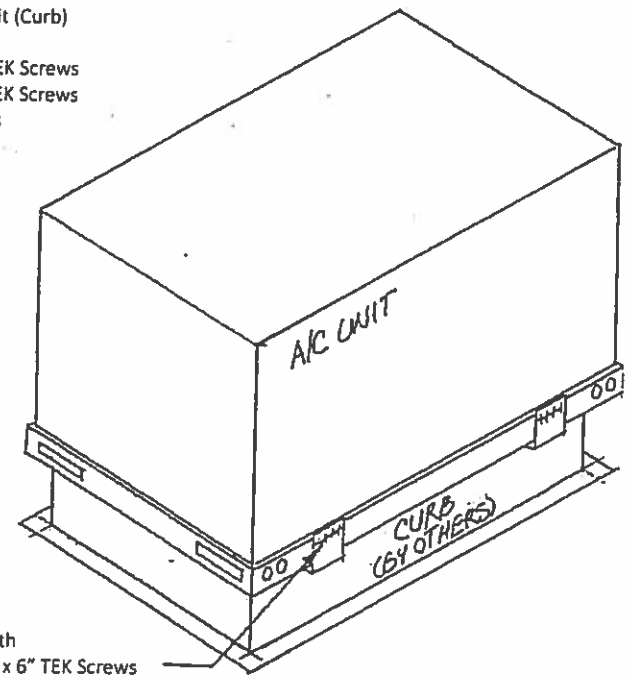
Curb Mounting

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



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

CARRIER Chassis 1 & 2:

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

Each package unit air conditioner listed above conforms to the Florida Building Code 6th Edition (2017) requirements for installation including High Velocity Hurricane Zone (HVHZ), Risk Category III/IV (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 = 197.18 lb/ft²
Design Uplift Pressure = 95.41 lb/ft²

Unit itself will withstand wind loads imposed by 197.18 PSF lateral and 95.41 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.

MAR 26 2019

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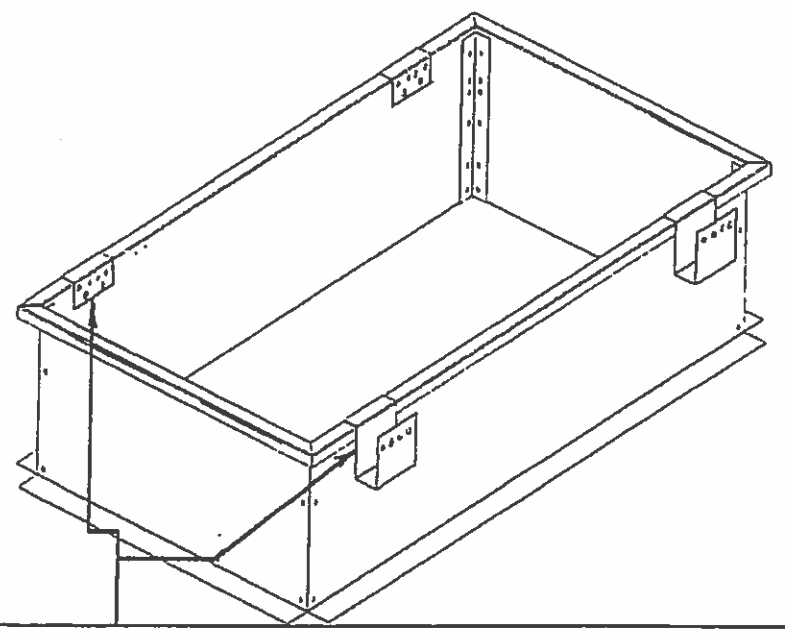
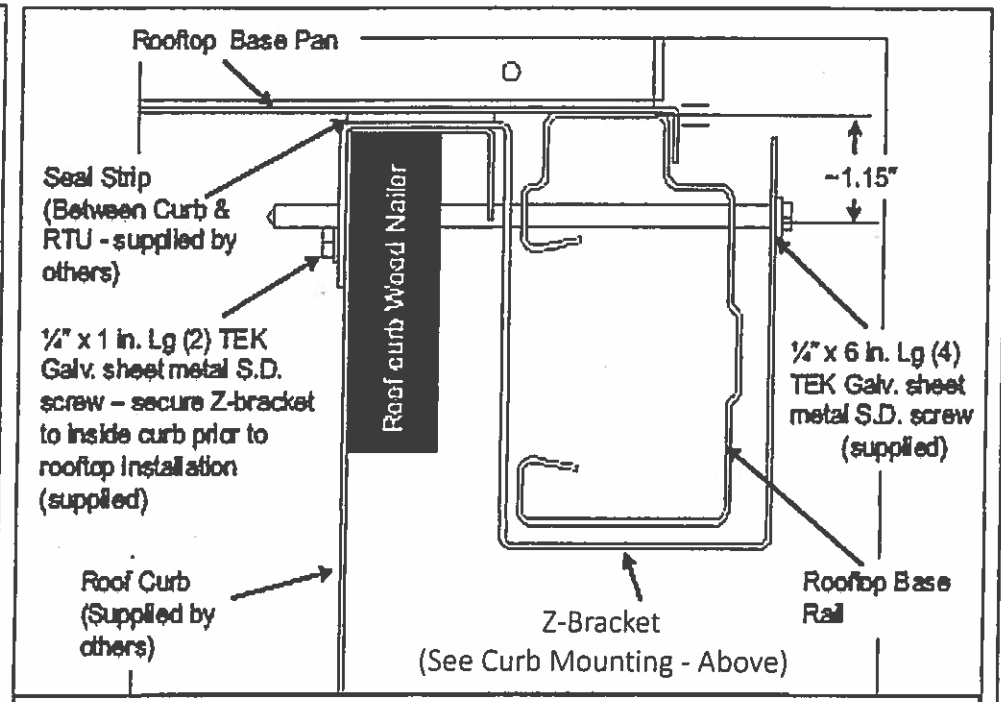
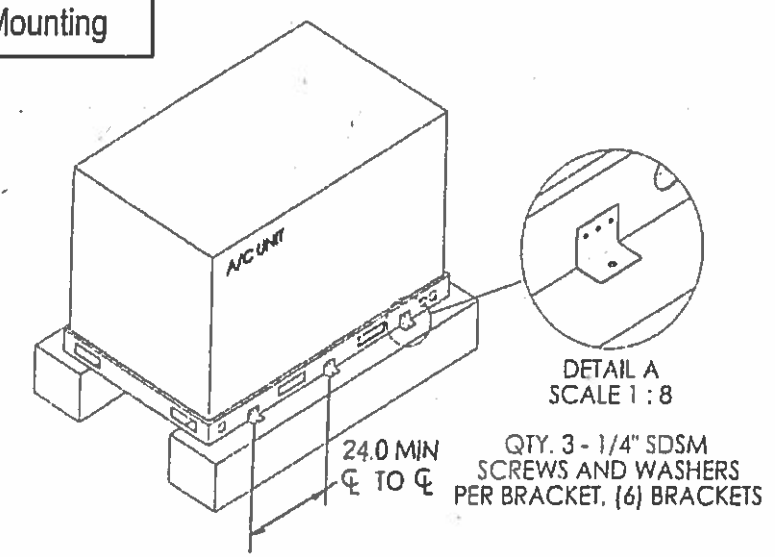


