ENGINEERING EXPRESS®
ENGINEERINGEXPRESS.COM
POSTAL ADDRESS:
2234 NORTH FEDERAL HWY #7664
BOCA RATON, FL 33431

Technical Evaluation Report

DIVISION: 23 08 00 – COMMISSIONING OF HVAC

**THIS DOCUMENT CONTAINS (9) PAGES.
ENGINEER DIGITAL OR ORIGINAL HAND SEAL REQUIRED FOR USE.
COPIES ARE NOT VALID FOR PERMIT.**

(Subject to Renew January 1, 2026 or next code cycle)

EVALUATION SUBJECT: CARRIER PACKAGE UNITS TER-23-69589

REPORT HOLDER:
CARRIER ENTERPRISE
8050 VISTA RESERVE BOULEVARD - SUITE 2200
ORLANDO, FL 32829, USA
(407) 982-7745 | WWW.CARRIERENTERPRISE.COM

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 Product Evaluation Report is being issued in accordance with the requirements of the **Florida Building Code Seventh Edition (2020) & Eighth Edition (2023)** 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 & Residential Codes (2012, 2015, 2018, & 2021).** The product noted in 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 concrete, aluminum, and steel host substrates (host by others).
- Unit panel wind pressure connection integrity

Calculation summary is included in this TER and appears herein.

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.

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:
0.86mm galvanized sheet steel ASTM A653 EDDS cold rolled steel for removable top panel. 1.14mm galvanized sheet steel ASTM A653 EDDS cold rolled steel for base pan. 0.86mm galvanized steel sheet ASTM A653 for side protector louvers and panels, secured with #10-16 sheet metal screws into top and base pan. Contact Report Holder for further unit construction information.

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.

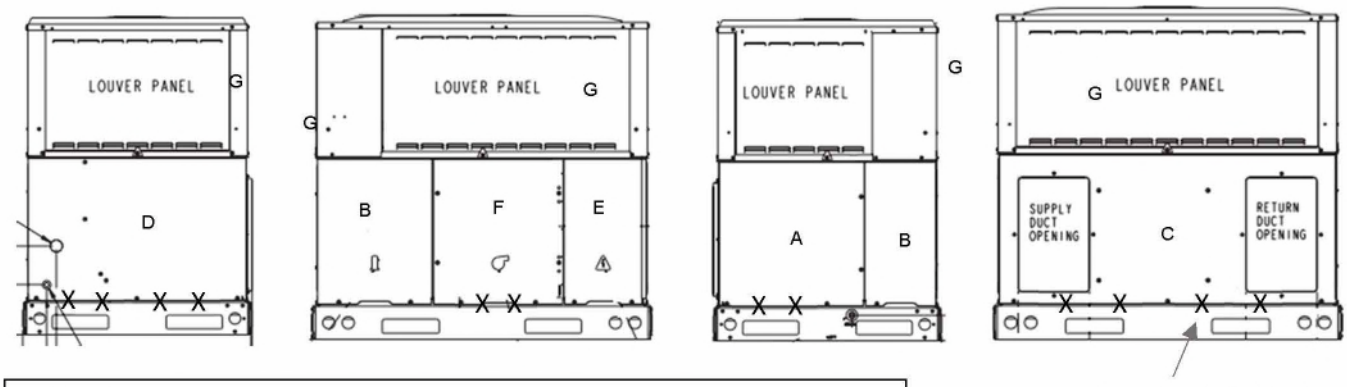
VISIT ECALC.IO/CARRIER
FOR ENGINEER CERTIFIED ORIGINALS & MORE INFORMATION ABOUT THIS DOCUMENT OR SCAN THE QR CODE TO THE RIGHT >
VISIT ENGINEERINGEXPRESS.COM/STORE FOR ADDITIONAL PLANS, REPORTS & RESOURCES

ORIGINAL SIGNATURE AND RAISED SEAL
OR DIGITAL SEAL REQUIRED TO BE VALID PER CODE:

