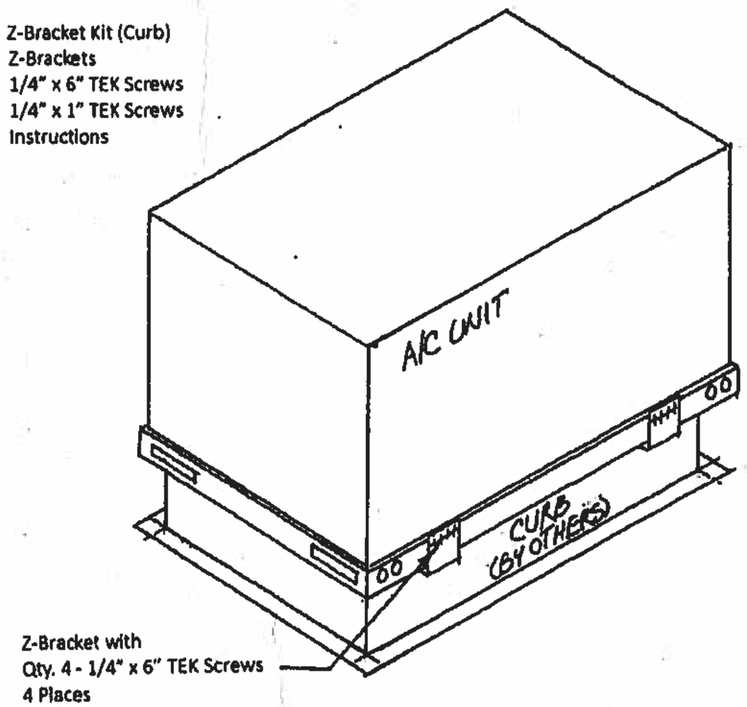
Curb Mounting

Part Number BRK-CRBHOLD-01: Z-Bracket Kit (Curb)
One Kit Contains: Qty. 4 - Z-Brackets
Qty. 16 - 1/4" x 6" TEK Screws
Qty. 8- 1/4" x 1" TEK Screws
Qty. 1 Instructions
One Kit Required per Unit



CARRIER Chassis 1 & 2:

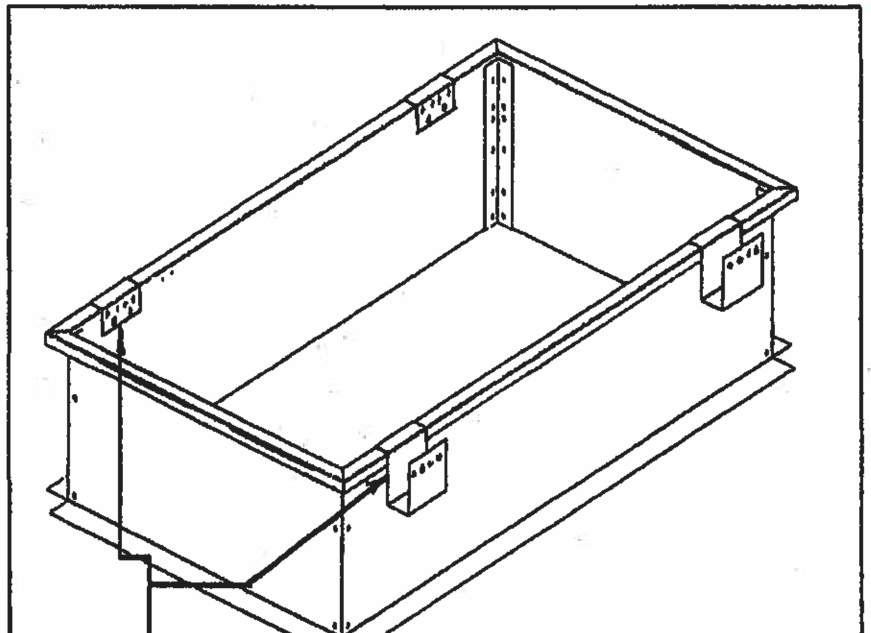
Models: 48/50FC, 48/50TC, 50FCQ and 50TCQ size 04 (min) through 07(max)
48/50KC, 50KCQ, 48/50GC, 48/50HC, 50GCQ, 50HCQ, 50JC and 48/50LC size 04(min) through 06 (max)

Each package unit air conditioner listed above conforms to the Florida Building Code 7th Edition (2020) requirements for installation including High Velocity Hurricane Zone (HVHZ), Risk Category III (V = 186 MPH), exposure category "D", and installation height up to and including 65 feet above grade. Worst case is -07 (chassis 2) 74-3/8" x 46-3/4" x 41-3/8" tall.