Z-Bracket Installed on Roof Curb prior to installation of seal strip & RTU



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

Job No. Chase 1 & 2
Job No.: Carrier Rooftop Units
Date:
Title Model List and Details
Created by: J. Buerosse
S1

Rational Analysis: Worst case is -07 (Chassis 2) 74-3/8" x 46-3/4" x 41-3/8" tall

Design Pressures complying to FBC Building 1620.6 (HVHZ):
V = 186 mph (Risk Cat. III/IV), For Exp.Cat. "D" and Z = 65 ft, Kz = 1.33, Kzt = 1.0, Kd = 0.90
qz = .00256KzKztKdV2 = 106.01 lb/ft2
Using 1620.6,
Lateral Wind Pressure = WL = qz(3.1) = 328.64 lb/ft2
Uplift Wind Pressure = UL = qz(1.5) = 159.02 lb/ft2
Factoring in the required Load Combination factor (0.6):

Design Lateral Pressure = WL(0.6) = 197.18 lb/ft2
Design Uplift Pressure = UL(0.6) = 95.41 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 ASCE7-10, Chapter 27, Figure 27.4-1 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 Sheet 5

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 sqft
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 sqft
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 sqft
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 = AL = 73.6(37.53)/12(12) = 19.18 sqft
Lateral Design Load = 19.18(197.18) = 3782 lbs
Overturning Moment = 3782(37.53)/2 = 70975 in-lb

Uplift Wind Area = AU = 73.6(45)/12(12) = 23.0 sqft
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 197.18 psf lateral and 95.41 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 = AL = 74.375(41.375)/12(12) = 21.37 sqft
Lateral Design Load = 21.37(197.18) = 4214 lbs
Overturning Moment = 4214(41.375)/2 = 87,172 in-lb
Uplift Wind Area = AU = 74.375(46.75)/12(12) = 24.15 sqft
Uplift Design Load = 24.15(95.41) – 0.6(607) = 1940 lbs
Uplift Moment = 1940(46.75)/2 = 45,348 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 = (87,172 + 45,348)/3(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 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 24.0" (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

MAR 26 2019

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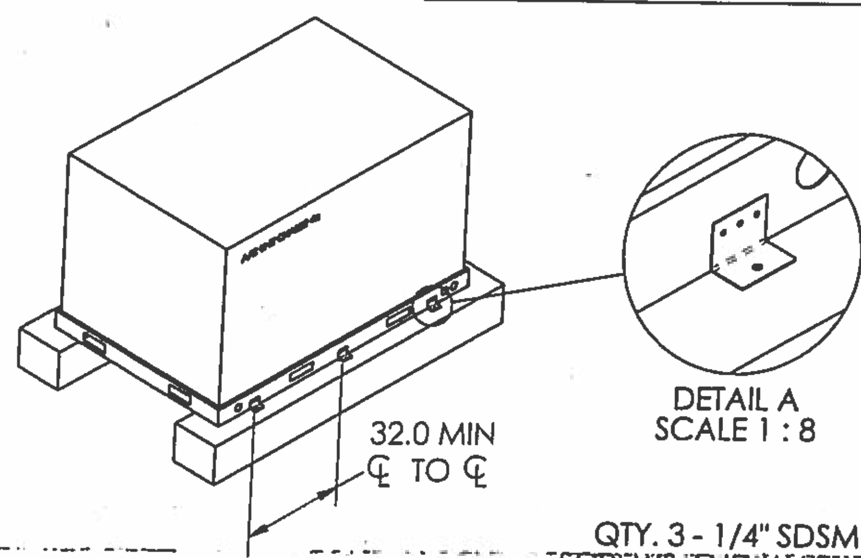
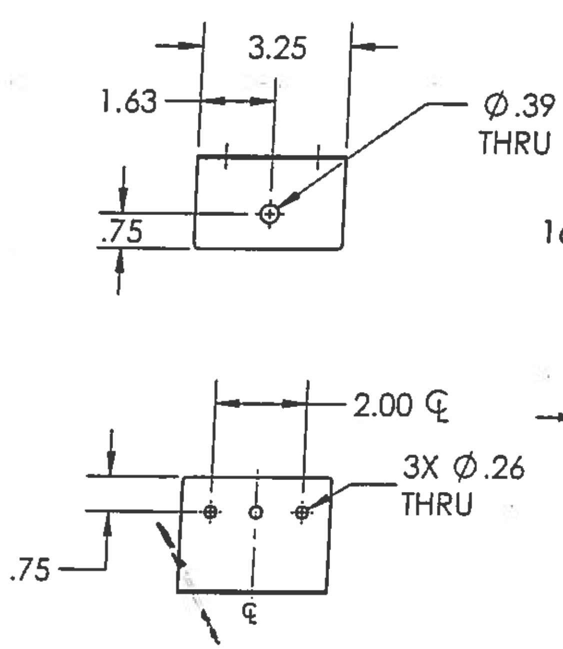
Job No.: Carrier Rooftop Units
Title: Model List and Details
Job No. Chase 1 & 2
Date:
Created by: J. Buerosse
S2

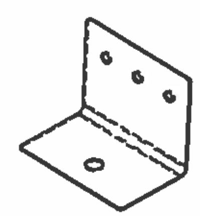
Optional Mounting



QTY. 3 - 1/4" SDSM SCREWS AND WASHERS PER BRACKET, (6) BRACKETS

QTY. 1 - 3/8" SAE GR5 BOLT, NUT AND WASHER PER BRACKET INTO PROPERLY DESIGNED METAL STAND (BY OTHERS)
OR
QTY. 1 - 3/8" POWERS WEDGE-BOLT+ ANCHOR PER BRACKET INTO MINIMUM 2000 PSI CONCRETE (BY OTHERS), AS FOLLOWS:
- 2-1/8" MIN EMBED
- 2-3/4" EDGE DISTANCE
- 2-1/2" MIN SPACING





GALVANIZED STEEL
16 GA., 90 DEG. BRACKET

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)
48/50LC - size 07

Each condenser unit listed above conforms to the Florida Building Code 6th Edition (2017) requirements for installation including High Velocity Hurricane Zone (HVHZ), Risk Category III/IV (V =186 MPH), exposure category "D", and installation height up to and including 65 feet above grade.

