Pedestal Post
Seismic Calculations

May 2, 2022

the stair shall be designed with Ω_0 corresponding to the seismic force-resisting system but not less than $2 - 1/2$.

13.6 MECHANICAL AND ELECTRICAL COMPONENTS

13.6.1 General. Mechanical and electrical components and their supports shall satisfy the requirements of this section. The attachment of mechanical and electrical components and their supports to the structure shall meet the requirements of Section 13.4. Appropriate coefficients shall be selected from Table 13.6-1.

EXCEPTION: Light fixtures, lighted signs, and ceiling fans not connected to ducts or piping, which are supported by chains or otherwise suspended from the structure, are not required to satisfy the seismic force and relative displacement requirements provided that they meet all of the following criteria:

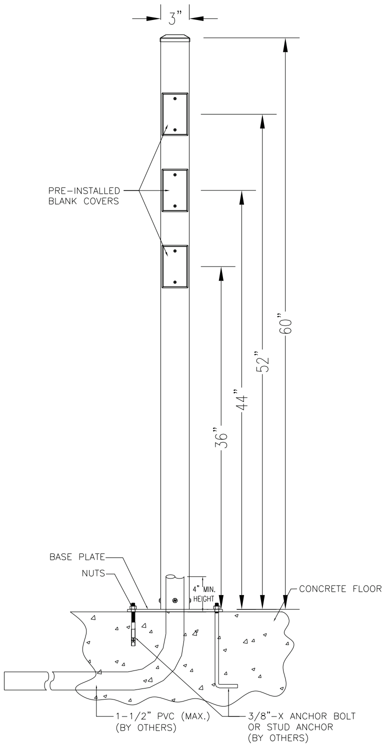
1. The design load for such items shall be equal to 1.4 times the operating weight acting down with a simultaneous horizontal load equal to 1.4 times the operating weight. The horizontal load shall be applied in the direction that results in the most critical loading for the design.
2. Seismic interaction effects shall be considered in accordance with Section 13.2.3.

Table 13.6-1 Seismic Coefficients for Mechanical and Electrical Components

Components	a_p[a]	R_p[b]	Ω_0[c]
MECHANICAL AND ELECTRICAL COMPONENTS			
Air-side HVACR, fans, air handlers, air conditioning units, cabinet heaters, air distribution boxes, and other mechanical components constructed of sheet metal framing	2½	6	2
Wet-side HVACR, boilers, furnaces, atmospheric tanks and bins, chillers, water heaters, heat exchangers, evaporators, air separators, manufacturing or process equipment, and other mechanical components constructed of high-deformability materials	1	2½	2
Air coolers (fin fans), air-cooled heat exchangers, condensing units, dry coolers, remote radiators and other mechanical components elevated on integral structural steel or sheet metal supports	2½	3	1½
Engines, turbines, pumps, compressors, and pressure vessels not supported on skirts and not within the scope of Chapter 15	1	2½	2
Skirt-supported pressure vessels not within the scope of Chapter 15	2½	2½	2
Elevator and escalator components	1	2½	2
Generators, batteries, inverters, motors, transformers, and other electrical components constructed of high-deformability materials	1	2½	2
Motor control centers, panel boards, switch gear, instrumentation cabinets, and other components constructed of sheet metal framing	2½	6	2
Communication equipment, computers, instrumentation, and controls	1	2½	2
Roof-mounted stacks, cooling and electrical towers laterally braced below their center of mass	2½	3	2
Roof-mounted stacks, cooling and electrical towers laterally braced above their center of mass	1	2½	2
Lighting fixtures	1	1½	2
Other mechanical or electrical components	1	1½	2
VIBRATION-ISOLATED COMPONENTS AND SYSTEMS[b]			
Components and systems isolated using neoprene elements and neoprene isolated floors with built-in or separate elastomeric snubbing devices or resilient perimeter stops	2½	2½	2
Spring-isolated components and systems and vibration-isolated floors closely restrained using built-in or separate elastomeric snubbing devices or resilient perimeter stops	2½	2	2
Internally isolated components and systems	2½	2	2
Suspended vibration-isolated equipment including in-line duct devices and suspended internally isolated components	2½	2½	2
DISTRIBUTION SYSTEMS			
Piping in accordance with ASME B31 (2001, 2002, 2008, and 2010), including in-line components with joints made by welding or brazing	2½	12	2
Piping in accordance with ASME B31, including in-line components, constructed of high- or limited-deformability materials, with joints made by threading, bonding, compression couplings, or grooved couplings	2½	6	2
Piping and tubing not in accordance with ASME B31, including in-line components, constructed of high-deformability materials, with joints made by welding or brazing	2½	9	2
Piping and tubing not in accordance with ASME B31, including in-line components, constructed of high- or limited-deformability materials, with joints made by threading, bonding, compression couplings, or grooved couplings	2½	4½	2
Piping and tubing constructed of low-deformability materials, such as cast iron, glass, and nonductile plastics	2½	3	2
Ductwork, including in-line components, constructed of high-deformability materials, with joints made by welding or brazing	2½	9	2
Ductwork, including in-line components, constructed of high- or limited-deformability materials with joints made by means other than welding or brazing	2½	6	2
Ductwork, including in-line components, constructed of low-deformability materials, such as cast iron, glass, and nonductile plastics	2½	3	2
Electrical conduit and cable trays	2½	6	2
Bus ducts	1	2½	2
Plumbing	1	2½	2
Pneumatic tube transport systems	2½	6	2