VALID ONLY FOR ZIP CODE: 00000
VALID ONLY FOR: MANUFACTURER'S COPY ONLY
NOT VALID FOR PERMIT USE OR CONSTRUCTION PURPOSES
FRANK BENNARDO PE0046549 CA-9885

DIGITAL SEAL NOTICE: IF THIS DOCUMENT IS DIGITALLY SIGNED, THIS ITEM HAS BEEN DIGITALLY SIGNED BY THE ABOVE-SIGNING ENGINEER ON THE DATE ADJACENT TO THE SEAL. **PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.** VISIT 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.**

MODEL INFORMATION



Recommended reinforcing screw location. See panel integrity for quantities per panel.

TABLE 1
FAMILIES: 50VL-C, 50VT-C, 50VG-A, 50VR-A, 50ZPC, 50ZHC, 50VL-D, 50VR-C, 48VL-E, 50VL-K, 50VT-K, 48VL-K
CAPACITIES: 24, 30, 36, 42, 48, 60
UNITS DIMENSIONS:
WIDTH: 31.19" ~ 44.13"
DEPTH: 48.25" ~ 48.19"
HEIGHT: 42.13" ~ 54.75"
WEIGHT: 275 lbs. ~ 525 lbs.

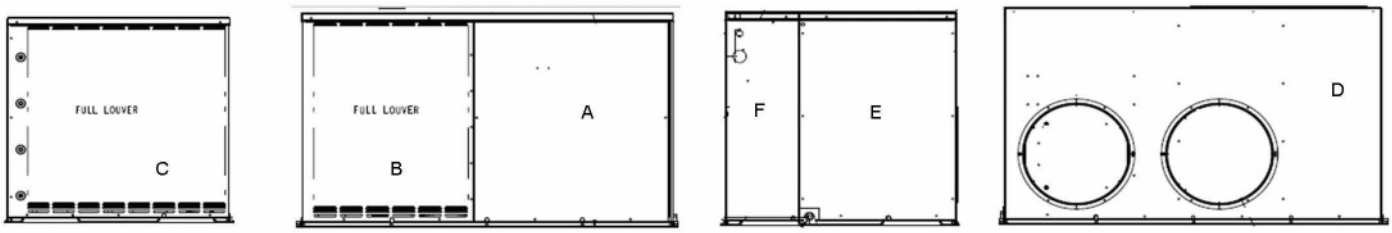


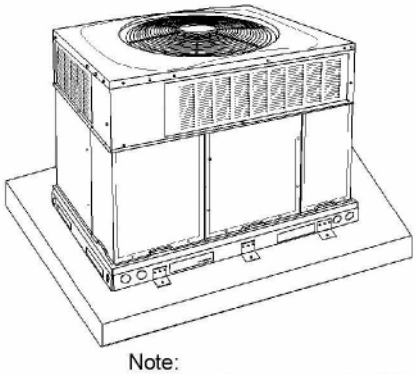
TABLE 2
FAMILIES: 50ZPC, 50ZPD, 50ZHC, 50ZPK, 50ZHK
CAPACITIES: 24, 30, 36, 42, 48, 60
UNITS DIMENSIONS:
WIDTH: 32.00"
DEPTH: 51.00"
HEIGHT: 30.13" ~ 42.13"
WEIGHT: 217 lb ~ 425 lb
CABINET NOTE: Table 2 Units are not suitable for Clip A, Rail, or Roof Curb installations. Approved for Concrete Slab and Ground Mounting designs.

REMAINDER OF PAGE INTENTIONALLY LEFT BLANK

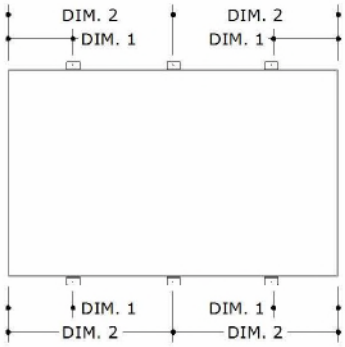
TIE-DOWN CLIP LAYOUT

Table 1 Units

Directive: Use (6) tie-down clips total, (3) per long side. Tie-down clips may be clip "A" or clip "B". Refer to the previous page for anchor specifications and screw specifications for connecting each tie-down clip to unit. Tie-down clip placement shall conform to the details shown below.



