



CBKD Series AFF1860

Form No: CBKD - 78

Prepared For:

PROVENT

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Prepared By:

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Job No.: PRO1103
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For wood, concrete and steel attachments see Roof Anchorage Detail, Form No. CB-24A.

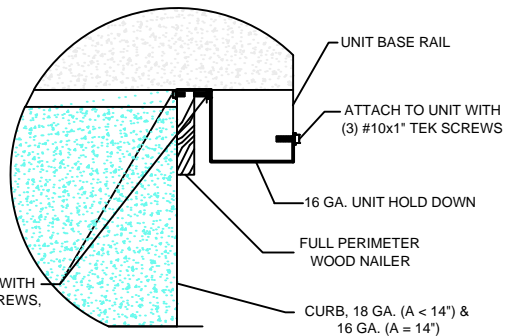
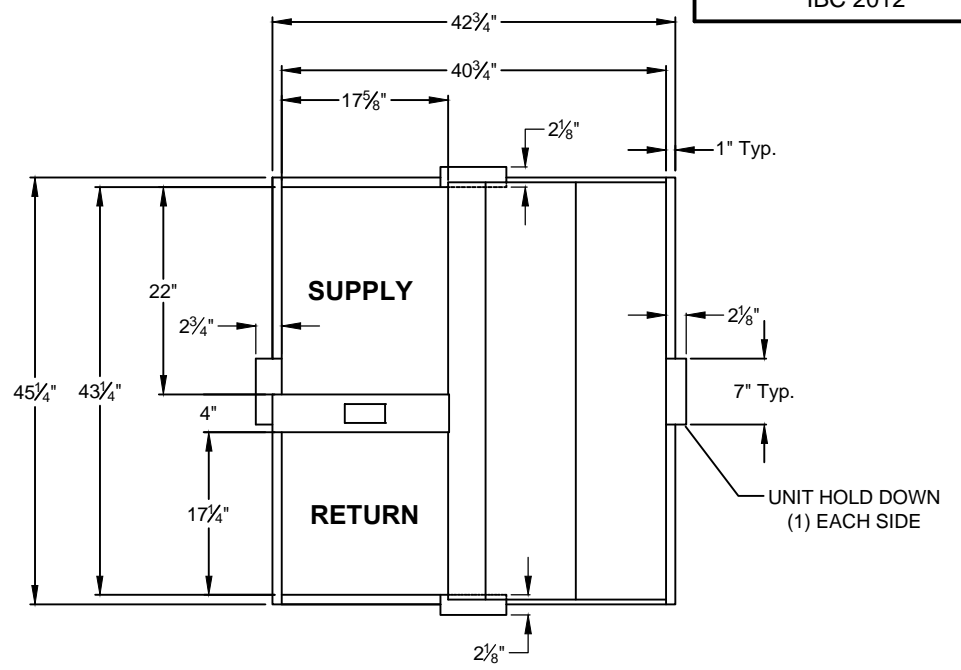
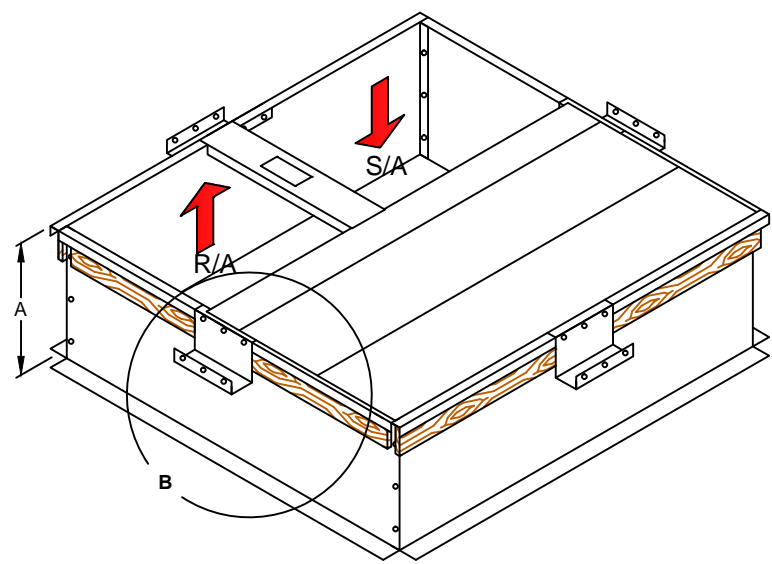
Will conform to seismic code requirements for knock-down or pre-assembled application. (Contact factory for assembled version.)

