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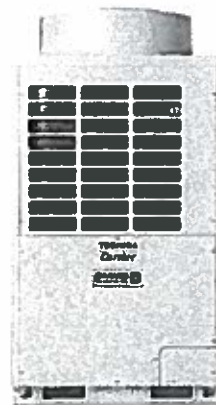
(Issued December 2nd, 2016 Subject to Renew December 1st, 2017)

EVALUATION SUBJECT: TOSHIBA / CARRIER VRF MODELS

TER-16-3173

REPORT HOLDER:

CARRIER ENTERPRISE OF FLORIDA
2000 PARKS OAKS AVE
ORLANDO, FL 33428 USA
(954) 247-2003 | FL.CARRIERENTERPRISE.COM



SCOPE OF EVALUATION (compliance with the following codes):

THIS IS A STRUCTURAL (WIND) PERFORMANCE EVALUATION ONLY. NO ELECTRICAL OR COOLING PERFORMANCE RATINGS OR CERTIFICATIONS ARE OFFERED OR IMPLIED HEREIN.

This Product Evaluation Report is being issued in accordance with the requirements of Florida Building Code Fifth Edition (2014) per FBC Section 104.11, FMC 301.15, FBC Building Ch. 16, ASCE-7-10, FBC Existing Building sections 701.1, 706.6.1, FBC Building 1522.2, and FBC Residential M1202.1, M1301.1, FS 471.025, including Broward County Administrative Provisions 107.3.4. 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 OF THE EVALUATING ENGINEER.

SUBSTANTIATING DATA:

• Product Evaluation Documents

Substantiating documentation has been submitted to support 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:

- Maximum allowable unit panel wind pressure connection integrity
- Maximum allowable uplift, sliding, & overturning moment for ground and roof applications

Calculation summary for this TER is provided in the forces summary table. NOTE: No 33% increase in allowable stress has been used in the design of this product.

INSTALLATION:

The product(s) listed above shall be installed in strict compliance with this TER & manufacturer-provided model specifications.

The product components shall be of the material specified in the manufacturer-provided product specifications. All screws must be installed in accordance with the applicable provisions & anchor manufacturer's published installation instructions.

LIMITATIONS & CONDITIONS OF USE:

Use of this product shall be in strict accordance with this TER as noted herein. See final page for complete limitations and conditions of use.

INSTALLATION:

Shall follow manufacturer specifications as well as information provided herein.

FINISH:

Baked powder coat.

NOTE: GRAPHICAL DEPICTIONS IN THIS REPORT ARE FOR ILLUSTRATIVE PURPOSES ONLY. ACTUAL UNITS MAY DIFFER SLIGHTLY IN APPEARANCE.

UNIT CASING MATERIAL:

23ga galvanized sheet steel equivalent to ASTM A653 Cold Rolled Steel. Removable top & side covers secured with M5 sheet metal screws (see Panel Integrity Table to reinforce panels). Knockouts provided for utility & control connections.

OPTIONS:

This evaluation is valid for Variable Refrigerant Flow Systems stated in the table located on the final page.

STRUCTURAL PERFORMANCE:

Models referenced herein are subject to the following design limitations: ASCE-710 Exposure Category C, Risk II

Up to and including 175mph (V_{ur}) for up to 200' MRH**. HVHZ***
Up to and including 170mph (V_{ur}) for up to 250' MRH**. HVHZ***
Up to and including 200mph (V_{ur}) for up to 200' MRH**. Non-HVHZ***
Ground or Roof Application per installation instructions
Mean Roof Height *High Velocity Hurricane Zone

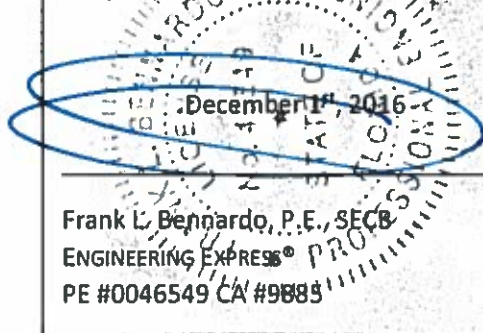
$$V_{ssd} = \sqrt{0.6} \times V_{ult}$$

Maximum Rated Wind Pressure:

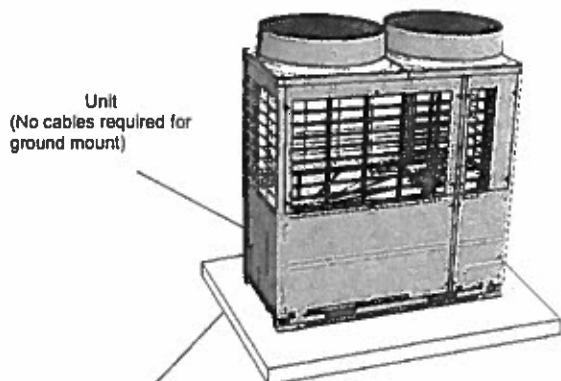
193psf Lateral 93psf Uplift (less Dead Load)

Site specific wind analysis may produce alternate limitations provided maximum rated wind pressure is not exceeded.