Note:
Reinforce louvers per detail 5



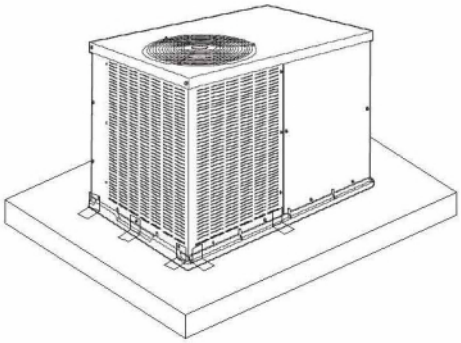
TIE-DOWN CLIP LOCATIONS

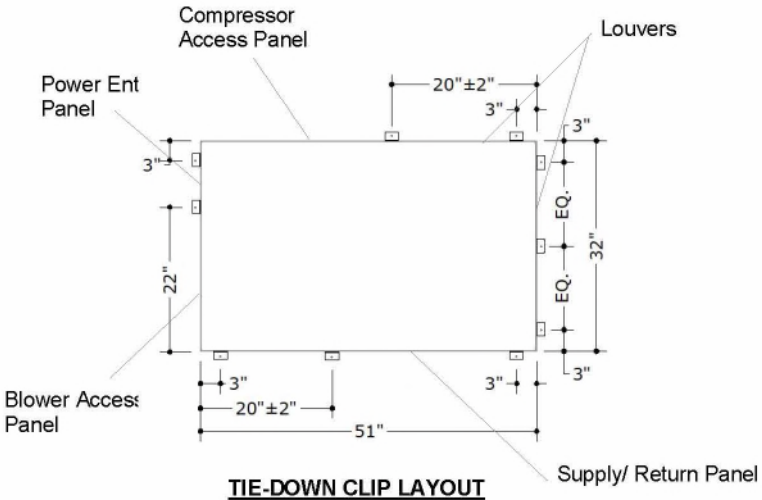
DIM. 1	10" MAX.
DIM. 2	ON CENTER (LONG SIDE OF UNIT)

TIE-DOWN CLIP LAYOUT

Table 2 Units

Directive: Use (10) tie-down clips total. Tie-down clips shall be clip "B". Refer to the previous page for anchor specifications and screw specifications for connecting each tie-down clip to unit. Tie-down clip placement shall conform to the details shown below.

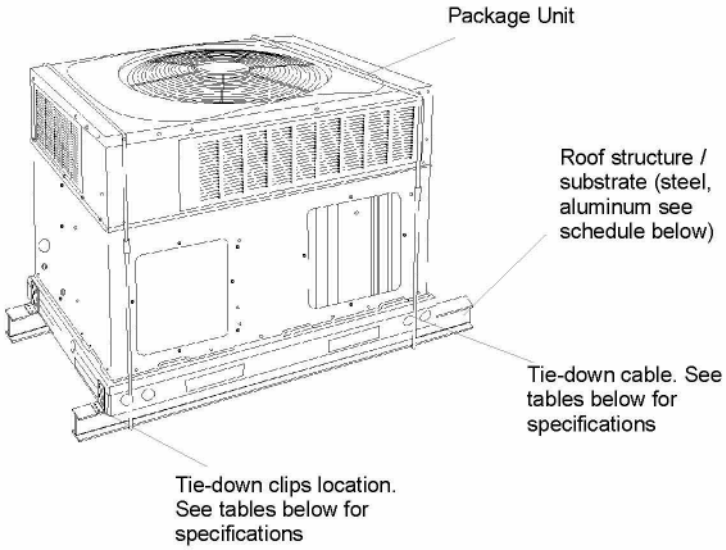


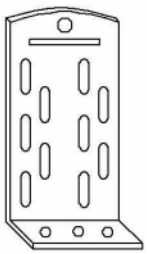


TIE-DOWN CLIP LAYOUT

Note:
Compressor Access panel and Blower Access Panel shall not be blocked with Tie-down Clips