STRUCTURALLY CALCULATED KNOCK-DOWN ROOF CURBS FOR YORK UNITS

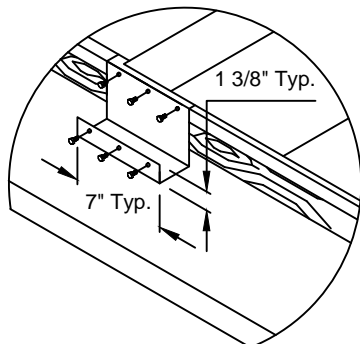
**DNQ/DNY/DNZ/DEQ/DEZ/BHQ/BHX/BHZ 024-060
DNX/DEX 024-060, DEY 060**

ProVent P/N	A	WEIGHT	SEISMIC KIT P/N	WEIGHT
CBKDAFF186008	8"	55 Lbs	KDKITAFF1860	5 Lbs
CBKDAFF186014	14"	82 Lbs		

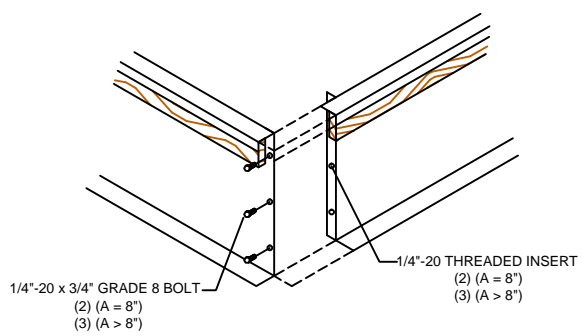
Meets seismic requirements for the following codes:
CBC 2013
IBC 2012



HOLD DOWN DETAIL



DETAIL B



CORNER DETAIL



3847 WABASH DR.
MIRA LOMA, CA 91725

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SUBMITTED TO: _____
COMPANY: _____
JOB NAME: _____
EQUIPMENT: _____
NOTES: _____

FORM NO:
CBKD-78

DATE:
7/23/14

REV:
1

PART NUMBER:
KDKITAFF1860

DRAWN BY:
JG

Curb Information

HVAC UNIT: Affinity Knock-Down Series Curb 8-14"

Curb Number:

Hcurb	14	(Height from support structure to top of curb)
Lcurb	43.25	(Length of Curb - In to In)
Wcurb	40.75	(Width of Curb - In to In)
Lclip	22.625	(min Length in Long dir from end to clip)
# clips Long Side	1	(Shear + Uplift Clips)
# clips short side	1	(Shear Clips)

Unit Information:

	845 lbs	(Max Weight)
Weight:	845 lbs	(Min Weight)
W c-max	401 lbs	(Maximum corner weight)
W c-min	110 lbs	(Minimum corner weight)
W mid	161 lbs	
H unit	41.50	(Height of unit above curb)
H cm	20.75	(Height from top of curb to center of mass of unit)
L unit	49.13	(Length of unit)
w unit	47.25	(Width of unit)

Seismic Loading

	CBC2012	(DESIGN ALSO OK FOR IBC 2009/CBC2010)
Ss	2.00	
Fa	1.00	(worst case for site; Ss>1.25, Site Class D)
Sms	2.00	(=Fa*Ss)
Sds	1.33	(=2/3*Sms)
Ip	1.5	(=Worst case)
ap	2.5	
Rp	6	
Fp max	1.0 Wp	(=0.4*ap*Sds*Wp*(1+2*z/h)/(Rp/Ip))
Fp ASD	611 lbs	(=0.7*Fpmax)

Wind Loading (Ultimate)

Code:	CBC2012	(DESIGN ALSO OK FOR IBC 2009/CBC2010 - 90MPH)
Wind Exposure:	C	
V	120 mph	(Ultimate Wind Speed)
Kzt	1	
Kd	0.9	
Kh	1.13	for 60 foot roof height
GCf	1.9	