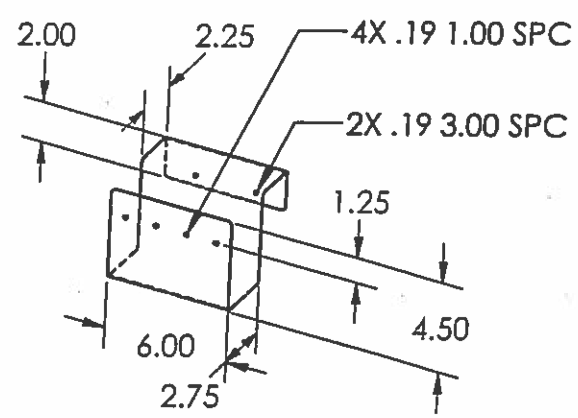
Worst Case is -09 (Chassis 4a) 88-1/8" x 59-1/2" x 49-3/4"

ALLOWABLE DESIGN PRESSURES FOR THE UNIT ITSELF:

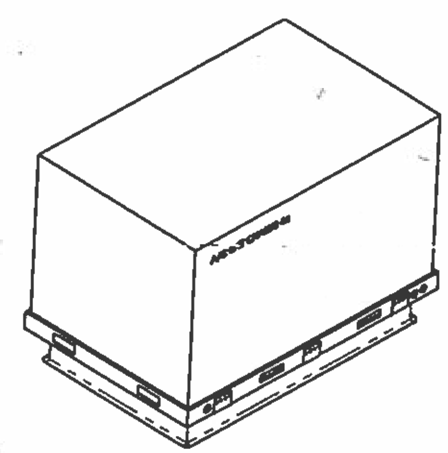
Design Lateral Pressure = 197.2 psf
Design Uplift Pressure = 95.4 psf

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

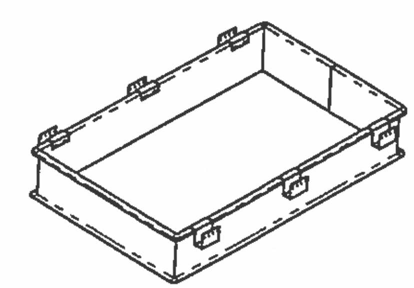
Curb Mounting

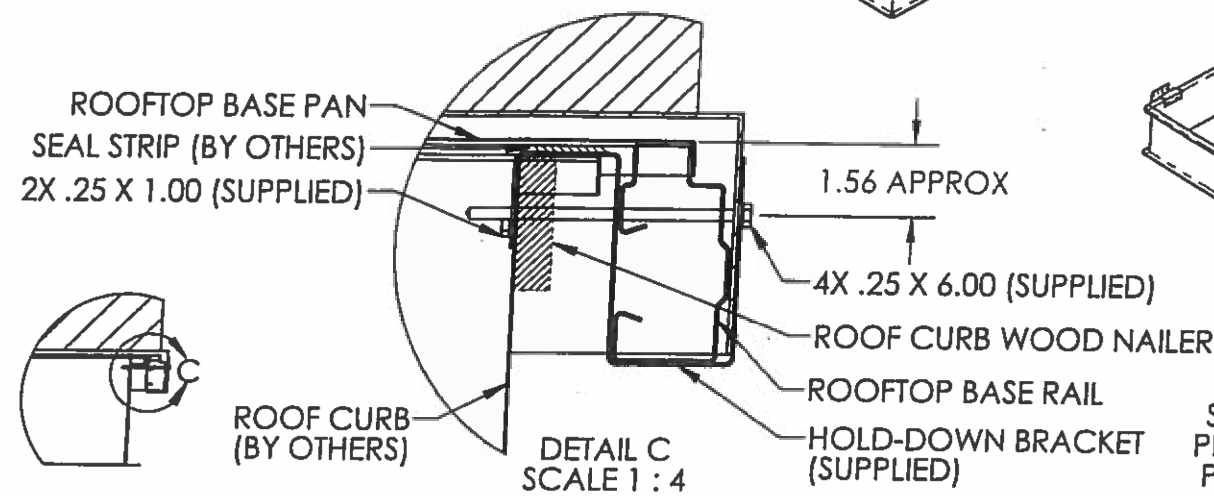


GALVANIZED STEEL, 16 GA.



QTY. 4 - TEK .25-6.00 GALVANIZED SHEETMETAL S.D. SCREWS AND WASHERS PER Z-BRACKET, (6) BRACKETS





DETAIL C
SCALE 1 : 4

QTY. 2 - TEK .25-1.00 GALVANIZED SHEETMETAL S.D. SCREWS AND WASHERS PER Z-BRACKET, (6) BRACKETS PRIOR TO SEAL STRIP INSTALL

APR 26 2018
John B. Sberosse (?)
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Pompano Beach, FL 33064
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Job No: Carrier RTUs	Title: Model List and Details
Job No: Chassis 3 & 4	Date: 2-11-16
Created by: CORE	

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/IV), For Exp.Cat. "D" and Z = 65 ft, Kz = 1.33, Kzt = 1.0, Kd = 0.90
Qz = .00256KzKztKdV2 = 106.0 psf
Lateral Wind Pressure = WL = qz(3.1) = 328.64 lb/ft2
Uplift Wind Pressure = UL = qz(1.5) = 159.02 lb/ft2
Factoring in the required Load Combination factor (0.6):

Design Lateral Pressure = WL(0.6) = 197.2 psf
Design Uplift Pressure = UL(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 ASCE7-10, Chapter 27, Figure 27.4-1 may be used to distribute the Design Lateral Pressure into positive and negative componenets acting on the windward and leeward surfaces, respectively.

L/B = 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) = 121.3 psf (Worst Case Positve)
Lateral Negative Design Pressure = 197.18 (0.5) / (0.8 + 0.5) = 75.8 psf
Sidewall Negative Design Pressure = 197.18 (0.7) / (0.8 + 0.5) = 106.2 psf (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) Pullout Strength in 20 ga. = 351 lbs (ultimate)
Pullover Strength of 22 ga. = 828 lbs (ultimate) Pullover Strength of 20 ga. = 993 lbs (ultimate)
Shear Strength in 22 ga. = 684 lbs (ultimate) Shear Strength in 20 ga. = 684 lbs (ultimate)
Pullout Strength in 18 ga. = 450 lbs (ultimate)
Shear Strength in 16 ga. = 927 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 sqft
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 sqft
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 sqft
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 = AL = 87.32(45.63)/12(12) = 27.67 sqft
Lateral Design Load = 27.67(197.18) = 5455 lbs
Overturning Moment = 5455(45.63)/2 = 124443 in-lb
Uplift Wind Area = AU = 87.32(57.68)/12(12) = 34.98 sqft
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 (shcar)
Safety Factor = 927/318.8 = 2.9 OK for Components and Cladding

