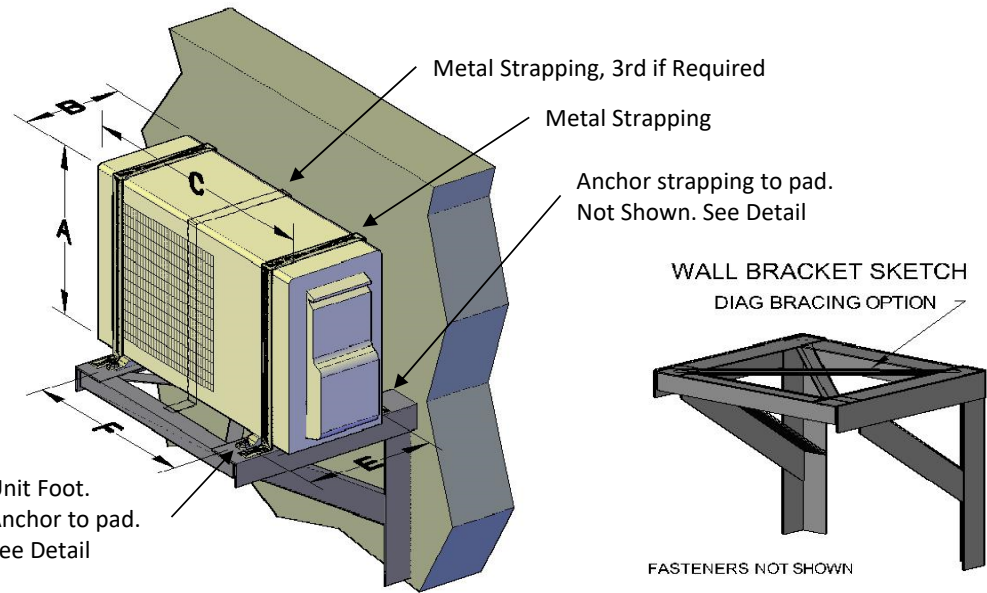


GREE DUCTFREE MINI-SPLITS OUTDOOR CONDENSING UNITS
WALL MOUNT CONFIGURATION AND ANCHOR SELECTION - WIND LOAD EXAMINATION

CODE: FBC 6th Ed. (2017) and ASCE 7-10
 MIAMI-DADE WIND SPEED = 186 MPH
 For Heights <= 60 ft. (Wood stud walls only <= 20')



Bri-Ko Engineering, Inc.,
 Structural Analysis
 Spreadsheet designed by: B. Schwartz, PE
 Date data input: 15-Apr-19

Calc Sht: EC-1 Mechanical Equipment on Wall Mount Bracket Calc
 Description: Structural Analysis of wall mounted mechanical equipment to resist wind forces.

Code: Florida Building Code 6th Ed. (2017) and ASCE 7-10.

Design Methodology and Load Combinations:

Design Method: LRFD $\Phi = 0.90$

Load Combos: FBC Eqn. 16-6 0.9 D + 1.0 W

Wind Forces: Based on FBC 6th Ed., ASCE 7-10, 29.4.2, "Wind Loads on Other Structures ..."

Ultimate Design Wind Speed, Vult (3-sec gust):	186 mph	Miami Dade
Nominal Design Wind Speed, Vasd:	144 mph	
Risk Category:	IV	Dir., Topo., Gust Effect: 0.85 1.00 N/A
Height, h:	60 ft	Exp. Cat.: C Vel. Pres. Exp Coef., Kz: 1.137
Enclosure Cat.	N/A	$G_{cp} = 0$
Velocity Pressure	$q_h = 0.00256 K_z K_{zt} K_d V^2$ (lb/ft ²)	$q_h = 85.6$ psf
$p = q_h(GC_p - GC_{pi})$	$(GC_p) = (1.0 \text{ ver.}, 1.4 \text{ lat.})$	Fver, Flat: 85.6 psf, 119.8 psf

Limit States: for illustration purposes only:

