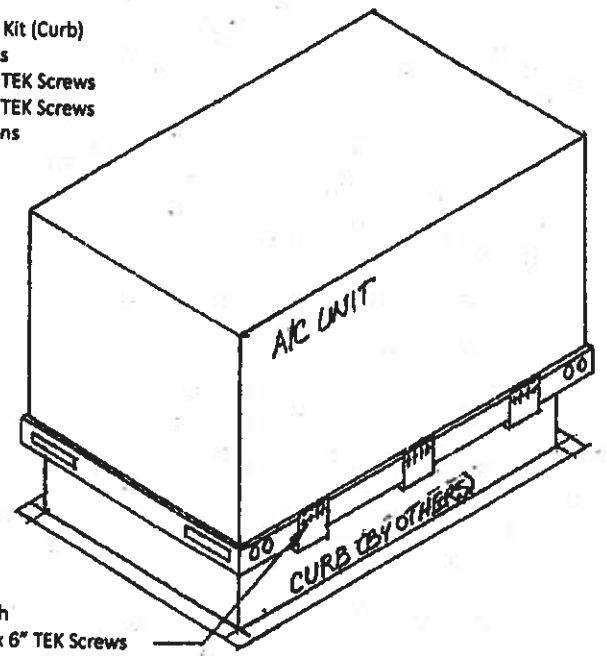
Curb Mounting

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
Two Kits Required per Unit



Z-Bracket with
Qty. 4 - 1/4" x 6" TEK Screws
6 Places

CARRIER Chassis 3 & 4:

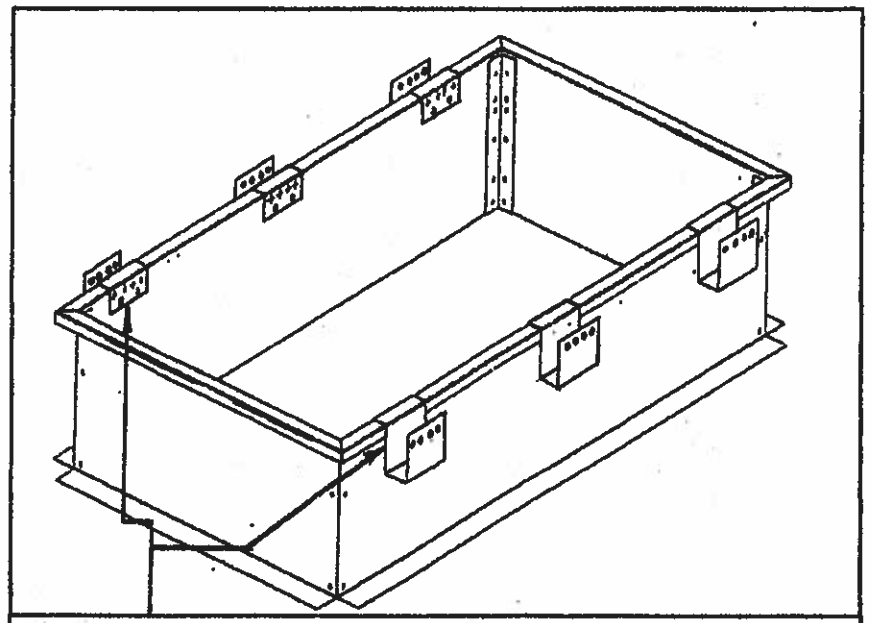
Models: 48/50TC size 08 (min) through 14 (max), 50TCQ size 08 (min) through 12(max), 48/50HC size 07 (min) through 12 (max), 50HCQ size 07 (min) through 09 (max), and 48/50LC size 07

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 -09 (chassis 4a) 88-1/8" x 59-1/2" x 49-3/4" tall.

