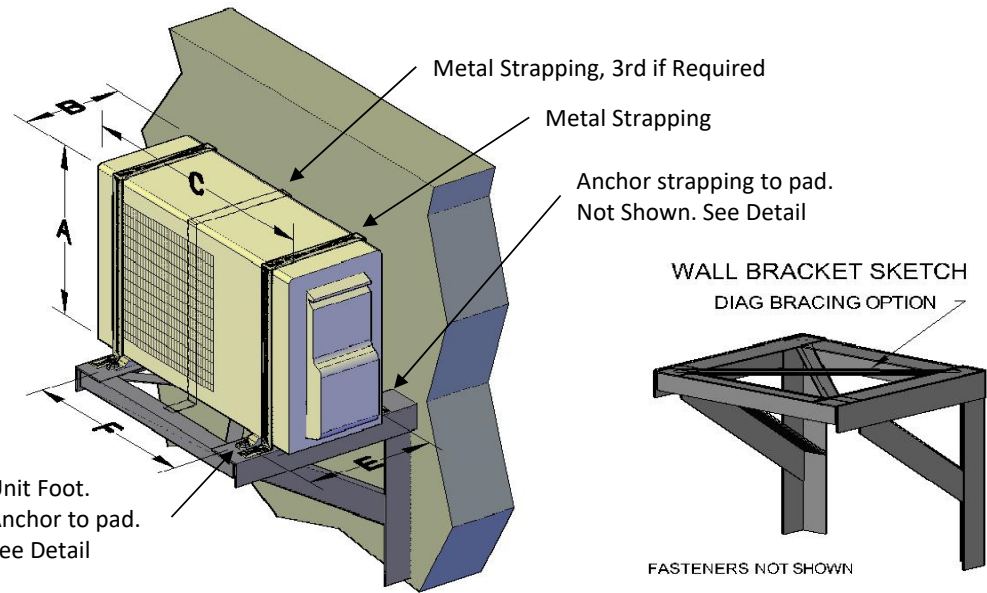


GREE DUCTFREE MINI-SPLITS OUTDOOR CONDENSING UNITS
WALL MOUNT CONFIGURATION AND ANCHOR SELECTION - WIND LOAD EXAMINATION

CODE: FMC and FBC 7th Ed. (2020) BLDG, ASCE 7-16
 MIAMI-DADE WIND SPEED = 195 MPH (Risk Cat. IV)
 For Heights <= 60 ft. (Wood stud walls only <= 20')



Bri-Ko Engineering, Inc., Spreadsheet designed by: B. Schwartz, PE
 Structural Analysis Date data input: 25-Mar-21

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

Code: FBC 7th Ed. (2020) and ASCE 7-16.

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 ASCE 7-16, 30.3, Fig 30.3-1, C&C Walls < 60ft.

Ultimate Design Wind Speed, Vult (3-sec gust):	195 mph	Miami Dade
Nominal Design Wind Speed, Vasd:	151 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)	$q_h =$ 94.0 psf
$p = q_h(GC_p - GC_{pi})$	($GC_p = 1.0$ ver., 1.4 lat.)	Fver, Flat: 94.0 psf , 131.7 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= 1591	P2= 376	P3= 573	PD= 253
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Resistance to shear -unit feet:

Reqd. Shear/leg = **423 lbs** Nominal Shear per leg: **1500 lbs** **CHECKS OK**

Resistance to tension -unit feet:

Reqd Sher/anc: **1132 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: **86.5 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: **68.7 k-in** for wood at max 20' ht.

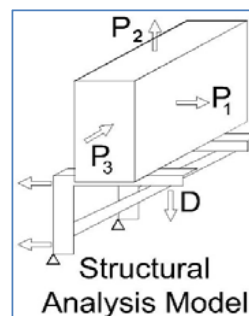
Wood Wall: Nom Mom resist from all anchors: **93.2 k-in** **CHECKS OK**

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

Required tension on strap= **826 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 3 TONS THAT MEET THE FOLLOWING ANALYSIS: • OVERTURN • SLIDING • ANCHOR PULLOUT AND SHEAR STRENGTH • EQUIPMENT INTEGRITY.