Unit itself will withstand wind loads imposed by 197.18 psf lateral and 95.41 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 = AL = 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 = AU = 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 32" 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 (see sheet 4):
Screw Load = (147090 + 88272)/3(3)(59.5) = 439.5lbs (shear) at base rail outer surface
Safety Factor = 1389/439.5 = 3.2 OK

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" 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)/3(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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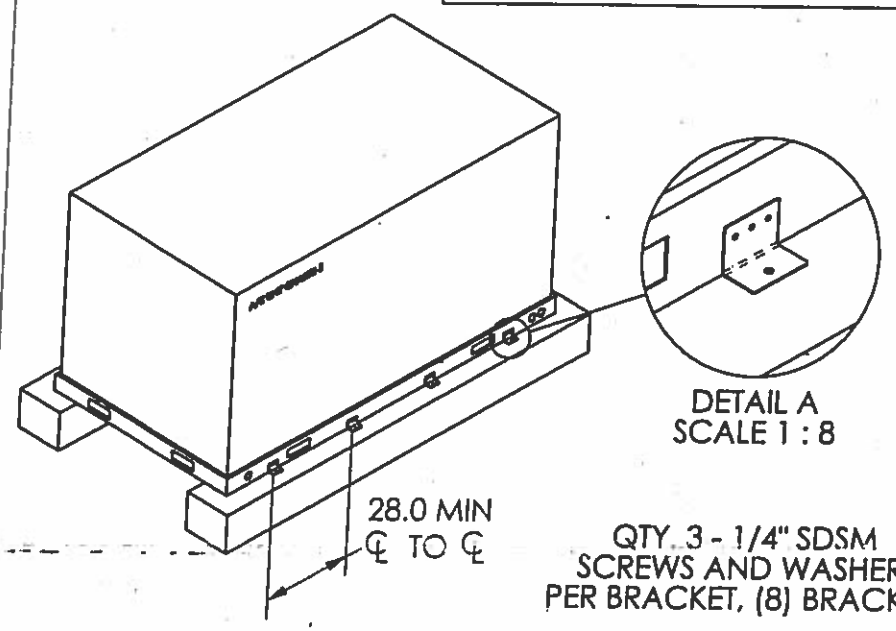
APR 26 2018

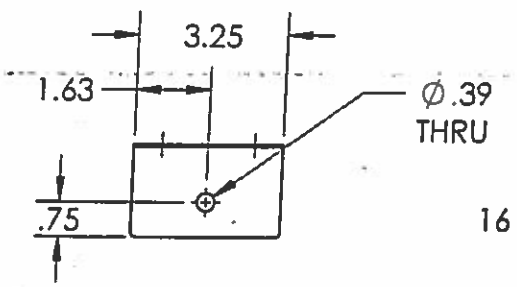
Job No: Chassis 3 & 4
Date: 1-08-16
Created by: CORE
Job No: Carrier RTUs
Title: Model List and Details

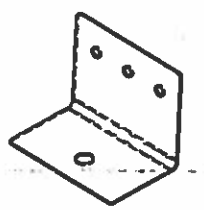
Optional Mounting



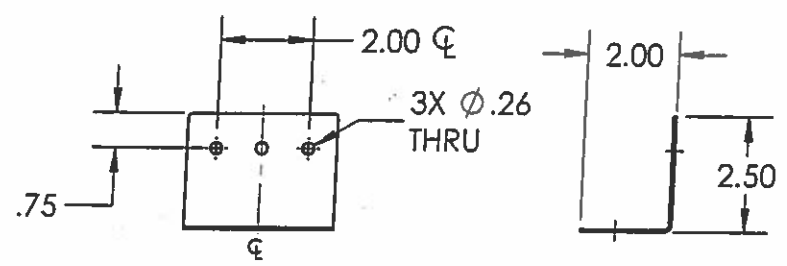
QTY. 3 - 1/4" SDSM SCREWS AND WASHERS PER BRACKET, (8) BRACKETS

QTY. 1 - 3/8" SAE GR5 BOLT, NUT AND WASHER PER BRACKET INTO PROPERLY DESIGNED METAL STAND (BY OTHERS)
OR
QTY. 1 - 3/8" POWERS WEDGE-BOLT+ ANCHOR PER BRACKET INTO MINIMUM 2000 PSI CONCRETE (BY OTHERS), AS FOLLOWS:
2-1/8" MIN EMBED
2-3/4" EDGE DISTANCE
2-1/2" MIN SPACING





GALVANIZED STEEL
16 GA., 90 DEG. BRACKET



CARRIER Chassis 5:
Models:
48/50TC - size 16, 50TCQ and 48/50HC - size 14,
50HCQ - size 12, 48/50LC - size 08(min) through 12 (max)

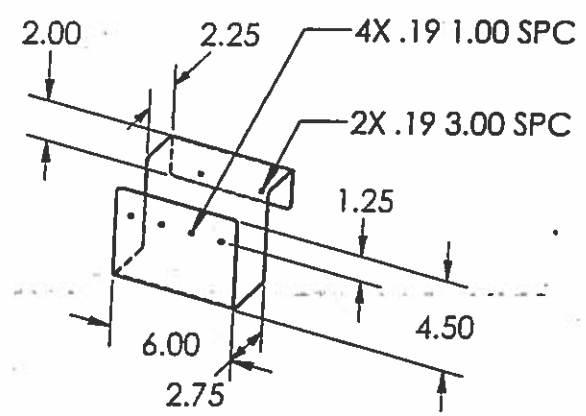
Each condenser unit listed above conforms to the Florida Building Code 6th Edition (2017) requirements for installation including High Velocity Hurricane Zone (HVHZ), Risk Category III/IV (V =186 MPH), exposure category "D", and installation height up to and including 65 feet above grade.