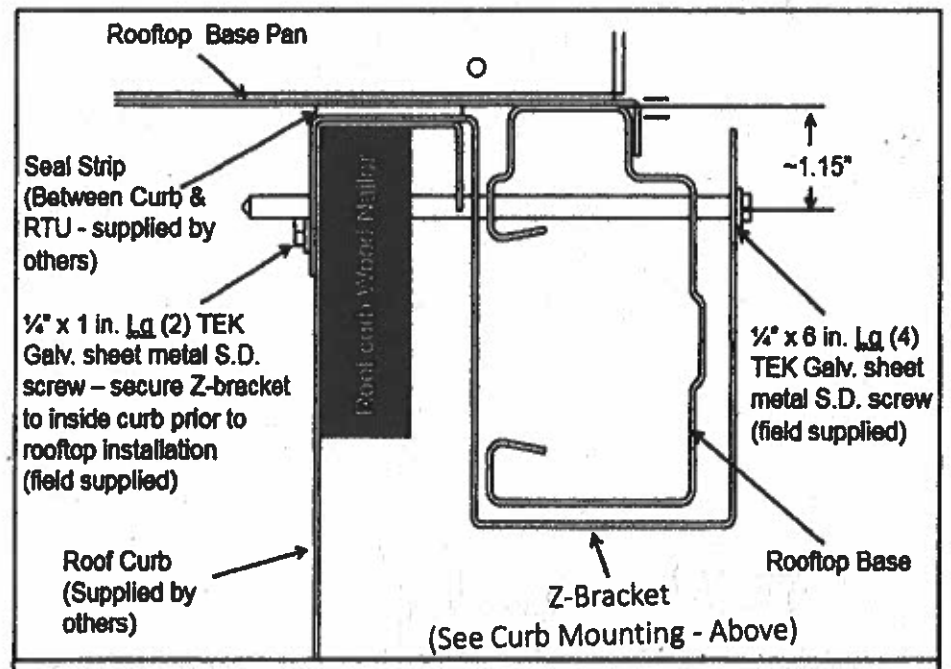
ALLOWABLE DESIGN PRESSURES FOR THE UNIT ITSELF:

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.

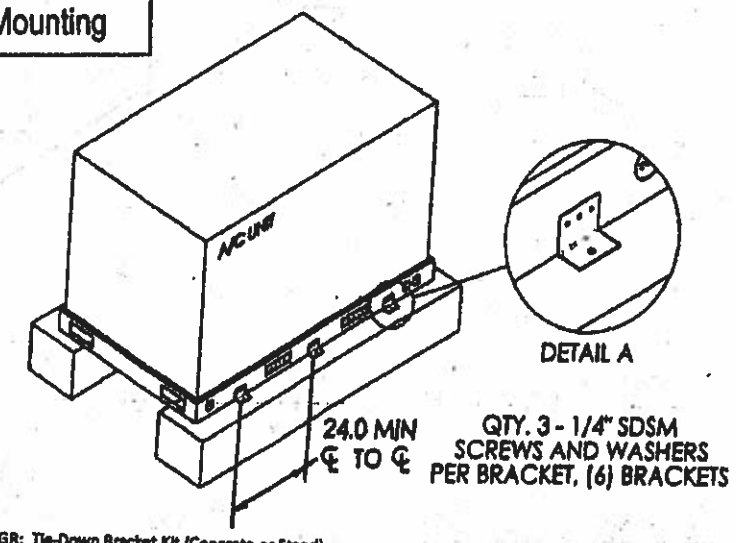


Z-Bracket Installed on Roof Curb prior to installation of seal strip & RTU



Z-Bracket Wind Load Fastening to RTU to Roof Curb

Optional Mounting



Part Number CBTDC-HGR: 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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Job No.: Carrier Rooftop Units
Title: Model List and Details
Job No. Chassis 3 & 4
Date: 12/18/20
Created by: J. Buerosse
S1

Rational Analysis: Worst case is -09 (Chassis 4a) 88-1/8" x 59-1/2" x 49-3/8"

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 psf
Design Uplift Pressure = $U_L(0.6)$ = 95.4 psf

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 components acting on the windward and leeward surfaces, respectively.

L/B = 59.5/88.125 = 0.68 for wind on long (88-1/8") side
L/B = 88.125/59.5 = 1.48 for wind on short (59-1/2") 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, 20, and 18 ga. panels and columns are fastened together and to 16 ga. base rails using #10 serrated washer head self tapping 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 18 ga. = 450 lbs (ultimate)
Shear Strength in 16 ga. = 927 lbs (ultimate)
Pullout Strength in 20 ga. = 351 lbs (ultimate)
Pullover Strength of 20 ga. = 993 lbs (ultimate)
Shear Strength in 20 ga. = 684 lbs (ultimate)

For Top Panel (50HJ501228):
87.32" x 57.68" draw formed 20 ga. panel anchored at edges and through top to 18 ga. center panel and 20 ga. control box. Worst case portion is over air handler section since condenser section has two large holes in the top causing internal and external pressure to be equal. For portion tributary to air handling section:

A = 42.86(57.68)/12(12) = 17.17 ft²
Load = 17.17 (95.41) = 1638.0 lbs

For outside edge (8 screws, all in shear through 20 ga. top panel into 22 ga. indoor panel and corner posts), Screw Load = 1638.0/2(8) = 102.4 lbs