TABLE A-2

VIREO GEN3 - 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

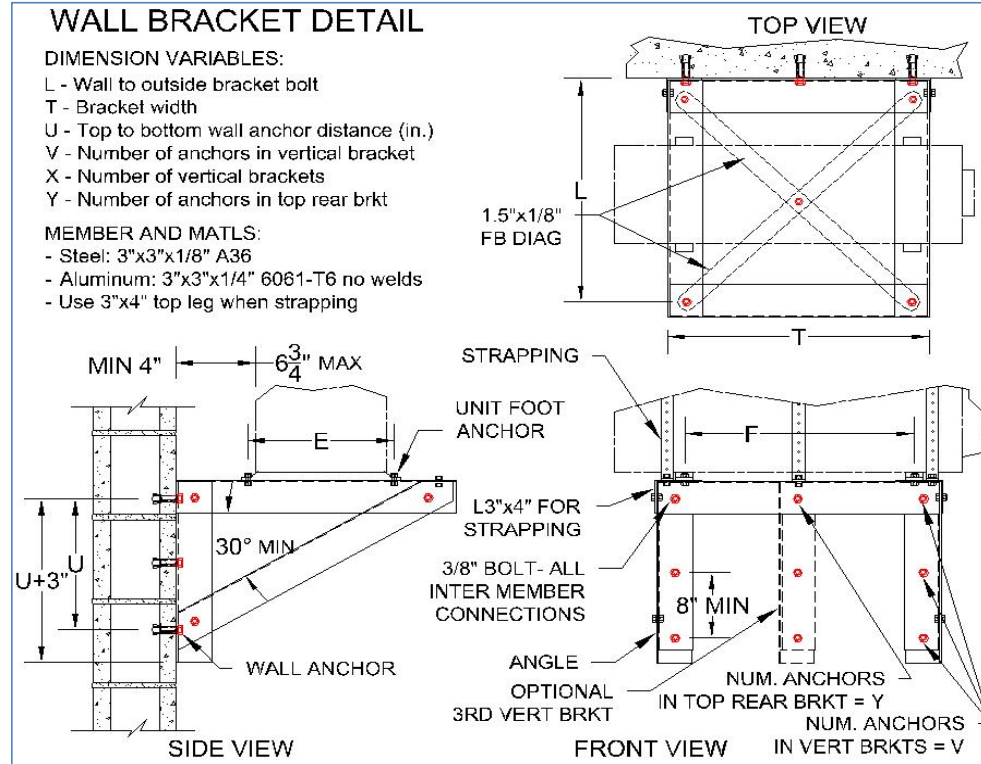


TABLE A-1 ANCHOR TYPE AND ALLOWABLE STRENGTHS (LRFD)

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

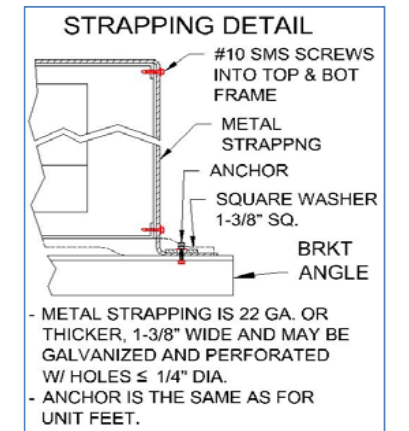
Anchor Notes: 1. Strengths for lag screws in wood are from NDS for wood construction 2005 for Southern Pine, Cd= 1.6, Cm= 1.0, Ceg= 1.0, Ct= 1.0, main member tm= 3.5", side member ts= 14 ga mtl. Strengths for other anchors are from manufacturer's specs with min. safety factor of 4. 2. Poured concrete 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	Unit Foot Anchor	Wall Anchor Check
A-4	27	21	16	2	2	2	Yes, 2	22ga	2.78	4.63
A-4	27	21	16	2	2	2	Yes, 2	22ga	2.78	4.63
A-4	27	21	16	2	2	2	Yes, 2	22ga	3.04	4.44
A-4	27	21	16	2	2	2	Yes, 2	22ga	3.05	4.50
A-4	27	24	16	3	2	2	Yes, 2	22ga	1.90	5.00
A-4	32	24	16	3	2	2	Yes, 2	22ga	1.91	5.06
A-4	29	26	16	3	2	3	Yes, 2	20ga	1.56	5.94
A-4	29	26	16	3	2	3	Yes, 2	20ga	1.56	6.00
A-5	29	25	24	3	3	3	Yes, 3	20ga	1.36	3.42
A-5	29	25	24	3	3	3	Yes, 3	20ga	1.36	3.46

GENERAL NOTES:

1. THE ANALYSIS CONFORMS TO THE REQUIREMENTS OF THE FBC 7TH ED. (HIGH VELOCITY HURRICANE ZONE) AND ASCE 7-16 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 GEN3_Wall Mount	
Issue Date: 25-Mar-21	
Dwn By: B.S.	
Dwg Size: 11x 17	