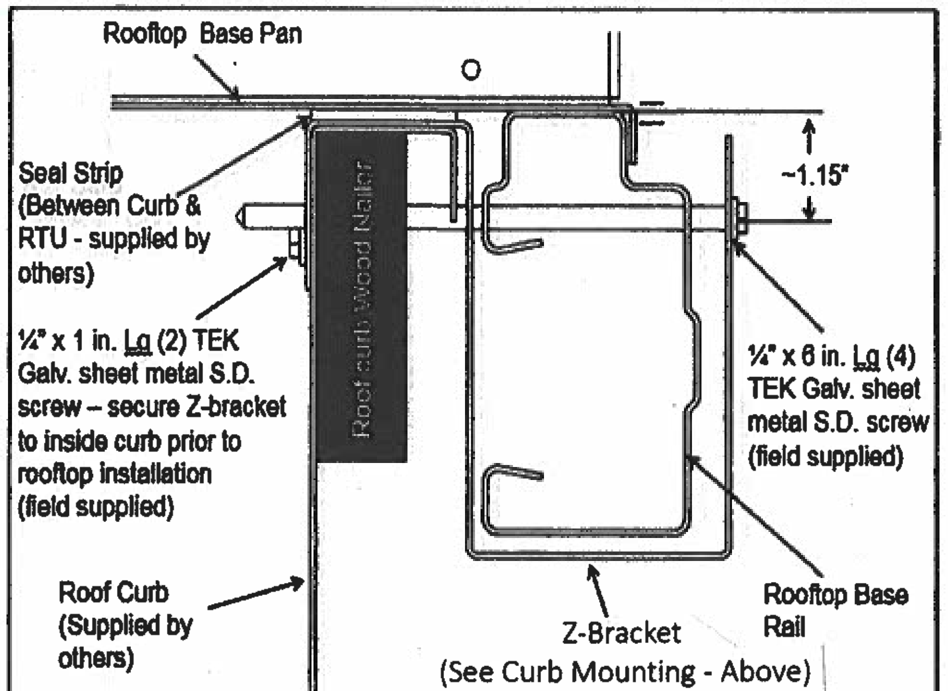
ALLOWABLE DESIGN PRESSURES FOR THE UNIT ITSELF:

Design Lateral Pressure = 197.2 lb/ft^2
Design Uplift Pressure = 95.4 lb/ft^2

Unit itself will withstand wind loads imposed by 197.2 PSF lateral and 95.4 PSF uplift design pressures provided the 16 gage galvanized base rails are properly fastened to a suitable slab, curb, curb adapter, or other suitable mounting arrangement and all factory supplied assembly fasteners are in place.

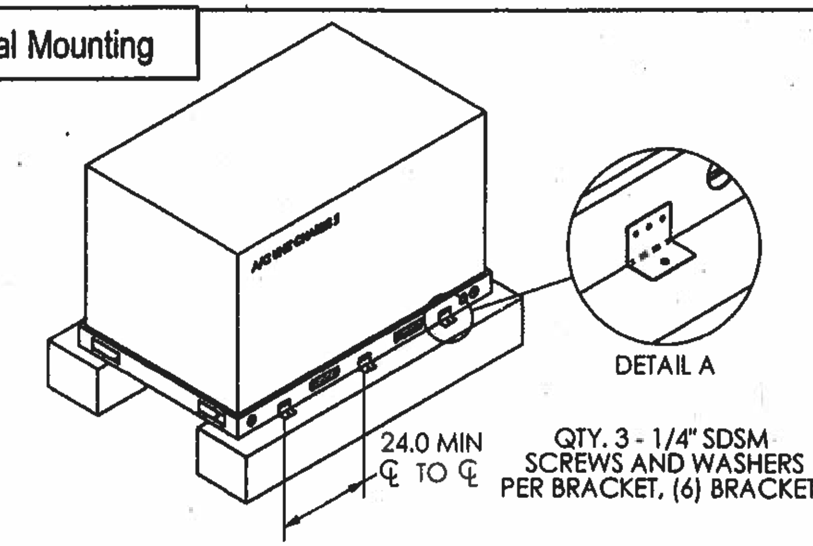


Z-Bracket Installed on Roof Curb prior to installation of seal strip & RTU



Z-Bracket Wind Load Fastening to Rooftop to Roof Curb

Optional Mounting



Part Number CBTDC-KGR: Tie-Down Bracket Kit (Concrete or Stand)
One Kit Contains: Qty. 2 - Tie-Down Brackets
Qty. 6 -1/4" x 3/4" Self-Drilling Screws with Washers
Qty. 2- 3/8" x 2-1/4" Ultra-Wedge Anchors (Concrete)
Qty. 1 - Instructions
Qty. 2 - 3/8" x 1" Bolts, Washers and Nuts (Stand)
Three Kits Required per Unit