Select UnitType: VIREO Select Model # VIRU36HP230V1AO
 Number of Vert Brkts is 3 Total number of anchors is 9

Loads, (lbs):	P1= 1447	P2= 342	P3= 521	PD= 253
----------------------	----------	---------	---------	---------

Resistance to shear -unit feet:

Reqd. Shear/leg = **384 lbs** Nominal Shear per leg: **1500 lbs** CHECKS OK

Resistance to tension -unit feet:

Reqd Sher/anc: **1024 lbs** Nom Shear per bolt: **2500 lbs** CHECKS OK

Resistance to Moment and Uplift: Use Load Combo: 0.90 D + 1.00 W

Overturn M at brkt bottom: **79.1 k-in** for concrete and block at max 60' ht.

Concrete Wall: Nom Mom resist from all anchors: **138.4 k-in** CHECKS OK

Block Wall: Nom Mom resist from all anchors: **101.3 k-in** CHECKS OK

Overturn M at brkt bottom: **62.8 k-in** for wood at max 20' ht.

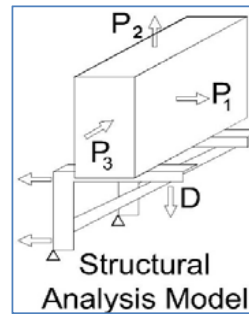
Wood Wall: Nom Mom resist from all anchors: **93.2 k-in** CHECKS OK

Unit Integrity: If Required. Only if manufacturer does not state design wind pressure.

Required tension on strap= **748 lbs**

Strap width, gauge= **1.375 in.** **20ga** min gauge thickness

Steel Strength= **45 ksi min.** Strength of strap= **981 lbs** Checks OK



ENGINEERING CONFORMANCE ANALYSIS:

THE TABLE SHOWS WALL MOUNT BRACKET AND ANCHOR TYPES FOR VARIOUS MODELS OF HVAC OUTDOOR EQUIPMENT UP TO 5 TONS THAT MEET THE FOLLOWING ANALYSIS: • OVERTURN • SLIDING • ANCHOR PULLOUT AND SHEAR STRENGTH • EQUIPMENT INTEGRITY.

TABLE A-2

VIREO - Series		Weight	Length C	Width B	Height	Mount	Mount
Model No.	(lbs)	(in.)	(in.)	A (in.)	E (in.)	F (in.)	
VIR09HP115V1AO/BO	71	30.7	10.1	21.3	11.3	21.3	
VIR12HP115V1AO/BO	77	30.7	10.1	21.3	11.3	21.3	
VIR09HP230V1AO/BO	78	28.0	10.0	21.3	11.3	21.3	
VIR12HP230V1AO/BO	86	28.0	10.0	21.3	11.3	21.3	
VIR18HP230V1AO/BO	114	35.3	13.4	27.6	15.6	22.0	
VIR24HP230V1AO/BO	142	35.3	13.4	27.6	15.6	26.4	
VIR30HP230V1AO/BO/CO	154	36.2	14.6	31.1	15.5	24.0	
VIR36HP230V1AO/BO/CO	161	36.2	14.6	31.1	15.5	24.0	
VIRU30HP230V1AO	229	40.0	14.4	43.5	15.8	23.2	
VIRU36HP230V1AO	253	40.0	14.4	43.5	15.8	23.2	

WALL BRACKET DETAIL

DIMENSION VARIABLES:

- L - Wall to outside bracket bolt
- T - Bracket width
- U - Top to bottom wall anchor distance (in.)
- V - Number of anchors in vertical bracket
- X - Number of vertical brackets
- Y - Number of anchors in top rear brkt

MEMBER AND MATLS:

- Steel: 3"x3"x1/8" A36
- Aluminum: 3"x3"x1/4" 6061-T6 no welds
- Use 3"x4" top leg when strapping