Worst Case is -16 (Chassis 5) 115-7/8" x 63-3/8" x 57-3/8"

ALLOWABLE DESIGN PRESSURES FOR THE UNIT ITSELF:

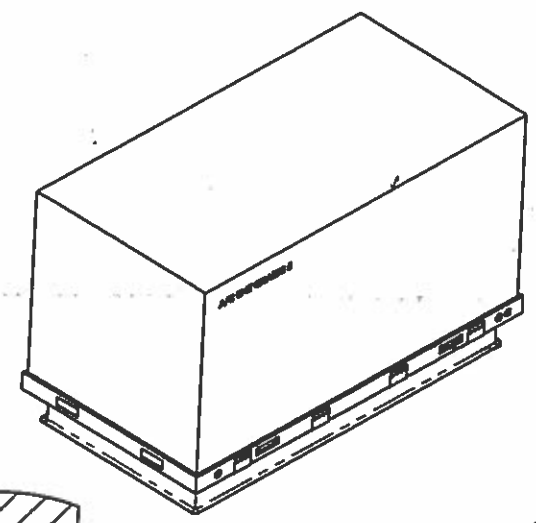
Design Lateral Pressure = 197.2 psf
Design Uplift Pressure = 95.4 psf

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

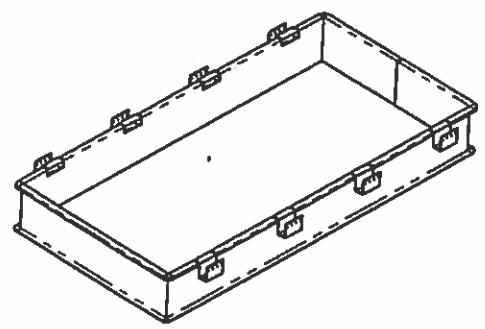


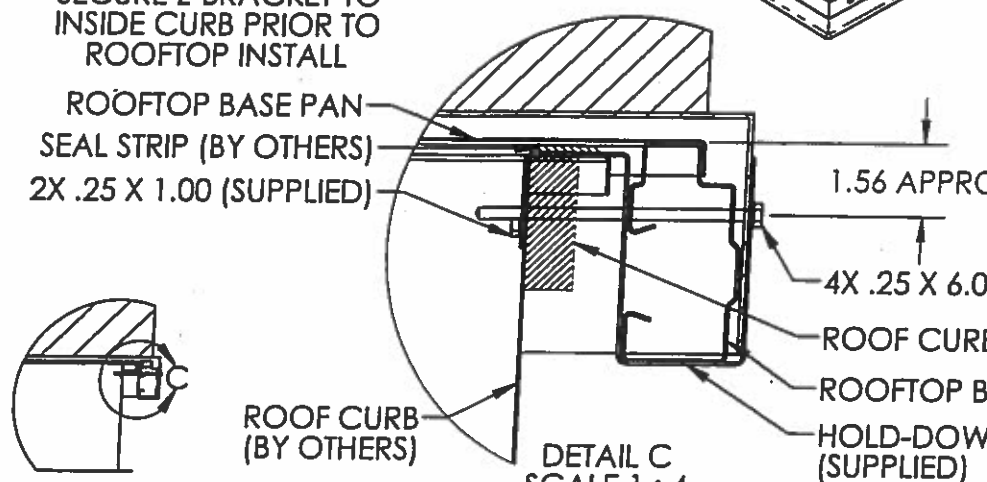
GALVANIZED STEEL, 16 GA.
SECURE Z-BRACKET TO INSIDE CURB PRIOR TO ROOFTOP INSTALL

Curb Mounting



QTY. 4 - TEK .25-6.00 GALVANIZED SHEETMETAL S.D. SCREWS AND WASHERS PER Z-BRACKET, (8) BRACKETS





DETAIL C
SCALE 1 : 4

QTY. 2 - TEK .25-1.00 GALVANIZED SHEETMETAL S.D. SCREWS AND WASHERS PER Z-BRACKET, (8) BRACKETS PRIOR TO SEAL STRIP INSTALL

APR 25 2018
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Job No: Carrier RTUs
Title: Model List and Details
Job No: Chassis 5
Date: 2-11-16
Created by: CORE

Rational Analysis: Worst case is - 16 (Chassis 5) 115-7/8" x 63-3/8" x 57-3/8"
Design Pressures complying to FBC Building 1620.6 (HVHZ):
V = 186 mph (Risk Cat. III/IV), For Exp.Cat. "D" and Z = 65 ft, Kz = 1.33, Kzt = 1.0, Kd = 0.90
Qz = .00256KzKztKdV2 = 106.0 psf
Lateral Wind Pressure = WL = Qz(3.1) = 328.64 psf
Uplift Wind Pressure = UL = Qz(1.5) = 159.02 psf
Factoring in the required Load Combination factor (0.6):

Design Lateral Pressure = WL(0.6) = 197.2 psf
Design Uplift Pressure = UL(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 ASCE7-10, Chapter 27, Figure 27.4-1 may be used to distribute the Design Lateral Pressure into positive and negative componenets acting on the windward and leeward surfaces, respectively.

L/B = 63.375/115.875 = 0.55 for wind on long (115-7/8") side
L/B = 115.875/63.375 = 1.83 for wind on short (63-3/8") 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) Pullout Strength in 20 ga. = 351 lbs (ultimate)
Pullover Strength of 22 ga. = 828 lbs (ultimate) Pullover Strength of 20 ga. = 993 lbs (ultimate)
Shear Strength in 22 ga. = 684 lbs (ultimate) Shear Strength in 20 ga. = 684 lbs (ultimate)
Pullout Strength in 18 ga. = 450 lbs (ultimate)
Shear Strength in 16 ga. = 927 lbs (ultimate)

For Top Panel Assembly (50TM500066 and 50TM500065 joined using 50TM500359 and 12 screws):
114.4" x 61.6" draw formed 20 ga. assembly, anchored at edges and through top, to 16 ga. center panel and 18 ga. control box. Worst case portion is over air handler section since condenser section has (3) large holes in the top causing internal and external pressure to be equal. For portion tributary to air handling section:
A = 61.61(55.41)/12(12) = 23.70 sqft
Load = 23.70 (95.41) = 2261.9 lbs
For outside edge (9 screws, all in shear through 20 ga. top panel into 22 ga. indoor panel and corner posts):
Screw Load = 2261.9/2(9) = 125.7 lbs
Safety Factor = 684/125.7 = 5.4 OK
For inside edge (8 screws in tension through 20 ga. top panel into 16 ga. center panel and 4 screws in shear through top panel into 22 ga. center posts):
Screw Load = 2261.9/2(12) = 94.2 lbs
Safety Factor = 684/94.2 = 7.3 OK for Components and Cladding

For Inside Panel (50TM500063):
61.5" x 53.42" draw formed 22 ga. panel anchored at edges with 7 screws through top panel into face at top, 6 screws each vertical edge through flange perpendicular to face, and 6 screws at 7/16 inch above bottom edge through panel into base rail, and 5 screws between supply and return openings into stiffener (50TM500058) fastened to condensing coil.
A = 61.5(53.42)/12(12) = 22.81 sqft
Load = 22.81(106.17) = 2422.2 lbs
Screw Load = 2422.2/2(6+6) = 100.93 lbs
Safety Factor = 450/100.93 = 4.5 OK for Components and Cladding

For Access Panels (50TM500062):
53.30" x 25.61" draw formed 22 ga. panel anchored with 3 screws through face each vertical side, 2 screws through face at bottom edge into 16 ga. base rail, and top edge fits inside top panel (trapped).
A = 53.30(25.61)/12(12) = 9.48 sqft
Load = 9.48(106.17) = 1006.4 lbs
Screw Load = 1006.4/2(2 + 3) = 100.64 lbs
Safety Factor = 306/100.64 = 3.0 OK for Components and Cladding

For Access Panel Assembly(50TM500086 and 50TM500061):
53.0" x 53.30" assembly of draw formed 20 ga. panels anchored with (3) screws through face each vertical side, (5) screws through face at bottom edge intp 16 ga. base rail, and top edge fits inside top panel (trapped).