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



SECTION 2 PRODUCT INSTALLATION



Roof or ground structure / substrate
(concrete, steel, aluminum see
schedule below) by others.

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ANCHOR SCHEDULE TO HOST STRUCTURE

Cabinet	Ground or Roof Height*	Anchor Quantity	Anchor Type		
			Concrete 3,000 Psi	1/8" Min A36 Steel	1/8" Min 6061-T6 Aluminum
Small Cabinet	Ground	4	A	NA	NA
	Up to 200' (250')	4	NA	B	B
Medium Cabinet	Ground	6	A	NA	NA
	Up to 200' (250')	6	NA	B	B
Large Cabinet	Ground	6	A	NA	NA
	Up to 200' (250')	6	NA	B	B

Note: provide two new holes equally spaced at middle span as a new anchor points as shown in the above picture.

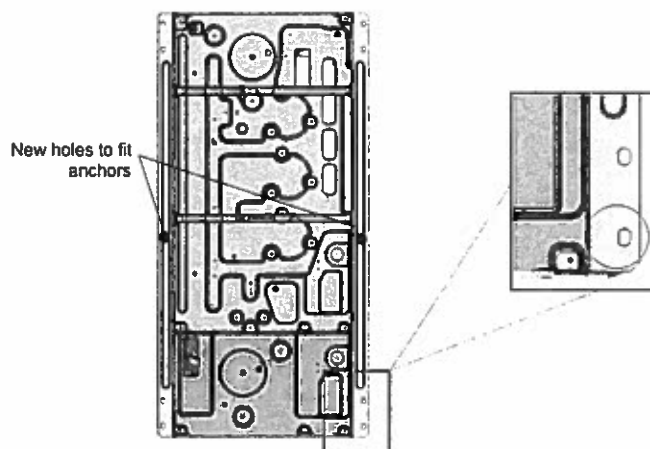
*The value shown in parentheses indicates the allowable roof height in 170mph conditions, i.e. 60' (80') indicates an allowable roof height of 60' for 175mph or 80' for 170mph Vult. (Exposure category C. Site specific adjustment for other exposure categories)

TIE-DOWN CABLE SCHEDULE

Cabinet	Ground or Roof Height*	Tie- down Cable	Cable Diameter	Cable WLL (lbs)	Bolts to Stand per long side	Cable type
Small Cabinet	Ground	NA	NA	NA	NA	NA
	Up to 200' (250')	2	3/8"	2880	2	7x19
Medium Cabinet	Ground	NA	NA	NA	NA	NA
	Up to 200' (250')	2	3/8"	2880	3	7x19
Large Cabinet	Ground	NA	NA	NA	NA	NA
	Up to 200' (250')	3	3/8"	2880	3	7x19

Tie-down Cable Type: (for roof applications)

- Tie-down cable shall be galvanized for industrial applications.
- Equivalent cable is permitted, using the minimum Working Load Limit per roof height.



**BASE RAIL HOLE FOR ANCHORAGE - Cold rolled steel
0.0984" thick, equivalent to ASTM A653**

Anchor bolt hole 6 x Ø 0.59"x0.79" large cabinet
Anchor bolt hole 6 x Ø 0.59"x0.79" medium cabinet (See Note)
Anchor bolt hole 4 x Ø 0.59"x0.79" small cabinet
Fasten cabinet to the supporting structure using Anchor Schedule to Host Structure Table.
Use SAE GR5 ASTM-A449 OD 1 1/2" washer to secure anchor to supporting structure.