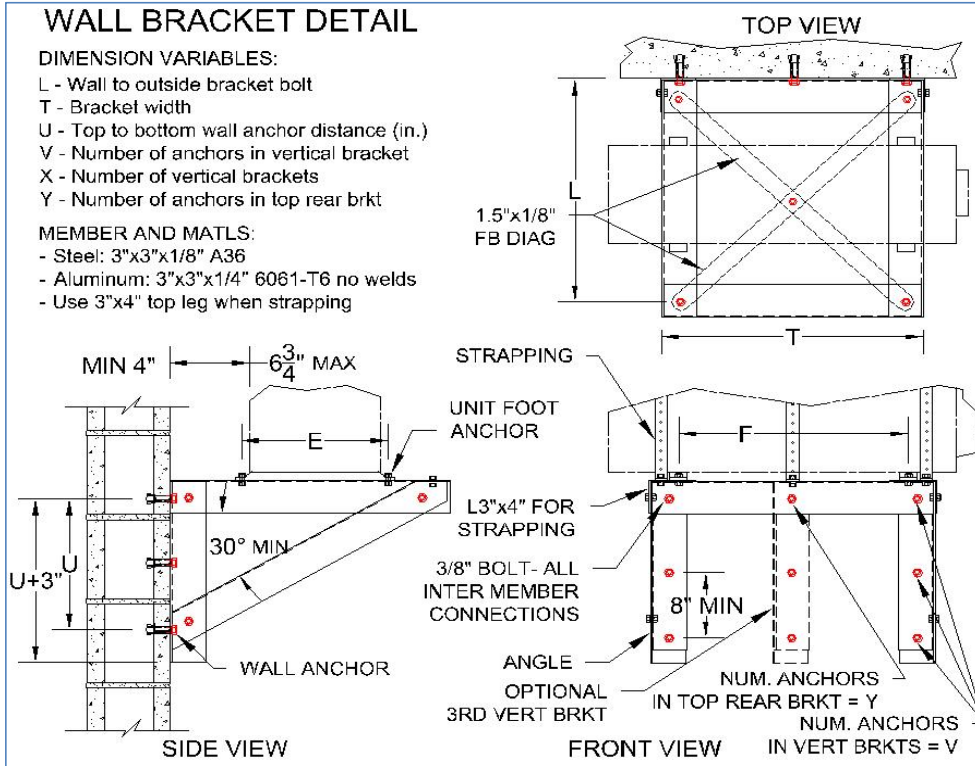


TABLE A-1 ANCHOR TYPE AND ALLOWABLE STRENGTHS (LRFD)

SYM	ANCHOR DESCRIPTION & MANUFACTURER	EMBED	STRENGTH AT MIN SPACING	
			PULL OUT (LBS)	SHEAR (LBS)
C-1	3/8" WEDGE BOLT (Powers)	2-1/2"	1025	1370
BG-1	3/8" WEDGE BOLT	3-1/2"	750	755
W-1	3/8" LAG SCREW	2-1/2"	690	320
A-4	1/4" A307 Bolt	N/A	1700	900
A-5	5/16" A307 Bolt	N/A	2500	1500

Anchor Notes: 1. Strengths for lag screws in wood are from NDS for wood construction 2005 for Southern Pine, Cd= 1.6, Cm= 1.0, Ceg= 1.0, Ct= 1.0, main member tm= 3.5", side member ts= 14 ga mtl. Strengths for other anchors are from manufacturer's specs with min. safety factor of 4. 2. Poured concrete wall with minimum f'c= 3000 psi. 3. BG-1 -Blocks (CMU) are medium weight and grout filled. One anchor per cell maximum. 4. Wood stud is minimum nominal 2"x4" with anchor centered in stud. 5. IMPORTANT: For Structure Type of Wood, Roof heights are limited to 20 ft maximum for all models.

