

CODES:

FLORIDA BUILDING CODE 2014, 5TH EDITION
 ASCE STANDARD 7-2010
 MIAMI DADE WIND SPEED = 186 MPH

WIND DESIGN REQUIREMENTS:

ULTIMATE DESIGN WIND SPEED, Vult (3 sec. gust) 186 mph
 NOMINAL DESIGN WIND SPEED, Vasd 144 mph

RISK CATEGORY IV
 HEIGHT TO CENTROID 35 FT
 EXPOSURE CATEGORY D
 ENCLOSURE CATEGORY N/A
 EFFECTIVE WIND AREA N/A

INTERNAL PRESSURE COEFFICIENT GCPI N/A
 DIRECTIONALITY FACTOR Kd 0.90
 TOPOGRAPHIC FACTOR Kzt 1.00
 GUST EFFECT FACTOR N/A

WIND LOAD METHOD:

VELOCITY PRESSURE:
 based on ASCE 7-10, Eq. 29.3-1
 $qz = 0.00256 Kz Kzt Kd V^2$ psf
 $Kz = 1.19$
 $V = Vult$
 $qz = 94.9$ psf

WIND PRESSURES:

based on ASCE 7-10 Eq. 29.5.1 & FBC 1620.6
 $F = qh GcF Af$ psf Eq. 29.5-2
 $GcF = 3.10$ FOR LATERAL FORCES
 $GcF = 1.50$ FOR VERTICAL FORCES

LOAD COMBINATIONS:

POSITIVE VERTICAL FORCE: $1.0 \cdot D + 0.6 \cdot W$ [FBC 1605.3.1 EQ. 16-12]
 SLIDING & ANCHOR PULLOUT: $0.6 \cdot D + 0.6 \cdot W$ [FBC 1605.3.1 EQ. 16-15]
 OVERTURNING: $0.67 \cdot D + 0.78 \cdot W$ [FBC 1605.3.2 EQ. 16-18]

GENERAL NOTES:

- THIS ENGINEERING REPORT DOCUMENTS THE ANALYSIS OF AC EQUIPMENT MOUNTED ON A ROOF STAND AND THE ASSOCIATED ANCHORING SYSTEMS TO RESIST DEAD WEIGHT AND WIND LOAD FORCES.
- THE ANALYSIS CONFORMS TO THE REQUIREMENTS OF THE FLORIDA BUILDING CODE 2014 AND ASCE 7-2010, FOR USE WITHIN & OUTSIDE HVHZ.
- THE AC UNIT IS MOUNTED ON A METAL STAND WHICH IS SECURED TO THE ROOF. 4. ANCHORS USED TO FASTEN THE UNIT TO THE ROOF STAND ARE A307 OR HIGHER STRENGTH STEEL BOLTS.
- THE ROOF STAND IS DESIGNED AND VERIFIED BY STRUCTURAL ANALYSIS BY THIS ENGINEER.
- ALTERNATE ROOF STAND DESIGNS (E.G. ALUMINUM) THAT ARE DESIGNED TO RESIST THE ABOVE WIND LOADS MAY BE USED AT THE CONTRACTOR'S OPTION. FOR ALTERNATE ROOF STAND DESIGNS, PROVIDE DETAILS AND CALCULATIONS SIMILAR TO THIS SHEET AND DETAILED CALCULATIONS ON DRAWING 2, STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA.
- THE CONTRACTOR IS RESPONSIBLE FOR SAFETY, INSTALLATION, AND SPECIAL INSPECTIONS & TESTS PER FBC CHAPTER 17.

CALCULATIONS: SEE DETAILED CALCULATIONS ON DRAWING 2.

WIND LATERAL AND VERTICAL FORCES:

- THE WIND LOAD ACTING NORMAL TO THE LARGE VERTICAL SIDE OF THE AC UNIT IS USED FOR WORST CASE SHEAR.
- THE WIND LOAD ACTING ON THE TOP OF THE UNIT UPWARD AND THE HORIZONTAL WIND LOAD IS USED TO CALCULATE UPLIFT AND MOMENT.
- THESE FORCES MUST BE RESISTED BY THE SHEAR AND TENSILE STRENGTHS OF THE ANCHORS HOLDING THE UNIT TO THE SUPPORT BAR AND ALSO THE ANCHORS HOLDING THE SUPPORT BAR TO THE ROOF STAND. THE ROOF STAND INTERNAL STRESSES ARE VERIFIED BY THIS ENGINEER TO BE WITHIN THE ALLOWABLE STRENGTHS OF ITS ELEMENTS AND CONNECTIONS.