[a]A lower value for a_p is permitted where justified by detailed dynamic analyses. The value for a_p shall not be less than 1. The value of a_p equal to 1 is for rigid components and rigidly attached components. The value of a_p equal to 2½ is for flexible components and flexibly attached components.
[b]Components mounted on vibration isolators shall have a bumper restraint or snubber in each horizontal direction. The design force shall be taken as $2F_p$ if the nominal clearance (air gap) between the equipment support frame and restraint is greater than 0.25 in. (6 mm). If the nominal clearance specified on the construction documents is not greater than 0.25 in. (6 mm), the design force is permitted to be taken as F_p.
[c]Overstrength as required for anchorage to concrete and masonry. See Section 12.4.3 for seismic load effects including overstrength.

PP-60



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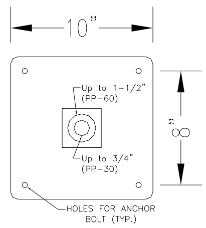


PEDESTAL BASE

Assumptions:
- Max weight = 80 lbs
- Post is HSS3x3x13ga
  Fy = 36 ksi
- Base plate is PL3GAx10"x0'-10"
  F_y = 50 ksi
- S_{DS} < 1.8
- $F'_{C,min}$ = 2500 psi

Per ASCE 7-16 Chapter 13:

13.3.1.1 Horizontal Force. The horizontal seismic design force (F_p) shall be applied at the component's center of gravity and distributed relative to the component's mass distribution and shall be determined in accordance with Eq. (13.3-1):

$$F_p = \frac{0.4 a_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)}\left(1 + 2\frac{z}{h}\right) \qquad (13.3\text{-}1)$$