Wind Loading: Lateral

qh	37 psf		(ASD=0.6W)
F	71 psf	(ultimate)	43 psf (service)
A net/transv.	14 sf		
Fwind transv	1008 lbs	(ultimate)	Fwind trnsv 605 lbs (service)
A net/long	14 sf		
Fwind long	970 lbs	(ultimate)	Fwind long 582 psf (service)

Controlling Lateral Load (Seismic vs. Wind)

Transverse	611 lbs (ASD)
Long	611 lbs (ASD)

Wind Loading: Uplift

qh	37.5 psf		
GCr	1.5		
Fv (psf)	56.2 psf	(ultimate)	
Av	16 sf		
Fv	906 lbs	(ultimate)	Fv = 544 lbs (ASD: 0.6W)

Curb Loading:

Transverse direction:

OTM:	1056 lb-ft	0.6W: F max - transv * Hcm
M res.	495 lb-ft	0.6D: 2 * Wcrnmin * 0.6 * (width curb + 4.25")
Net OTM:	561 lb-ft	0.6D+0.6W: OTM-RM
Max Comp	864 lbs /side	1.0D+0.6W: (2 x Wcrnmax + (Mot-Mres) / (width curb + 4.25"))
Max Tension	421 lbs /side	0.6D+0.6W: (Mot-Mres) / (width curb + 4.25") + Fv / (2 sides)
Max Tension	421 lbs /clip	0.6D+0.6W: Max tension / side / #clips
Max Corner:	449 lbs	W c-max + (Mot-Mres) / ((w / curb + 4.25") / Lcurb * (N-corner) / 2 / 12
Max Interior:	258 lbs	W mid + (Mot-Mres) / (width curb + 4.25") / Lcurb * (N-mid)

Longitudinal direction:

OTM:	1056 lb-ft	0.6W: F max long * Hcm
RM	525 lb-ft	0.6D: 2 X Wcrnmin x (Lcurb + 4.25in) / 12 x 0.6
Net OTM:	530 lb-ft	0.6D+0.6W: OTM-RM
Max Comp =	898 lbs /side	1.0D+0.6W: (2 * Wcmax + (NetOTM) / Lclip) + Fv / (U.C)
Max Tens =	553 lbs /side	0.6D+0.6W: (Mot-Mres) / Lclip + Fv / (2 sides)
Max Tension =	553 lbs /clip	0.6D+0.6W: (Mot-Mres) / Lclip + Fv / (2 sides) / #clips / side
Max Corner:	452 lbs	W c-max + (Mot-Mres) / Lcurb / Wcurb * (N-corner) / 2

Connection of Unit to Curb

Screws - metal ga

Screws in Uplift clips	#10-16ga	Vall= 582 lbs/screw
Screws in Short Side Clips	#10-16ga	Vall= 582 lbs/screw

UPLIFT CLIPS:

Shear:	305 lbs/clip
Uplift:	553 lbs/clip
F diag	412 lbs/clip to curb

UPLIFT CLIPS:

	2 #10-16ga
Fdiag/screw	206 lbs/screw
F/screw outs.	138 lbs/screw

SCREWS OK

SHORTSIDE CLIPS

Shear:	305 lbs/clip
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SHORTSIDE CLIPS

	2 #10-16ga
F screw	153 lbs/screw

SCREWS OK

Curb info

H curb	14	in, curb height max
Fy	50	ksi
E	29000	ksi
Fu	65	ksi
gage:	16	
R	0.0849	
t	0.0566	
R/t	1.50	
h	13.77	in

Interior Curb

N	28	bearing length: 2*h
C	20	
C _R	0.1	
C _N	0.08	
C _h	0.03	
φ _w	0.85	
Ω _w	1.75	
Pn	4.16 k	
Pall	2.38 k	
φPn	3.53 k	
Pmax	0.26 k	Pall>Pmax,curb OK,

Exterior Curb:

N total	28	2*curb height
N -BUS	1	bearing length with stiffener (built up section)
N - SWC	27	bearing length without stiffener (single web channel)