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S1	Job No. Chassis 1 & 2	Job No.: Carrier Rooftop Units
	Date: 12/18/20	Title: Model List and Details
	Created by: J. Buerosse	

Rational Analysis: Worst case is -07 (Chassis 2) 74-3/8" x 46-3/4" x 41-3/8"
Design Pressures complying to FBC Building 1620.6 (HVHZ):
V = 186 mph (Risk Cat. III), For Exp.Cat. "D" and Z = 65 ft, K_z = 1.33, K_{zt} = 1.0, K_d = 0.90
$q_z = .00256K_zK_{zt}K_dV^2 = 106.01$ lb/ft²
Using 1620.6,
Lateral Wind Pressure = $W_L = q_z(3.1) = 328.64$ lb/ft²
Uplift Wind Pressure = $U_L = q_z(1.5) = 159.02$ lb/ft²
Factoring in the required Load Combination factor (0.6):

Design Lateral Pressure = $W_L(0.6) = 197.2$ lb/ft²
Design Uplift Pressure = $U_L(0.6) = 95.4$ lb/ft²

Since positive pressure acts toward the surface being considered and negative pressure acts away, only the uplift pressure will remove a panel from the machine. The design lateral pressure which is considered to act toward the windward surface is recognized to be a combination of the pressures acting on the windward and leeward surfaces. Wall pressure coefficients from ASCE7-16, Chapter 27, Figure 27.3-1 may be used to distribute the Design Lateral Pressure into positive and negative componenets acting on the windward and leeward surfaces, respectively.

L/B = 46.75/74.375 = 0.63 for wind on long (74-3/8") side
L/B = 74.375/46.75 = 1.59 for wind on short (46-3/4") side

Worst case positive pressure coefficient is 0.8 for windward wall which has a corresponding negative pressure coefficient of 0.5 on the leeward wall. The worst case negative pressure coefficient is 0.7 for the sidewall (side parallel to wind). Since the windward and leeward wall pressures act in the same direction, the distibuted pressures are computed as follows:

Lateral Positive Design Pressure = 197.18 (0.8) / (0.8 + 0.5) = 121.34 lb/ft² (Worst Case Positve)
Lateral Negative Design Pressure = 197.18 (0.5) / (0.8 + 0.5) = 75.84 lb/ft²
Sidewall Negative Design Pressure = 197.18 (0.7) / (0.8 + 0.5) = 106.17 lb/ft² (Worst Case Negative)

22 ga. panels and columns are fastened together and to 16 ga. base rails using #10 serrated washer head self piercing screws having 0.425" head diameter, 0.19" nominal diameter, and 0.14 minor diameter. These screws are expected to exhibit the following properties based upon ICC-ES Report ESR-2196:

Pullout Strength in 22 ga. = 306 lbs (ultimate)
Pullover strength of 22 ga. = 828 lbs (ultimate)
Shear Strength in 22 ga. = 684 lbs (ultimate)

Pullout Strength in 16 ga. = 450 lbs (ultimate – based upon 18 ga.)
Shear Strength in 16 ga. = 927 lbs (ultimate – based upon 18 ga.)

For Top Panel (48TC500235):
73.6" x 45" draw formed panel anchored at edges and through top to center panel and control box. Worst case portion is over air handler section since condenser section has a large hole in the top causing internal and external pressure to be equal. For portion tributary to air handling section:

A = 45(38.6)/12(12) = 12.06 ft²
Load = 12.06 (95.41) = 1150.9 lbs
For outside edge (7 screws, all in shear), screw load = 1150.9/2(7) = 82.2 lbs
Safety Factor = 684/82.2 = 8.3 OK
For inside edge (8 screws, 4 in tension), screw load = 1150.9/2(8) = 71.9 lbs
Safety Factor = 306/71.9 = 4.3 OK
For Inside Panel (50HJ540465):
44.84" x 37.53" draw formed panel anchored at edges with 5 screws through face at top and bottom and 5 screws each vertical edge through flange perpendicular to face (10 screws in tension, 10 screws in shear).
A = 44.84(37.53)/ 12(12) = 11.69 ft²
Load = 11.69(106.17) = 1240.7 lbs
Screw Load = 1240.7/20 = 62.04 lbs
Safety Factor = 306/62.04 = 4.9 OK

For Access Door (48TM500284):
33.5" x 36.5" draw formed panel anchored with 2 screws through face each vertical side, 3 screws through face at bottom edge and top edge fits inside top panel (trapped).