Unit Anchor	Installation Requirements Wall Bracket						Strapping		Design Check:	
	T, in.	L, in.	U, in.	V, #	X, #	Y, #	# of Straps if Required	Gauge thickness	Nom/Reqd≥1.00=OK	Wall Anchor Check
A-4	27	21	16	2	2	2	Yes, 2	22ga	3.06	4.25
A-4	27	21	16	2	2	2	Yes, 2	22ga	3.06	4.25
A-4	27	21	16	2	2	2	Yes, 2	22ga	3.36	4.06
A-4	27	21	16	2	2	2	Yes, 2	22ga	3.37	4.13
A-4	27	24	16	3	2	2	Yes, 2	22ga	2.09	4.56
A-4	32	24	16	3	2	2	Yes, 2	22ga	2.11	4.69
A-4	29	26	16	3	2	3	Yes, 2	20ga	1.72	5.50
A-4	29	26	16	3	2	3	Yes, 2	20ga	1.72	5.50
A-5	29	25	24	3	3	3	Yes, 3	20ga	1.50	3.17
A-5	29	25	24	3	3	3	Yes, 3	20ga	1.50	3.21

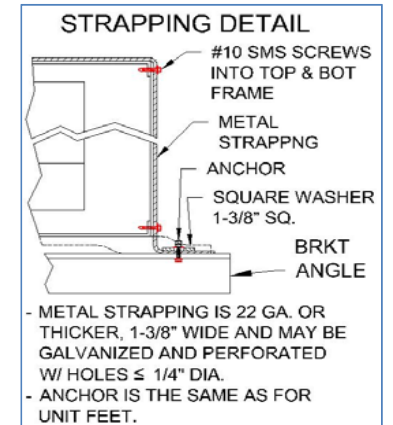
When multiple models with similar dimensions but differing weights, lowest weight stated for worst case overturn.

GENERAL NOTES:

1. THE ANALYSIS CONFORMS TO THE REQUIREMENTS OF THE FBC 6TH ED. (HIGH VELOCITY HURRICANE ZONE) AND ASCE 7-10 DESIGN WIND LOADS - OTHER STRUCTURES SECTION 29.4.2. NOTE: WIND FORCES ARE CONSIDERED AS MOST CLOSELY CONFORMING TO THE PRESSURES FOR SOLID ATTACHED SIGNS AND ARE DESIGNATED AS PER FIG.30.4-1 IN COMPONENTS AND CLADDING.
2. THE AC UNIT IS MOUNTED ON A BRACKET ON THE OUTSIDE OF A CONCRETE, BLOCK OR WOOD STUD WALL.
3. ANCHORS USED TO FASTEN THE UNIT TO THE WALL BRACKET ARE A307 OR HIGHER STRENGTH STEEL BOLTS. ANCHORS USED TO FASTEN THE WALL BRACKET TO WALL AS INDICATED IN THE TABLE A-2 ANCHORS DETAILS.
4. WALL BRACKET MEMBERS ARE EITHER STEEL BOLTED OR WELDED OR ALUMINUM BOLTED ONLY AS INDICATED IN THE DETAIL.
5. CLEARANCES: FASTENERS IN BRACKET METAL MUST HAVE EDGE CLEARANCES OF 1-1/2 DIAMETERS. ANCHORS IN CONC BLOCK MUST BE AT LEAST 12" FROM THE EDGE OF THE WALL.
6. UNIT INTEGRITY, IF NOT DESIGNATED BY THE MANUFACTURER FOR THE STATED WIND PRESSURES, IS ADDRESSED BY STRAPPING ATTACHED TO THE UNIT AND ANCHORED TO THE SUPPORT ANGLES. THIS RESISTS SHELL AND FRAME SEPARATION.

Bracket design parameters:

Distance from wall to unit: --->	6 in.
Distance from bottom anchor to bottom of vertical bracket: --->	3 in.
Distance from foot anchor to outside of bracket width: ---->	2.5 in.
Outside bracket angle width: ->	3 in.



Sheet:	ENG-1	BRI-KO ENGINEERING INC	Cert. Of Auth.:#27622	tel: 954.648.6218
Doc:	Page 1 of 1			
Gree -VIREO_Wall Mount				
Issue Date:	15-Apr-19			
Dwn By:	B.S.			
Dwg Size:	11x 17			