SUPPORT BAR STRENGTH:

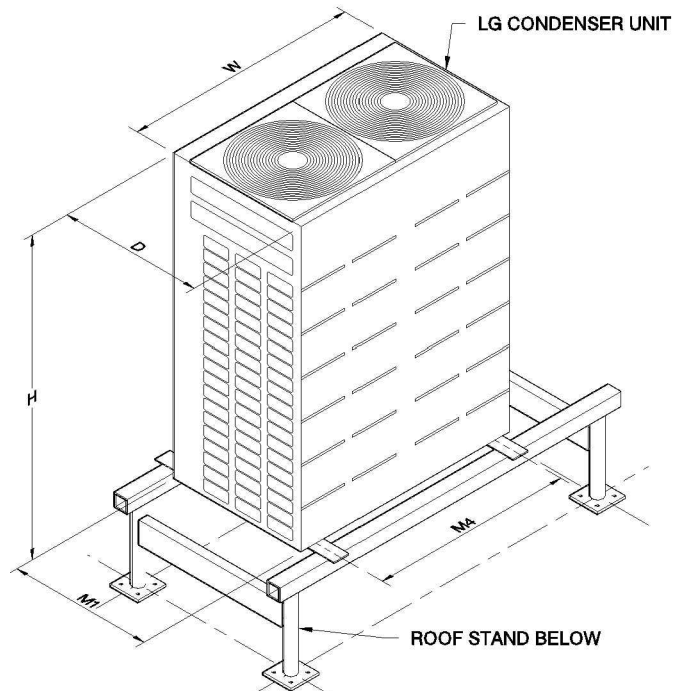
- THE MOMENT AND SHEAR MUST BE TRANSFERRED FROM THE AC UNIT TO THE ROOF STAND BY A SUPPORT BAR AS THE AC UNIT DEPTH CAN BE UNEQUAL TO THE ROOF STAND DEPTH.
- MAX MOMENT AND SHEAR TO THE SUPPORT BAR DETERMINE SELECTION OF THE SUPPORT BAR.

ROOF STAND STRENGTH:

- CRITICAL LIMITS ARE THE POST LEGS AND WELD STRENGTH TO THE BASE, CROSS BRACE TO POST CONNECTION, AND RAILING TO POST CONNECTION.

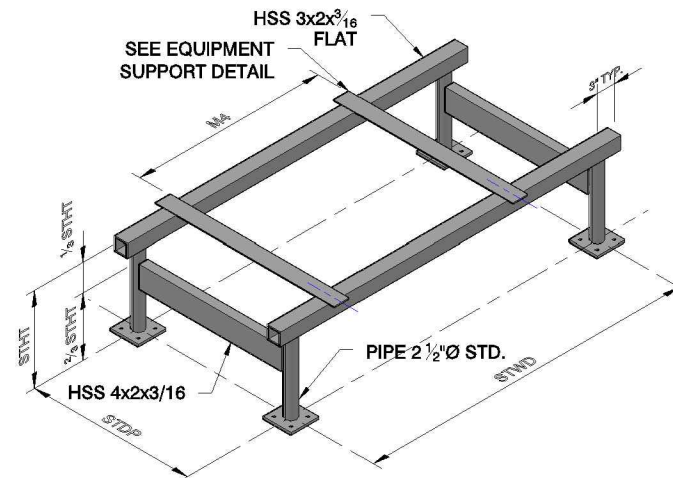
ENCLOSURE FASTENERS:

- THE METAL SHELL FASTENERS MUST RESIST THE NEGATIVE WIND PRESSURES CAUSING TENSILE STRESS IN THE SCREWS AND PULL-OVER EFFECTS OF THE SHEET METAL.