F_p is not required to be taken as greater than

$$F_p = 1.6 S_{DS} I_p W_p \qquad (13.3\text{-}2)$$

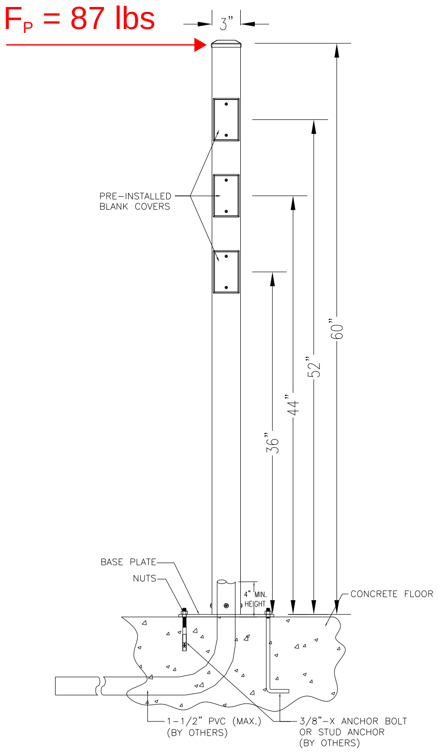
and F_p shall not be taken as less than

$$F_p = 0.3 S_{DS} I_p W_p \qquad (13.3\text{-}3)$$

Assume "other components constructed of sheet metal framing "
a_P = 2, R_P =6, Ω_0 = 2
Z/H = 1, I_P = 1.5, S_{DS} = 1.8

F_P = (0.4)(1.8)(2.5)(80 lbs)(1 + 2(1))/(6/1.5) = 87 lbs - governs
$F_{P,max}$ = (1.6)(1.8)(1.5)(80 lbs) = 346 lbs
$F_{P,}$min = (0.3)(1.8)(1.5)(80 lbs) = 65 lbs

PP-60



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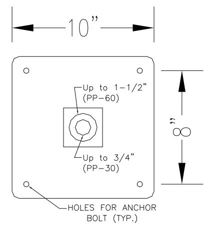


PEDESTAL BASE

Assumptions:
- Max weight = 80 lbs
- Post is HSS3x3x13ga
  Fy = 36 ksi
- Base plate is PL3GAx10"x0'-10"
  F_y = 50 ksi
- $S_{DS} < 1.8$
- $F'_{C,min}$ = 2500 psi

M_u = (87 lbs)(60") = 5220 lbin

Check Bending of HSS3x3x13ga Post
$ØM_N$ = (0.9)(36 ksi)(0.96 in^3) = 31104 lbin > 5220 lbin - ok!

Check 1/4" SMS Screw
V_N = 302 lbs > (87 lbs)(0.7) = 61 lbs - ok!

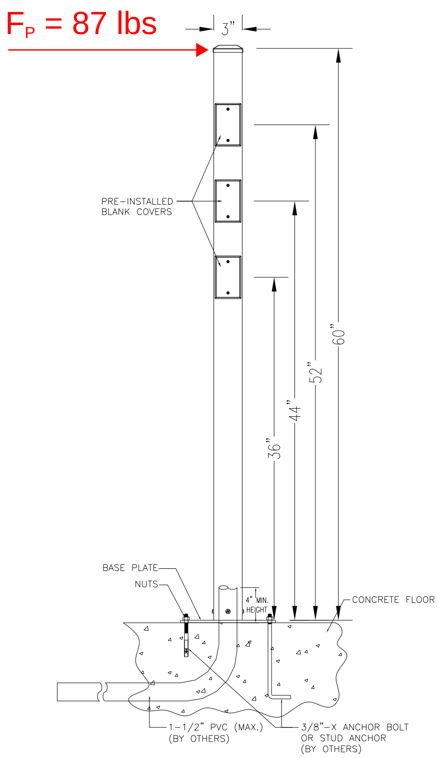
Check 3/16 Fillet Weld Connecting HSS3x3x13ga Post to PL3GAx10"x0'-10" Base Plate
T_u/C_u = 5220 lbin/3" = 1740 lbs = 1.74 kips
$ØT_N$ = 1.392(1")(3) = 4.17 kips > 1.74 kips - ok!

Check Pl3GAx10"x0'-10" Base Plate for Bending
$ØM_N$ = (0.9)(50 ksi)(10")(0.236")^2/4 = 6265 lbin > 5220 lbs - ok!