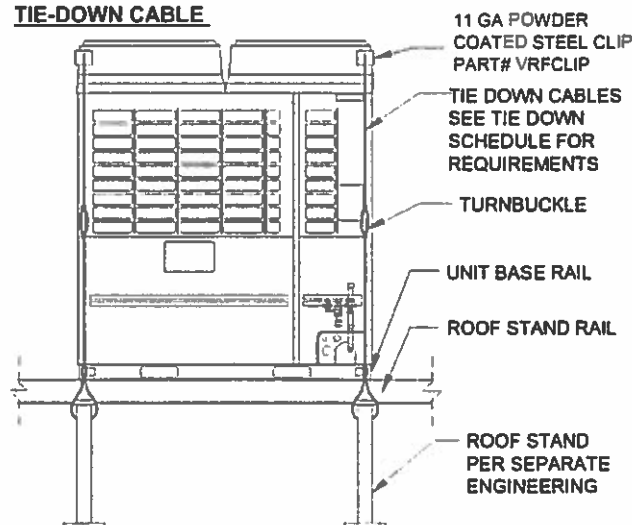
Anchor Types to Host Structure:

A.- 1/2" Wej-it ANKR-TITE Wedge-bolt anchor embedded 2 1/2" in 3,000 psi concrete, 5" from edge minimum and 10" spacing minimum or equivalent. NOA 13-0701.05

B.- 7/16" SAE grade 5 bolt, minimum 0.875" from edge with nut and washer specified.

All members in contact with dissimilar metals shall be insulated to prevent electrolysis.

TIE-DOWN CABLE



Note:

Tie-down cable shall be wrapped around roof stand post, and shall be tightened to a snug fit around the unit using the turnbuckle. Provide one turnbuckle per cable.
Alternatively, cables can be wrapped around the stand rail, if the cable position does not match with the stand post.

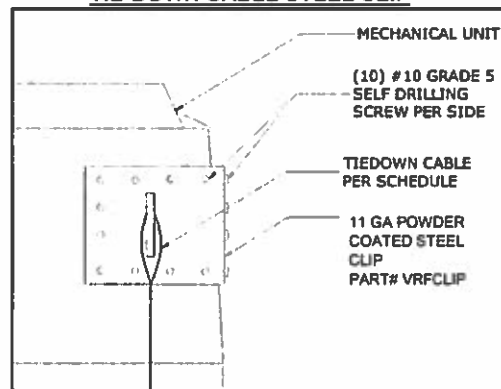
IN ALL CONDITIONS IT IS THE RESPONSIBILITY OF THE PERMIT HOLDER TO ENSURE THE HOST STRUCTURE IS CAPABLE OF WITHSTANDING THE RATED GRAVITY, LATERAL, AND UPLIFT FORCES BY SITE-SPECIFIC DESIGN. NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, IS OFFERED BY ENGINEERING EXPRESS AS TO THE INTEGRITY OF THE HOST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

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TIE-DOWN CABLE STEEL CLIP



PANEL INTEGRITY SUMMARY

Cabinet	Ground or Roof Height	Panel Name	Add'l Screw Qty Required (pcs)	Add'l screws required for original cabinet	Cabinet	Add'l Screw Qty Required (pcs)	Add'l screws required for original cabinet	Cabinet	Add'l Screw Qty Required (pcs)	Add'l screws required for original cabinet
Small Cabinet	Ground	TOP PANEL	0	Yes	Medium Cabinet	0	Yes	Large Cabinet	0	Yes
		PANEL A	0			0			0	
		PANEL B *	8			8			8	
		PANEL C *	2			2			2	
		PANEL D *	2			2			2	
		PANEL E	-			-			0	
		PANEL F	-			-			0	
	Up to 200' (250')	TOP PANEL	0	Yes	Medium Cabinet	0	Yes	Large Cabinet	0	Yes
		PANEL A	0			0			0	
		PANEL B *	31			31			31	
		PANEL C *	7			7			7	
		PANEL D *	7			7			7	
		PANEL E	-			-			0	
		PANEL F	-			-			0	

Notes:

* Panel does not require screws if optional strap is used.

Cabinets were assumed solid (0% porosity) for panel integrity calculation purposes. Screw quantities were checked to reinforce unit panels as needed. When reinforcing, use M5 x 12 mm screws (#10), with minimum tensile strength of 94.3 ksi or 650 MPa (similar to screws existing on cabinet). Screws shall be spaced evenly throughout the connection between panel and side panels, validating that the screw joins the panel with the supporting element. Screw sizes, quantities on panel, and panel characteristics were assumed according to client's description. All fastener shall have appropriate corrosion protection.

STRAP OPTION LAYOUT

It is permissible the use of horizontal straps instead of screw at all roof heights and for all cabinets to comply with the unit panel integrity table, where the need of reinforcing the panel exists. For all cases straps with no less than 700 lb. working load limit shall be used to secure the corresponding panel as shown in the figure. Straps shall be tightened to a snug fit. The use of the straps is totally at the discretion of the manufacturer / installer as long as the minimum working load limit is met. Straps material shall be webbing or metal, for webbing straps: tight using its buckle; for metal straps: tight and attach it using (3) ½" SS 410 sheet metal screw spaced ½" OC, verifying that the screw joins the strap with the supporting element (the unit). Metal straps shall be 20 ga thick and 1 ½" width.