A = 53.0(53.30)/12(12) = 19.62 sqft
Load = 19.62(106.17) = 2082.8 lbs
Screw Load = 2082.8/2(5+3) = 130.17 lbs
Safety Factor = 306/130.17 = 2.4 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:
16 screws each long side fasten frame posts and 22 ga. (min) panels to the long 16 ga. 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.

Lateral Wind Area = AL = 114.35(53.625)/12(12) = 42.58 sqft
Lateral Design Load = 42.58(197.18) = 8296.6 lbs
Overturning Moment = 8396.6(53.625)/2 = 225134 in-lb

Uplift Wind Area = AU = 114.35(61.61)/12(12) = 48.92 sqft
Uplift Design Load = 48.92(95.41) = 4667.9 lbs
Uplift Moment = 4667.9(61.61)/2 = 143794 in-lb

Screw Load = (225134 + 143794)/16(61.61) = 374.3 lbs (shear)
Safety Factor = 927/374.3 = 2.5 OK for Components and Cladding

Unit itself will withstand wind loads imposed by 197.18 psf lateral and 95.41 psf uplift design pressures provided the 16 ga. 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 = AL = 115.875(57.375)/12(12) = 46.17 sqft
Lateral Design Load = 346.17(197.18) = 9103.6 lbs
Overturning Moment = 9103.6(57.375)/2 = 261159 in-lb
Uplift Wind Area = AU = 115.875(63.375)/12(12) = 51.00 sqft
Uplift Design Load = 51.00(95.41) – 0.6(1305) = 4082.6 lbs
Uplift Moment = 4082.6(63.375)/2 = 129369 in-lb

For connection of 16 ga. (min) straps, clips, or brackets spaced 28" 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 (4) straps, clips, or brackets each long side:
Screw Load = (261159 + 129369)/3(4)(63.375) = 513.5 lbs (shear) at base rail outer surface
Safety Factor = 1389/513.5 = 2.7 OK for Components and Cladding

For (4) Z-Brackets each long side 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 = (261159 + 129369)/3(4)(53.81) = 604.8 lbs (shear) at curb inside surface
Safety Factor = 1218/604.8 = 2.0 OK for Components and Cladding

For quantity (4) angle clips 3.25" wide x 2" x 2-1/2", 16 ga. (min), spaced 28" (min) on-center each long side:
Anchor Load = (261159 + 129369)/4(64.125) = 1522.6 lbs (tension)
Anchor Load = 9103.6/8 = 1138.0 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 = 3720/1522.6 = 2.4 (tension) OK
Safety Factor = 1937/1138.0 = 1.7 (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 = 3000/1522.6 = 2.0 (tension) OK
Safety Factor = 3100/1138.0 = 2.7 (shear) OK

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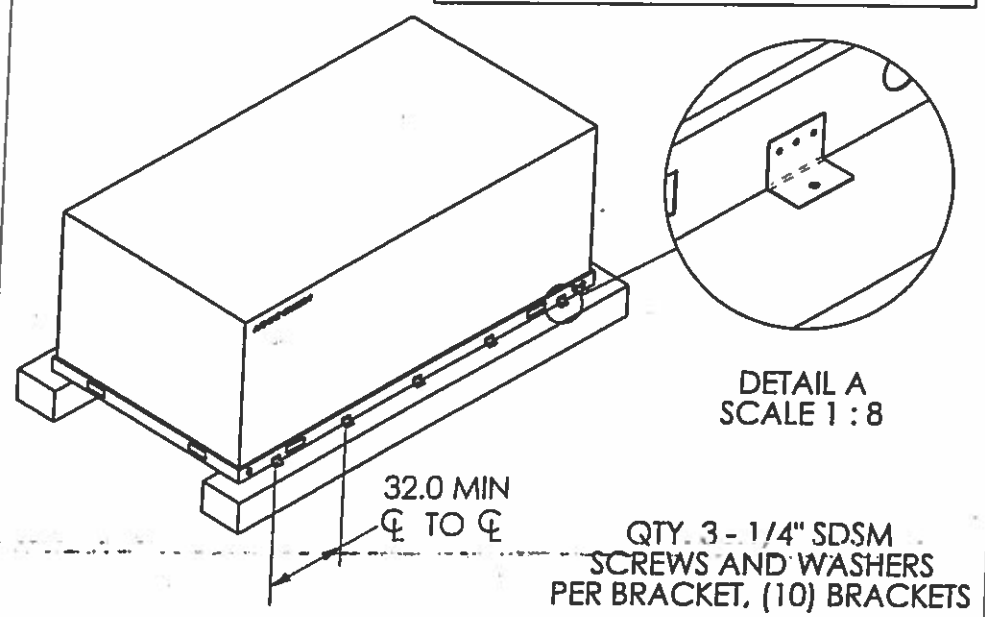
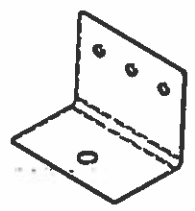
Job No: Carrier RTUs
Title: Model List and Details
Job No: Chassis 5
Date: 1-08-16
Created by: CORE

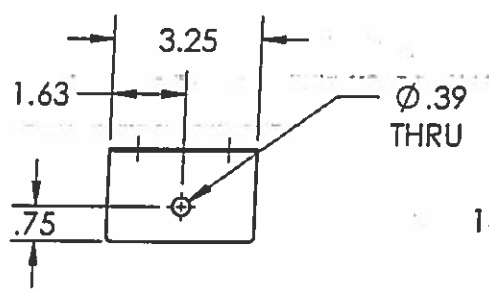
Optional Mounting

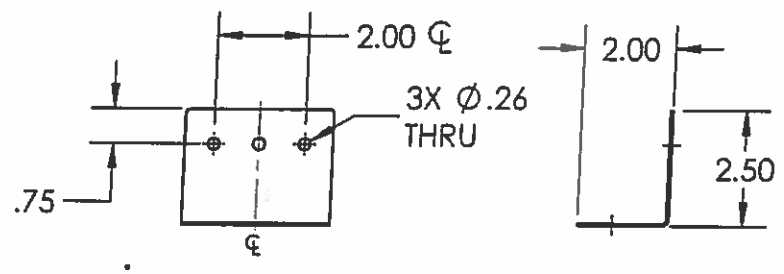


QTY. 1 - 3/8" SAE GR5 BOLT, NUT AND WASHER PER BRACKET INTO PROPERLY DESIGNED METAL STAND (BY OTHERS)
OR
QTY. 1 - 3/8" POWERS WEDGE-BOLT+ ANCHOR PER BRACKET INTO MINIMUM 2000 PSI CONCRETE (BY OTHERS), AS FOLLOWS:
- 2-1/8" MIN EMBED
- 2-3/4" EDGE DISTANCE
- 2-1/2" MIN SPACING