PRODUCT ROOF INSTALLATION





TIE-DOWN CLIP
(ROOF APPLICATION)

When using BMP Clip part# TD042; 2" wide ASTM A283 (Grade D) steel 0.113" thickness of varying length for all cabinets tied to a roof structure or ground structure, fasten number of clips per "Tie Down Strap Clip Schedule". Using qty. 2 anchors from Anchor Types to Host Structure table and qty. 4 #12 SAE grade 5 sheet metal screws to fasten clip to unit base pan. Locate clips at 3" from the appropriate corner using and equal number of clips near corners on opposite sides.

Tie-down Clip Schedule (Roof Installation)						
Unit Model+	**Max Lateral Pressure**	**Max Uplift Pressure**	**TIE-Down Cable**	**Cable Diameter**	**Screw Curb / Unit Rail**	**Tie-Down Clips**
Table 1 Units	119 psf	94 psf	2	1/4"	(1) B @ 2-1/8"	4

Anchor to Host Structure Schedule (Roof Installation) – Metal Host					
Unit Model+	**Max Lateral Pressure**	**Max Uplift Pressure**	**1/8" Min A36 Steel**	**1/8" min 6061-T6 Aluminum**	**A653 Steel Curb**
Table 1 Units	119 psf	94 psf	A	A	B

Panel Integrity Summary (Roof Installation)				
Unit Model+	**Panel**	**Max Applied Wind Pressure**	**Pressure Direction**	**Add'l Screws Needed (pcs)**
Table 1	Top Panel	94 psf	Uplift	NONE
	Panel A	119 psf	Lateral	2
	Panel B	119 psf	Lateral	NONE
	Panel C	119 psf	Lateral	4
	Panel D	119 psf	Lateral	4
	Panel E	119 psf	Lateral	NONE
	Panel F	119 psf	Lateral	2
	Panel G	119 psf	Lateral	SEE DETAIL 8

+ See table 1 above for cabinet classification

Notes:
1. Screw quantities were checked to reinforce unit panels as needed. They shall be spaced evenly throughout the panel bottom part, validating that the screw joins the panel with the supporting element (base panel, for more details see last page). Screw sizes, quantities on panel, and panel characteristics are according to client's description.
2. Additional screws shall be at least #10 SS 410.
3. For panel G, strap tie shall be no less than 16ga.
4. Installer shall insulate dissimilar metals.

Tie-down Cable Type: (for roof applications)

1.- 7x7 Galvanized cable for industrial application or any cable configuration that meets or exceeds WLL (Working Load Limit) specified.
2.- Minimum edge distance 3" from the unit corners.
3.- Tie-down cable shall be wrapped around the unit and roof stand rail, and shall be tightened to a snug fit using the turnbuckle.
4.- Provide two cables per unit and one turnbuckle per cable, installer shall verify that the capacity of the turn buckle meets or exceeds cable capacity.
5.- Neoprene pad shall be placed between the cable and the cabinet to prevent distortion.