Safety Factor = 684/102.4 = 6.7 OK for Components and Cladding

For inside edge (5 screws in tension through 20 ga. top panel into 18 ga. center panel and 4 screws in shear through top panel into 22 ga. center posts),

Screw Load = 1638.0/2(9) = 91.0 lbs
Safety Factor = 684/91.0 = 7.5 OK for Components and Cladding

For Inside Panel (50DK500689):
57.56" x 45.49" draw formed 22 ga. panel anchored at edges with 6 screws through top panel into face at top, 5 screws each vertical edge through flange perpendicular to face, and 6 screws at one inch above bottom edge through panel into base rail, and 4 screws between supply and return openings into stiffener (50DK502637) fastened to condensing coil.

A = 57.56(45.49)/ 12(12) = 18.18 ft²
Load = 18.18(106.17) = 1930.5 lbs
Screw Load = 1930.5/2(5+6) = 87.75 lbs
Safety Factor = 450/87.75 = 5.1 OK for Components and Cladding

For Access Panel (48TM500388):
45.33" x 42.95" draw formed 22 ga. panel anchored with 2 screws through face each vertical side, 3 screws through face at bottom edge into 16 ga. base rail, and top edge fits inside top panel (trapped).

A = 45.33(42.95)/12(12) = 13.52 ft²
Load = 13.52(106.17) = 1435.4 lbs
Screw Load = 1435.4/2(2 + 3) = 143.54 lbs
Safety Factor = 684/143.54 = 4.8 OK for Components and Cladding

For Filter Panel (50DK506970):
40.40" x 21.62" draw formed 20 ga. panel anchored with 3 screws through face at bottom edge and top edge fits inside top panel (trapped).

A = 40.40(21.62)/12(12) = 6.12 ft²
Load = 6.12(106.17) = 649.8 lbs
Screw Load = 649.8/2(3) = 108.32 lbs
Safety Factor = 684/108.32 = 6.3 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. 6 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. (min) panels and columns to 16 ga. base rails.

Lateral Wind Area = A_L = 87.32(45.63)/12(12) = 27.67 ft²
Lateral Design Load = 27.67(197.18) = 5455 lbs
Overturning Moment = 5455(45.63)/2 = 124443 in-lb

Uplift Wind Area = A_U = 87.32(57.68)/12(12) = 34.98 ft²
Uplift Design Load = 34.98(95.41) = 3337 lbs
Uplift Moment = 3337(57.68)/2 = 96242 in-lb

Screw Load = (124443 + 96242)/12(57.68) = 318.8 lbs (shear)
Safety Factor = 927/318.8 = 2.9 OK for Components and Cladding

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 = 88.125(49.375)/12(12) = 30.22 ft²
Lateral Design Load = 30.22(197.18) = 5958 lbs
Overturning Moment = 5958(49.375)/2 = 147090 in-lb
Uplift Wind Area = A_U = 88.125(59.5)/12(12) = 36.41 ft²
Uplift Design Load = 36.41(95.41) – 0.6(845) = 2697 lbs
Uplift Moment = 2697(59.5)/2 = 88272 in-lb

For connection of 16 ga. (min) straps, clips, or brackets spaced 30" min apart to unit base rails on long sides using 1/4" (#14) self-drilling screws:

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 = (147090 + 88272)/3(3)(59.5) = 439.5 lbs (shear) at base rail outer surface
Safety Factor = 1389/439.5 = 3.2 OK for Components and Cladding

For Z-Brackets similar to Micrometl design but modified to eliminate hidden structural fasteners anchored to 18 ga. (min) curb (by others):

Shear Strength in 18 ga. = 1218 lbs (ultimate)
Screw Load = (147090 + 88272)/3(4)(49.75) = 394.2 lbs (shear) at curb inside surface
Safety Factor = 1218/394.2 = 3.1 OK for Components and Cladding

For Brackets 3.25-4.13" wide x 2" x 2-1/2" , 16 ga. (min), spaced 32" (min) on center each long side, Using (3) screws per bracket, (3) brackets each side:

Anchor Load = (147090 + 88272)/63(60.25) = 1302.2 lbs (tension)
Anchor Load = 5958/6 = 993.0 lbs (shear) at 3/4" beyond base rail outer surface

For 3/8" SAE Gr. 5 bolts with nuts and washers to steel (by others),
Safety Factor = 3720/1302.2 = 2.9 (tension) OK
Safety Factor = 1937/993.0 = 2.0 (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 = 3000/1302.2 = 2.3 (tension) OK
Safety Factor = 3100/993.0 = 3.1 (shear) OK

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