GALVANIZED STEEL
16 GA., 90 DEG. BRACKET





CARRIER Chassis 6, 7, 8 & 9:
Models:
48/50TC - size 17 (min) through size 30 (max), 50TCQ - size 17 (min) through size 24 (max)
48/50HC - size 17 (min) through size 28 (max)
45/50LC - size 14 (min) through size 26 (max)

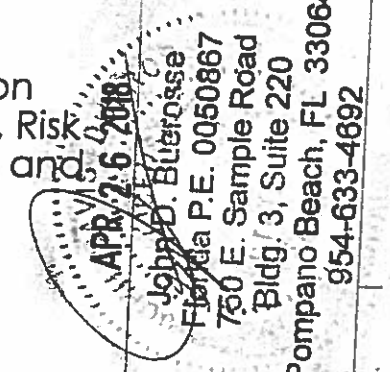
Each condenser unit listed above conforms to the Florida Building Code 6th Edition (2017) requirements for installation including High Velocity Hurricane Zone (HVHZ), Risk Category III/IV (V =186 MPH), exposure category "D", and installation height up to and including 65 feet above grade.

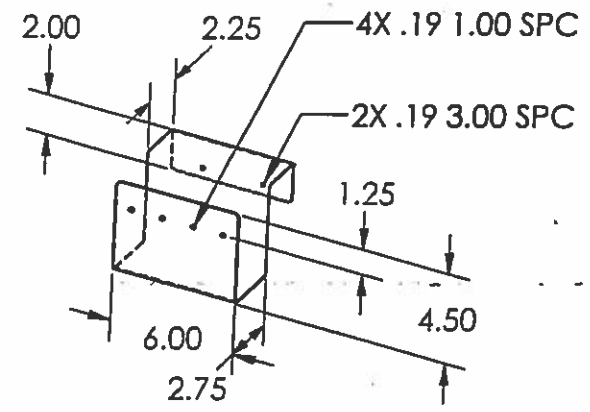
Worst Case is -26 (Chassis 9) 157-3/4" x 86-3/8" x 57-3/8"

ALLOWABLE DESIGN PRESSURES FOR THE UNIT ITSELF:

Design Lateral Pressure = 197.2 psf
Design Uplift Pressure = 95.4 psf

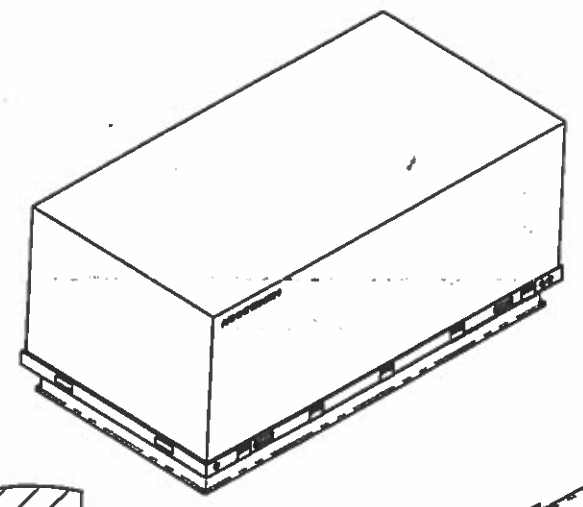
Unit itself will withstand wind loads imposed by 197.2 psf lateral and 95.4 psf uplift design pressures, provided the 16 GA. galvanized base rails are fastened to a properly designed concrete slab, metal stand, curb, curb adapter, or other suitable mounting arrangement and all factory supplied assembly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



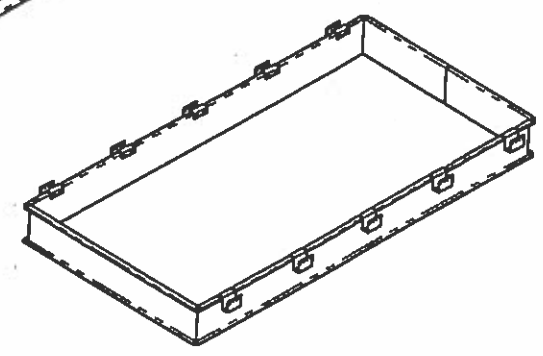


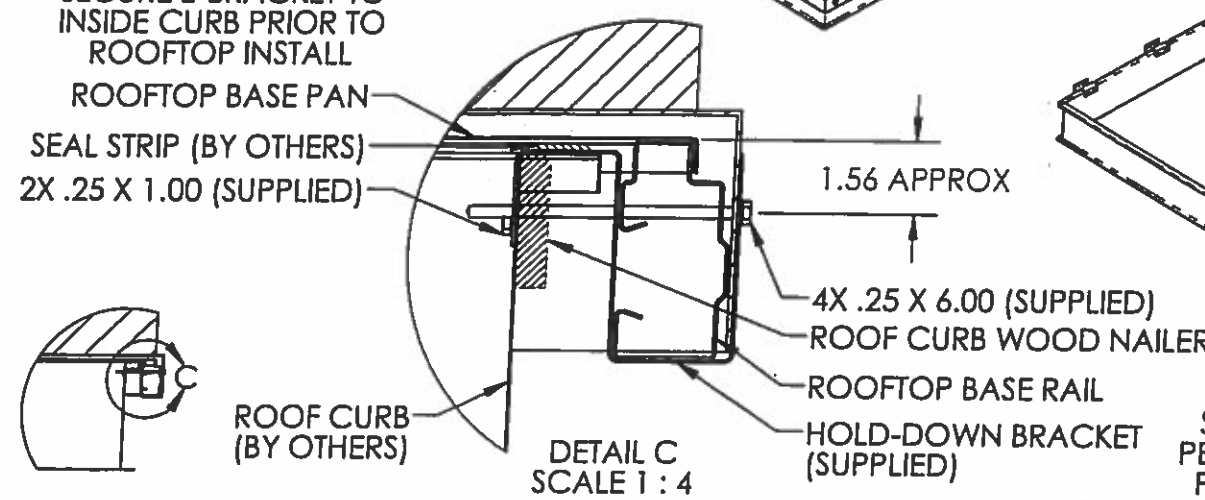
GALVANIZED STEEL, 16 GA.
SECURE Z-BRACKET TO INSIDE CURB PRIOR TO ROOFTOP INSTALL