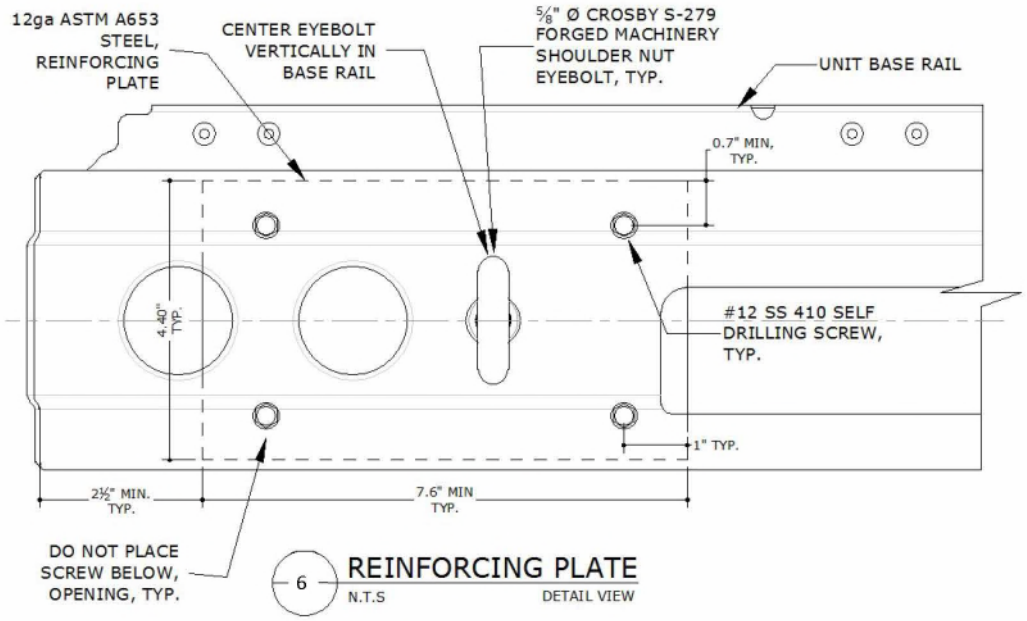
Anchor Types to Host Structure (to Metal Host):

A. (Metal Host)– 1/4" SAE Grade 5 screw minimum 1/2" from edges with nut and washer OD 0.75"

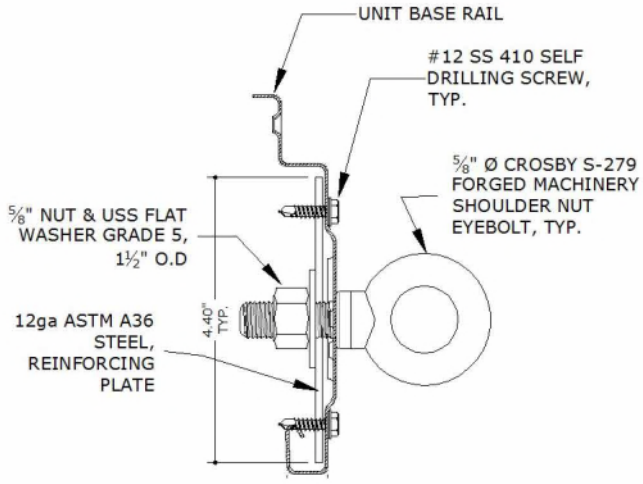
B. (Metal Host)– #12 Stainless Steel 410, Self-drilling screw, no less than ½" long.

Notes:
1.- Minimum steel curb thickness 18ga.

TIE-DOWN CABLE AND CLIP LAYOUT (CONTINUED FROM PREVIOUS PAGE)



6 REINFORCING PLATE
N.T.S DETAIL VIEW



7 REINFORCING PLATE
N.T.S DETAIL VIEW

REMAINDER OF PAGE INTENTIONALLY LEFT BLANK

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:

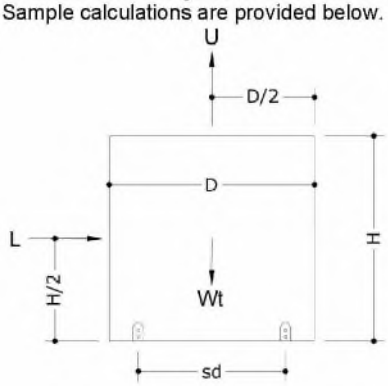
- ASCE 7 "Design Wind Loads: Other Structures: Rooftop Structures and Equipment for Buildings"
- Structure Shape = Square, flat terrain
- z = up to 7 ft, where z = height of stand or curb + ½ unit height
- Lateral GC_r = 1.90; Uplift GC_r = 1.50

VISIT 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.



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.