ROOF-MOUNT CONFIGURATION

SCALE: NTS



STEEL ROOF STAND

SCALE: NTS

ROOF STAND STRENGTH LIMITS		
LIMIT TYPE	AMOUNT	UNITS
MAX SHEAR AT POST BASE	1.04	KIP
MAX PULLOUT AT POST BASE	3.09	KIP
MAX MOMENT AT POST BASE	20.00	KIP*IN
MAX MOMENT AT CROSS BRACE	21.17	KIP*IN

ROOF STAND NOTES:

- ROOF STAND IS DESIGNED AND VERIFIED FOR THE FORCES DESCRIBED IN THIS DOCUMENT AS SUMMARIZED IN THE ENGINEERING CALCULATIONS INCLUDED.
- STHT = STAND HEIGHT = MIN 18", MAX 30".
- STWD = STAND POST SPACING = 54" MIN, 66" MAX.
- STDP = STAND DEPTH = 40" MIN, 48" MAX.
- EQUIPMENT SUPPORT AND FASTENERS TO STAND TOP RAIL ARE DEFINED IN SEPARATE DETAIL.
- AC UNIT MUST BE CENTERED ON SUPPORT.
- 1/2" BASE PLATE IS ANCHORED TO CONCRETE SLAB W/ 1/2" Ø ADHESIVE ANCHORS (HILTI HIT-HY 200+HAS) WITH MIN. 3 1/2" EMBED. OF GALV HAS RODS IN CONCRETE. ANCHOR GROUP CAPACITY COMBINED TENSION = 3090 LBS, SHEAR = 1040 LBS, AND MOMENT 20000 IN*LBS.
- IF NO ROOF SLAB, BASE PLATES SHALL BE ANCHORED TO STEEL ROOF FRAMING (DESIGNED BY OTHERS FOR THESE LOADS) WITH 1/2" Ø A307 BOLTS.

STEEL FABRICATION NOTES:

- ALL MATERIAL IS STEEL WITH MIN Fy = 35 KSI.
- ALL JOINTS SHALL BE WELDED CONTINUOUS ALL AROUND W/ 3/16" FILLET.

OTHER NOTES:

- EQUIPMENT SUPPORT IS NOT PART OF ROOF STAND.
- MIN NUMBER OF POSTS IS 4 PER CONDENSER. FOR MULTIPLE CONDENSERS, USE ONE STAND PER CONDENSER.
- 1"± NON-METALLIC NON-SHRINK GROUT MAY BE USED UNDER THE BASE PLATES.

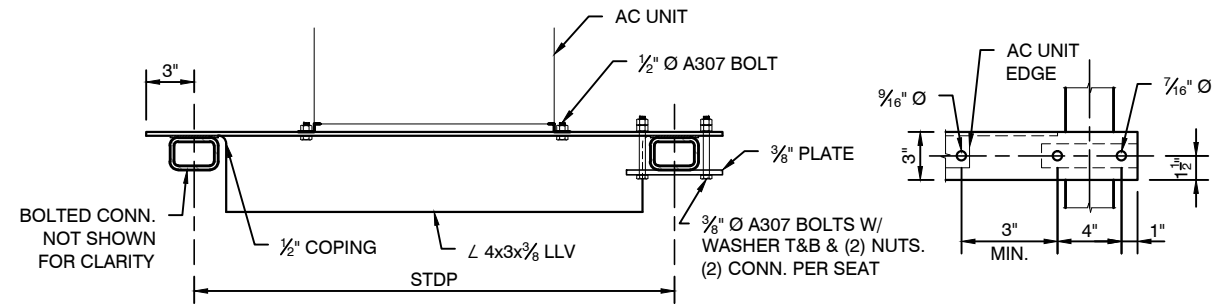
ENGINEERING CONFORMANCE ANALYSIS:

THE TABLE BELOW SHOWS DIMENSIONS, MIN STAND DEPTH, AND SHELL ENCLOSURE SCREWS FOR SOME MODELS OF LG ELECTRONICS USA HVAC OUTDOOR EQUIPMENT THAT MEET THE FOLLOWING ANALYSIS:

- ROOF STAND STRENGTH: POST AND CROSS-BRACE STRENGTH TO RESIST UNIT WEIGHT AND WIND LOAD LATERAL AND VERTICAL SURFACES
- STAND POST ANCHORS: PULLOUT AND SHEAR DUE TO OVERTURNING AND SLIDING FORCE IS WITHIN REQUIREMENTS
- EQUIPMENT METAL COVER FASTENERS: MIN NUMBER AND SIZE