Curb Mounting



QTY. 4 - TEK .25-6.00 GALVANIZED SHEETMETAL S.D. SCREWS AND WASHERS PER Z-BRACKET, (10) BRACKETS





DETAIL C
SCALE 1 : 4

QTY. 2 - TEK .25-1.00 GALVANIZED SHEETMETAL S.D. SCREWS AND WASHERS PER Z-BRACKET, (10) BRACKETS PRIOR TO SEAL STRIP INSTALL

Job No: Carrier RTUs
Title: Model List and Details
Job No: Chassis 6, 7, 8 & 9
Date: 2-11-16
Created by: CORE

Rational Analysis: Worst case is - 24 (Chassis 9) 157-3/4" x 86-3/8" x 57-3/8"
Design Pressures complying to FBC Building 1620.6 (HVHZ):
V = 186 mph (Risk Cat. III/IV), For Exp.Cat. "D" and Z = 65 ft, Kz = 1.33, Kzt = 1.0, Kd = 0.90
Qz = .00256KzKztKdV2 = 106.0 psf
Using 1620.6,
Lateral Wind Pressure = WL = qz(3.1) = 328.6 psf
Uplift Wind Pressure = UL = qz(1.5) = 159.0 psf
Factoring in the required Load Combination factor (0.6):

Design Lateral Pressure = WL(0.6) = 197.2 psf
Design Uplift Pressure = UL(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 ASCE7-10, Chapter 27, Figure 27.4-1 may be used to distribute the Design Lateral Pressure into positive and negative componenets acting on the windward and leeward surfaces, respectively.

L/B = 86.375/157.75 = 0.55 for wind on long (157-3/4") side
L/B = 157.75/86.375 = 1.83 for wind on short (86-3/8") 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) Pullout Strength in 20 ga. = 351 lbs (ultimate)
Pullover Strength of 22 ga. = 828 lbs (ultimate) Pullover Strength of 20 ga. = 993 lbs (ultimate)
Shear Strength in 22 ga. = 684 lbs (ultimate) Shear Strength in 20 ga. = 684 lbs (ultimate)
Pullout Strength in 18 ga. = 450 lbs (ultimate)
Shear Strength in 16 ga. = 927 lbs (ultimate)

For Top Panel Assembly (50HE500275 and 50HE500276 joined using 6 screws):
85.0" x 82.5" draw formed 20 ga. assembly anchored at edges and through top to 16 ga. center panel, 18 ga, end panel assembly, 20 ga. side panels, and 18 ga. control box. This portion is over air handler section and is worst case since condenser section has three large holes in the top causing internal and external pressure to be equal.

A = 85.0(82.5)/12(12) = 48.70 sqft
Load = 48.70 (95.41) = 4646.3 lbs
For 8 (min) screws each 85.0" side into 18 ga. (min) panels and 12 screws each 82.5" side into 20 ga. (min) side panels:
Screw Load = 4646.3/2(8 + 12) = 116.2 lbs
Safety Factor = 684/116.2 = 5.9 OK for Components and Cladding

For End Panel Assembly (50HE500719 and 50HE500762 joined together using 7 screws):
73.0" x 53.5" draw formed 18 ga. panel anchored at edges with 5 screws through top panel into face at top, 5 screws each vertical edge face into 22 ga. (min) corner posts, and 5 screws at 3/8" inch above bottom edge through panel into base rail.

A = 73.0(53.5)/12(12) = 27.12 sqft
Load = 27.12(106.17) = 2879.5 lbs
Screw Load = 2879.5/2(5+5) = 143.97 lbs
Safety Factor = 306/143.97 = 2.1 OK for Components and Cladding

For Access Panel (50HE500423):
53.30" x 25.61" draw formed 22 ga. panel anchored with 3 screws through face each vertical side, 2 screws through face at bottom edge into 16 ga. base rail, and top edge fits inside top panel (trapped).

A = 53.5(26.4)/12(12) = 9.81 sqft
Load = 9.81(106.17) = 1041.4 lbs
Screw Load = 1041.4/2(3 + 3) = 86.78 lbs
Safety Factor = 306/86.78 = 3.5 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 posts and 20 ga. (min) panels to the long 16 ga. base rails. 8 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.

Lateral Wind Area = AL = 156.0(53.625)/12(12) = 58.09 sqft
Lateral Design Load = 58.09(197.18) = 11454.9 lbs
Overturning Moment = 11454.9(53.625)/2 = 307135 in-lb

Uplift Wind Area = AU = 156.0(85.0)/12(12) = 92.08 sqft
Uplift Design Load = 92.08(95.41) = 8785.7 lbs
Uplift Moment = 8785.7(85.0)/2 = 373391 in-lb

Screw Load = (307135 + 373391)/(16 + 8)(85.0) = 333.6 lbs (shear)
Safety Factor = 927/333.6 = 2.8 OK for Components and Cladding

Unit itself will withstand wind loads imposed by 197.18 psf lateral and 95.41 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 = AL = 157.75(57.375)/12(12) = 62.85 sqft
Lateral Design Load = 62.85(197.18) = 12393.5 lbs
Overturning Moment = 12393.5(57.375)/2 = 355537 in-lb
Uplift Wind Area = AU = 157.75(86.375)/12(12) = 94.6 sqft
Uplift Design Load = 94.6(95.41) – 0.6(2248) = 7679.1 lbs
Uplift Moment = 7679.1(76.875)/2 = 295167 in-lb

For connection of 16 ga. (min) straps, clips, or brackets spaced 32" (min) apart to unit base rails 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 5 straps, clips, or brackets each long side:
Screw Load = (355537 + 295167)/3(5)(86.375) = 502.3 lbs (shear) at base rail outer surface
Safety Factor = 1389/502.3 = 2.8 OK for Components and Cladding

For (5) Z-Brackets each long side 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 = (355537 + 295167)/3(5)(76.875) = 564.3 lbs (shear) at curb inside surface
Safety Factor = 1218/564.3 = 2.2 OK for Components and Cladding

For quantity (5) angle clips 3.25" wide x 2" x 2-1/2", 16 ga. (min), spaced 32" (min), on-center each long side:

Anchor Load = (355537 + 295167)/5(87.125) = 1493.8 lbs (tension)
Anchor Load = 12393.5/10 = 1239.4 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 = 3720/1493.8 = 2.5 (tension) OK
Safety Factor = 1937/1239.4 = 1.6 (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 = 3000/1493.8 = 2.0 (tension) OK
Safety Factor = 3100/1239.4 = 2.5 (shear) OK

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Title: Model List and Details
Job No: Chassis 6, 7, 8 & 9
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