A = 33.5(36.5)/12(12) = 8.49 ft²
Load = 8.49(106.17) = 901.5 lbs
Screw Load = 901.5/2(5) = 90.15 lbs
Safety Factor = 306/90.15 = 3.4 OK for Components and Cladding

For Access Panel (48TM500345):
12.13" x 37.3" draw formed panel anchored with 1 screw through face each vertical side, 1 screw through face at bottom edge and top edge fits inside top panel (trapped).
A = 12.13(37.3)/12(12) = 3.14 ft²
Load = 3.14(106.17) = 333.6 lbs
Screw Load = 333.6/2(3) = 55.60 lbs
Safety Factor = 306/55.60 = 5.5 OK for Components and Cladding

Remaining panels are trivial cases of the above due to greater fastener quantity or having openings that limit negative pressure effects.

For connection of upper frame and panels to base rails:
12 screws each long side fasten frame columns and panels to the long base rails. 5 screws fasten inside panel to short base rail at air handler end. Opposite end is louvered and has a large opening in the top and mesh over cooling coils. Screws fasten 22 ga. panels and columns to 16 ga. base rails.

Lateral Wind Area = A_L = 73.6(37.53)/12(12) = 19.18 ft²
Lateral Design Load = 19.18(197.18) = 3782 lbs
Overturning Moment = 3782(37.53)/2 = 70975 in-lb
Uplift Wind Area = A_U = 73.6(45)/12(12) = 23.0 ft²
Uplift Design Load = 23.0(95.41) = 2194 lbs
Uplift Moment = 2194(45)/2 = 49375 in-lb

Screw Load = (70975 + 49375)/12(45) = 222.9 lbs (shear)
Safety Factor = 927/222.9 = 4.2 OK

Unit itself will withstand wind loads imposed by 197.2 psf lateral and 95.4 psf uplift design pressures provided the 16 gage galvanized base rails are properly fastened to a suitable slab, stand, curb, curb adapter, or other suitable mounting arrangement and all factory supplied assembly fasteners are in place.

For connection of unit base rails to properly designed curb, metal stand, or structural concrete (by others):

Lateral Wind Area = A_L = 74.375(41.375)/12(12) = 21.37 ft²
Lateral Design Load = 21.37(197.18) = 4214 lbs
Overturning Moment = 4214(41.375)/2 = 87172 in-lb
Uplift Wind Area = A_U = 74.375(46.75)/12(12) = 24.15 ft²
Uplift Design Load = 24.15(95.41) – 0.6(607) = 1940 lbs
Uplift Moment = 1940(46.75)/2 = 45348 in-lb

For connection of 16 ga. (min) straps, clips, or brackets spaced 48" min apart to unit base rails on long sides using 1/4" (#14) self-drilling screws:
These screws are expected to exhibit the following properties based upon ICC – ES Report ESR - 1976
Pullout Strength in 16 ga. = 573 lbs (ultimate)
Shear Strength in 16 ga. = 1389 lbs (ultimate)
Using 3 screws per strap, clip, or bracket, with 3 straps, clips, or brackets each long side:
Screw Load = (87172 + 45348)/2(3)(46.75) = 315.0 lbs (shear) at base rail outer surface
Safety Factor = 1389/315.0 = 4.4 OK for Components and Cladding

For Z-Brackets similar to Micrometl design but modified to eliminate hidden structural fasteners (see sheets 2 and 3) anchored to 18 ga. (min) curb (by others):
Shear Strength in 18 ga. = 1218 lbs (ultimate)
Screw Load = (87172 + 45348)/2(4)(42.69) = 388.0 lbs (shear) at curb inside surface
Safety Factor = 1218/388.0 = 3.1 OK for Components and Cladding

For brackets 3.25" wide x 2" x 2-1/2", 16 ga. (min) spaced 24" (min) on center into base rails, Using(3) screws per bracket, (3) brackets each long side:
Anchor Load = (87172 + 45348)/3(47.5) = 930.0 lbs (tension)
Anchor Load = 4214/6 = 702.3 lbs (shear) at 3/4" beyond baserail outer surface

For 3/8" SAE Gr. 5 bolts with nuts and washers to steel (by others),
Safety Factor = 3720/930.0 = 4.0 (tension) OK
Safety Factor = 1937/702.3 = 2.8 (shear) OK

For 3/8" Powers Wedge-Bolt + anchors with 2-1/8" (min) embedment into 2000 psi (min) concrete (by others), 4" (min) thick, 2-3/4" (min) edge distance, and 2-1/2" (min) spacing:

Safety Factor = 3000/930.0 = 3.2 (tension) OK
Safety Factor = 3100/702.3 = 4.4 (shear) OK

S2	Job No. Chassis 1 &2	Job No.: Carrier Rooftop Units	John Buerosse, P.E., P.A
	Date: 12/18/20	Title Model List and Details	Structural and Mechanical Engineering
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