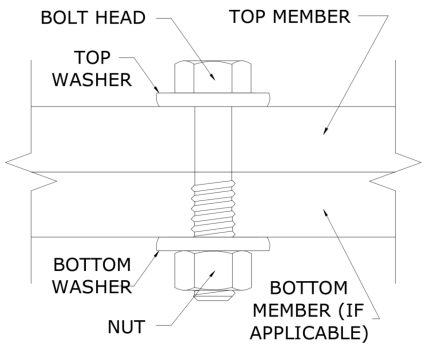
TERMINOLOGY, CONTINUED

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”, “ASTM” for “American Society for Testing and Materials”, “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”, “Fu” for “ultimate tensile strength” or “ultimate tensile stress”, “Fy” for “yield strength” or “yield stress” “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”, “pcf” for “pounds (force) per cubic foot”, “PE” for “Professional Engineer”, “qty” for “quantity”, “SAE” for “Society of Automotive Engineering”, “SMS” for “sheet metal screws”, “SS” for “stainless steel”, “TER” for “Technical Evaluation Report”, “typ.” for “typical”, “ult” for “ultimate loads”, “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”, “#” for “number”, “&” for “and”, and “Ø” for “diameter”. Please visit ecalc.io/glossary for additional abbreviation clarifications.



SAMPLE THRU-BOLT
SCALE: NTS SECTION VIEW

Note: The term “Thru-Bolt” or through bolt, if 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 above-right for a sample thru-bolt configuration.

Note: For instances herein which list material specifications as *“[material type] or stronger”:*
U.N.O. herein, the term “stronger” refers to a material with a UTS value equal to or greater than the UTS value of the stated material type. Consult appropriate literature for established material UTS values.

Note: Equivalent steel gauge thicknesses as used in this evaluation, U.N.O., are as follows:
22 GA (.030”), 20 GA (.036”), 18 GA (.048”), 16 GA (.060”), 14 GA (.075”), 12 GA (.098”).

LIMITATIONS & CONDITIONS OF USE, CONTINUED

Use of this product shall be in strict accordance with this product evaluation 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(s) specified in the manufacturer-provided product specifications. For permanent outdoor installations, all exposed anchors, fasteners, connectors, and metal plates shall be corrosion resistant. Corrosion resistance may be provided by inherent material composition or, where permitted by code, by an approved protective coating or galvanization. Where applicable near a saltwater coastline, such components shall comply with FBC Section 1711, including applicable requirements for exposed, protected, or enclosed conditions. Materials, coatings, and finishes shall be compatible with connected materials, and protective coatings shall be continuous over exposed surfaces. Fasteners used with aluminum members shall also comply with Section J.3.7.2 of the Aluminum Design Manual, “Specification for Aluminum Structures.” Substitution of components from alternate manufacturers, or with different materials, coatings, or finishes, shall not be assumed equivalent and may require additional engineering review or site-specific analysis. 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. 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, deflection, and material deformation cannot be accurately evaluated, but with the diaphragm action of external components and internal stiffeners, the base unit (with accompanying retrofits stated herein as applicable) has the capacity to withstand the design wind loads without detaching from the unit and becoming flying debris.

Survivability: This performance evaluation is valid for a newly installed unit and do not include certification of the product beyond a design event or if impacted by any debris. Inspections shall be implemented annually by the end user and after every 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 or as designated by the Authority Having Jurisdiction.

Durability: Components or component assemblies shall not deteriorate, crack, fail, or lose functionality due to galvanic corrosion or weathering. All supporting components which are permanently installed shall be protected against corrosion, contamination, and other such damage at all times. Each component or component assembly shall be supported and oriented in its intended installation position. All exposed plastic components shall be certified to resist sunlight exposure as specified by ASTM B117, or ASTM G155 in Broward or Miami Dade counties.

Extent of Certification: Certification pertains to the overall structural integrity of the unit components listed within the evaluation as required by code, subject to the limitations and criteria stated herein. Operability during or after a design event is not included in this certification. Water infiltration is outside the bounds of this certification. No other certifications are intended other than as described herein. This evaluation alone does not offer any evaluation for large missile impact debris or cyclic wind requirements unless specifically stated herein.

Proj. #	Remarks	By	Checked	Date	Proj. #	Remarks	By	Checked	Date
20-28655	Prev. Submittal (R4)	EPR	EPR	04/20/23					
23-68302	2023 FBC Update	EPR	RWN	10/23/23					

APPENDIX A: DESIGN WIND PRESSURE GUIDE

Max. Ult. Wind Speed (V_{ult})	Max. MRH (Roof Height)	Exposure Category	Required Design Wind Pressures (ASD)	
			Lateral Pressure	Uplift Pressure
140 mph	At-Grade (0 ft)	C	± 26 psf	0* psf
		D	± 31 psf	0* 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	0* psf
		D	± 49 psf	0* 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	0* psf
		D	± 54 psf	0* psf
	100 ft	C	± 111 psf	87 psf
		D	± 125 psf	99 psf
	200 ft	C	± 127 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 firm 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 not required for mechanical equipment at-grade. If uplift at-grade is required by the AHJ, contact this firm for a site-specific evaluation.

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

- ASCE 7 "Design Wind Loads: Other Structures"
- Structure Shape = Square, flat terrain
- Height of structure (unit + stand or curb, if used) = 6 ft max.
- Width of unit = 1 ft min., Depth of unit = 11 in min.

Rooftop (>15 ft MRH) Required Design Pressures:

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

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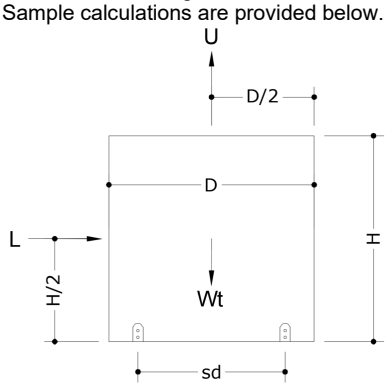
FOR DESIGN AID CALCULATORS AND RESOURCES RELATED TO THIS EVALUATION & GUIDES HEREIN, OR SCAN THE QR CODE RIGHT >

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 evaluation. 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.



Design Parameters:

- 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 in^2 / 144 ft^2) = **1680 lb**
2. Uplift Force, U = P_up x W x D
   = (95 psf) x (48 in) x (36 in) x (1 in^2 / 144 ft^2) **= 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 in^2 / 144 ft^2) **= 1260 lb**
2. Uplift Force, U = P_up x W x D
   = (95 psf) x (48 in) x (36 in) x (1 in^2 / 144 ft^2) **= 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.