SECTION 3 SUPPORTING CALCULATIONS & SUMMARY

FORCES ON UNIT MODELS SUMMARY

Cabinet	Outside Dimensions			Ground or Roof Height*	Lateral Pressure (Psf)	Uplift Pressure (Psf)	Max Side Force (lbs)	Max Side Overturn (lbs-in)	Max Side Tension (lbs)	Max Uplift Force (lbs)
	D (in)	W (in)	H (in)							
Small Cabinet	30.70	39.00	70.90	Ground	45.2	0	871.0	26247.0	855.0	0.0
	30.70	39.00	70.90	200' (250')	193.1	93.4	3706.0	137826.0	4489.5	777.0
Medium Cabinet	30.70	47.64	70.90	Ground	173.7	0.0	1064.0	32062.0	1044.4	0.0
	30.70	47.64	70.90	200' (250')	193.1	93.4	4527.0	168217.0	5479.4	949.0
Large Cabinet	30.70	63.00	70.90	Ground	45.2	0	1407.0	39905.0	1299.8	0.0
	30.70	63.00	70.90	200' (250')	193.1	93.4	5987.0	224656.0	7317.8	1254.0

Notes:

Calculations performed according to the information provided by the Client; cabinets were assumed solid (0% porosity) for shear and tension calculations purposes.

PANELS LOCATION, CABINETS & DIMENSIONS

Cabinet	Model #
Small	MMY-MAP0724HT9UL
	MMY-MAP0724HT6UL
	MMY-MAP0726HT9PUL
	MMY-MAP0726HT6PUL
	MMY-MAP0726FT9PUL
	MMY-MAP0726FT6PUL
	MMY-MAP0726FT9PUL
	MMY-MAP0726FT6PUL
Medium	MMY-MAP0964HT9UL
	MMY-MAP1144HT9UL
	MMY-MAP0964HT6UL
	MMY-MAP1144HT6UL
	MMY-MAP0966HT9PUL
	MMY-MAP1206HT9PUL
	MMY-MAP0966HT6PUL
	MMY-MAP1206HT6PUL
	MMY-MAP0966FT9PUL
	MMY-MAP1206FT9PUL
	MMY-MAP0966FT6PUL
	MMY-MAP1206FT6PUL
	MMY-MAP0966FT9PUL
	MMY-MAP1206FT9PUL
	MMY-MAP0966FT6PUL
	MMY-MAP1206FT6PUL
Large	MMY-MAP1446HT9PUL
	MMY-MAP1686HT9PUL
	MMY-MAP1446HT6PUL
	MMY-MAP1686HT6PUL
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	MMY-MAP1686FT9PUL
	MMY-MAP1446FT6PUL
	MMY-MAP1686FT6PUL

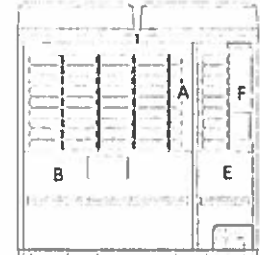
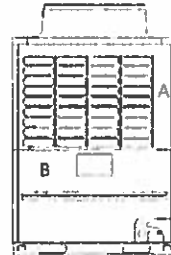
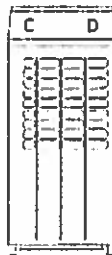
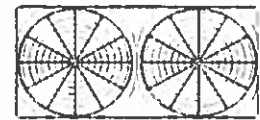
Medium Cabinet

Top panel



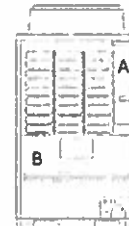
Large Cabinet

Top panel



Small Cabinet

Top panel



Cabinet	D (in)	W (in)	H (in)	Weight (lbs)
Small Cabinet	30.70	39.00	72.80	546 - 621
Medium Cabinet	30.70	47.60	72.80	659 - 751
Large Cabinet	30.70	63.00	72.80	838 - 888

LIMITATIONS & CONDITIONS OF USE:

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 codes must be considered, where applicable. All supporting components which are permanently installed shall be protected against corrosion, contamination, and other such damage at all times. 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 which typically are not required for this type of product.

All of the wind resisting exterior panels, individually meet or exceed their capacity to resist the design wind loads as stated in the calculations as required by the Florida State Building Code of 2014. 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. Yearly inspections, during equipment maintenance or after named storm, all screws, cabinet components, clips and anchor bolts are to be verified by the A/C contractor. All damaged cabinet components, loose, corroded, broken tech screws or anchor bolts shall be replaced to ensure structural integrity for hurricane wind forces. Evaluation based on first order analysis.