Exterior Curb SWC	
N	27
C	7.5
C _R	0.08
C _N	0.12
C _h	0.05
φ _w	0.85
Ω _w	1.75
Pn	0.86 k
Pall	0.49 k
φPn	0.73 k

Exterior Curb BUS	
N	1
C	15.5
C _R	0.09
C _N	0.08
C _h	0.04
φ _w	0.75
Ω _w	2
Pn	2.22 k
Pall	1.11 k
φPn	1.66 k

Corner:	
Pall	1.60 k
φPn	2.40 k
Pmax	0.45 k

Pall>Pmax,curb OK,

Connection of Curb to Supporting Structure (ASD)Transverse: **0.6D+0.6W**

**Uplift (wind)= 621 lbs
 *Uplift (seismic) 337 lbs
 Uplift max= 621 lbs/long side
 **Shear (wind) 785 lbs
 *Shear (seis) 611 lbs
 Shear max= 785 lbs/total curb

Longitudinal:

**Uplift (wind)= 915 lbs
 *Uplift (seismic) 659 lbs
 Uplift max= 915 lbs/long side
 **Shear (wind) 751 lbs
 *Shear (seis) 611 lbs
 Shear max= 751 lbs/total curb

T max

915

 lbs/long
 V max

785

 lbs/total

**Wood Attachment: (Use 1/4" ϕ x 3.5" SDS SCREWS)
(3.5" minimum embed into DF or SP wood)**

W'

616

 lbs
 V'

256

 lbs

total screws required=

8

 # screws: LONG SIDE

2

 # screws: SHORT SIDE

2

 W/screw (uplift) 229 lbs
 V/Screw 98 lbs

WOOD SCREWS OK**Steel Deck Attach.: (Use 5/8" ϕ A307 Bolts attached to L5x5x1/4 below deck at each conn.point)**

Tall=

6900

 lbs
 Vall=

3680

 lbs

total bolts required=

6

 # bolts: LONG SIDE

2

 # bolts: SHORT SIDE

1

 T/bolt (uplift) 915 lbs
 V/bolt 131 lbs
 fv 0.4 ksi
 ft 3.0 ksi
 Fnt' 56.9 ksi
 Fnv 24.0 ksi

OK
OK

BOLTS OK

Connection of Curb to Concrete Supporting Structure - STRENGTH DESIGN

Transverse: **0.9D +1.0(E or W)**

**Uplift (wind)=	1057 lbs	
*Uplift (seismic)	3285 lbs	*Rp*1.3/1.5/0.7asd
Uplift max=	3285 lbs/side	(Per long side curb)
**Shear (wind)	1308 lbs	(Maximum Lateral Force) (seismic: Rp=1.5 max)
*Shear (seis)	4535 lbs	*Rp*1.3/1.5/0.7asd
Shear max=	4535 lbs	(Total Curb)

Longitudinal:

**Uplift (wind)=	1571 lbs		
*Uplift (seismic)	6548 lbs		Tu max 6548 lbs
Uplift max=	6548 lbs/side	(Per long side curb)	Vu max 4535 lbs
**Shear (wind)	1252 lbs		
*Shear (seis)	4535 lbs		
Shear max=	4535 lbs	(Total Curb)	

Concrete Attach.: (Use 5/8" ϕ Simpson Strong Bolt 2)

phi-Tn	2600 lbs
phi-Vn	1100 lbs

(LRFD design)

Anchors Required for Uplift (long side only)=	2.5
Anchors Required for Shear (Total Curb)=	4.1
Anchors Required (long side only) =	3.0

Conc Anchors	
anchors (long side)	3.0 OK
anchors (short side)	2.0
anchors (total)	10 OK
Tu	2183 OK
Vu	454 OK

Simpson Strong Bolt 2
 3 5/8" Embed
 (f'c=4000psi, 6" min total thickness - normal weight concrete, 12" E.D.)
 ESR Report - 3037
 Special Inspection Required

*Uplift and Shear seismic anchorage forces have been designed for an Rp of 1.5 max per ASCE 13.4.2

Anchorage design per ASCE 14.2.2.17/ACI D3.3 with strength reduction factors not required in combination with Rp=1.5

** For wind force, shear at base for anchorage design, accounts for add'l area from curb width and height