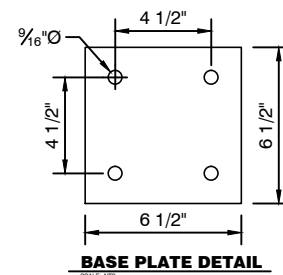
MODEL #	CONDENSER DIMENSIONS						ROOF STAND DIMS: STDP MIN (IN)	SHELL SCREWS ON LONG SIDE, QTY. & SIZE	DESIGN CHECK W/ NOM/REQ'D >= 1.00 = OK			
	W	D	H	M1	M4	Wt			STAND STRENGTH			METAL SHELL
									ANCHOR SHEAR	UPLIFT	BRACE MOMENT	
ARUB096BTE4 ARUB096DTE4 ARUN096BTE4 ARUN096DTE4 ARUN121BTE4 ARUN121DTE4 ARUB121BTE4 ARUB121DTE4 ARUB096BTE5 ARUB096DTE5 ARUB121BTE5 ARUB121DTE5	48.81	29.94	66.13	29.06	43.38	563	40	24, #10	0.95	0.98	0.93	0.97
ARUN122BTE4 ARUN122DTE4 ARUB122BTE4 ARUB122DTE4 ARUB122BTE5 ARUB122DTE5	48.81	29.94	66.13	29.06	43.38	661	40	24, #10	0.95	0.98	0.93	0.97
ARUN144BTE4 ARUN144DTE4 ARUB144BTE4 ARUB144DTE4 ARUN168BTE4 ARUN168DTE4 ARUB168BTE4 ARUB168DTE4 ARUB144BTE5 ARUB144DTE5 ARUB168BTE5 ARUB168DTE5 ARUB192BTE5 ARUB192DTE5	48.81	29.94	66.13	29.06	43.38	628	40	24, #10	0.95	0.98	0.93	0.97
ARUN145BTE4 ARUN145DTE4 ARUB145BTE4 ARUB145DTE4 ARUN169BTE4 ARUN169DTE4 ARUB169BTE4 ARUB169DTE4 ARUB216BTE5 ARUB216DTE5	48.81	29.94	66.13	29.06	43.38	660	40	24, #10	0.95	0.98	0.93	0.97

NOTE: STAND DIMENSIONS ARE MINIMUMS. STAND SHALL BE BUILT TO SUPPORT ONE CONDENSER UNIT AS OUTLINED IN THE LG ELECTRONICS USA INSTALLATION MANUAL.

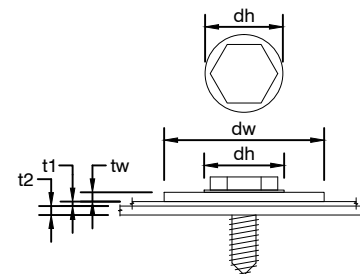


EQUIPMENT SUPPORT DETAIL

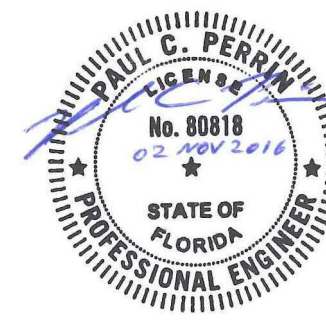
SCALE: NTS



BASE PLATE DETAIL



ENCLOSURE FASTENERS		
DESCRIPTION	SIZE	UNITS
SCREW SIZE (d)	#10	
INTEGRAL WASHER SIZE (dw)	0.50	IN
THICKNESS OF SHEET METAL (t1)	0.043	IN
MIN. THICKNESS OF FRAME (t2)	0.07	IN
DEPTH OF PENETRATION	0.25	IN
SCREW YIELD STRENGTH	55	KSI
ALLOWABLE TENSILE STRENGTH/SCREW	321	LBS
ALLOWABLE PULLOVER STRENGTH/SCREW	371	LBS
ALLOWABLE PULL-OUT STRENGTH/SCREW	170	LBS



State of Florida
 Certificate of Authorization
 # 31626

48-30-R-95 INFORMATION & DIAGRAMS
 LG ELECTRONICS USA HVAC
 OUTDOOR CONDENSING UNIT
 ROOF MOUNT CONFIGURATION

REVISIONS		SCALE	DATE
NO.	DESCRIPTION	NTS	11/02/16
DATE	BY	DRAWN BY	PROJECT MGR
		JDP	PCP
		PROJECT NO.	FLAT FILE
		160387	
DRAWING NO.			
48-30-R-95			
SHEET 1 OF 2			