Check Anchorage into (E) 4" Min Thickness Concrete
See PP-60 - 12" Extension Calculations

Check Anchorage into (E) Wood
See PP-60 - 12" Extension Calculations

PP-60 - 12" Extension



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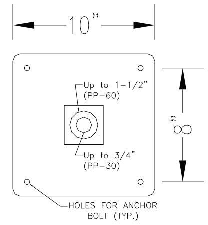

PEDESTAL BASE

Assumptions:
- Max weight = 80 lbs
- Post is HSS3x3x13ga
  Fy = 36 ksi
- Base plate is PL3GAx10"x0'-10"
  F_y = 50 ksi
- S_{DS} < 1.8
- $F'_{C,min}$ = 2500 psi

Assume 60" (post height) + 12" for extension attachment
M_u = (87 lbs)(72") = 6264 lbin

Check Bending of HSS3x3x13ga Post
$ØM_N$ = (0.9)(36 ksi)(0.96 in^3) = 31104 lbin > 6264 lbin - ok!

Check 1/4" SMS Screw
V_N = 302 lbs > (87 lbs)(0.7) = 61 lbs - ok!

Check 3/16 Fillet Weld Connecting HSS3x3x13ga Post to PL3GAx10"x0'-10" Base Plate
T_u/C_u = 6264 lbin/3" = 2088 lbs = 2.09 kips
$ØT_N$ = 1.392(1")(3) = 4.17 kips > 2.09 kips - ok!

Check Pl3GAx10"x0'-10" Base Plate for Bending
$ØM_N$ = (0.9)(50 ksi)(10")(0.236")^2/4 = 6265 lbin > 6264 lbin - ok!

Check Anchorage into (E) 4" Min Thickness Concrete
See Hilti Profis results, acceptable to use (4)3/8"Ø Hilti KBTZ-2 (ESR4266), embed=2" - ok!

Check Anchorage into (E) Wood
Assume 3/8"Ø Thru Bolts, A307 F_{nv} = 2.24 kips F_{nt} = 3.73 kips
(87 lbs/2.24 kips)^2 + (2.09 kips/3.73 kips)^2 = 0.57 < 1.0 - ok!
Provide 4x Blocking under through bolts with Simpson LUS ea end - ok!

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Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - May 2, 2022	Date:	5/3/2022
Fastening point:			

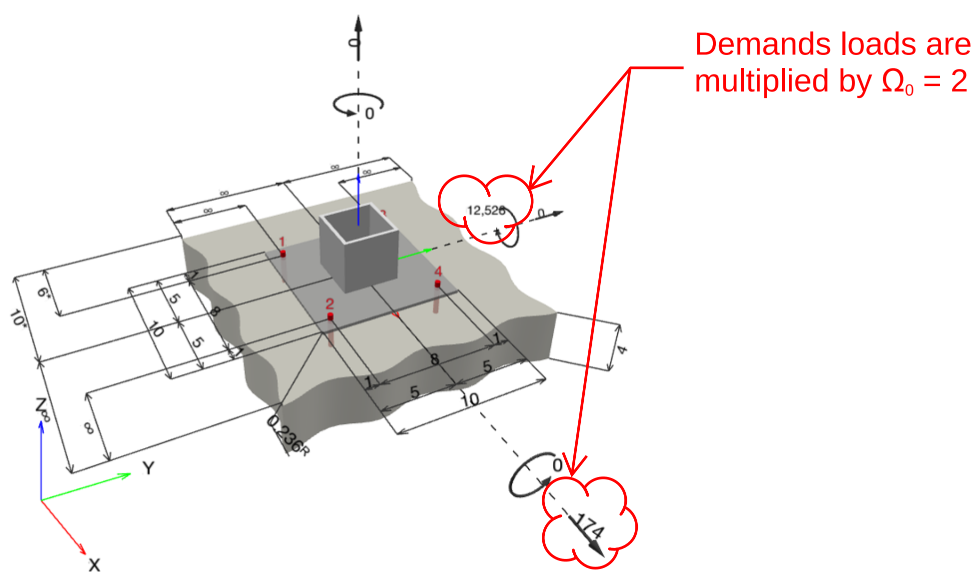
Specifier's comments:

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ2 - CS 3/8 (2) hnom2**
Item number:	2210237 KB-TZ2 3/8x3 1/2
Effective embedment depth:	$h_{ef,act}$ = 2.000 in., h_{nom} = 2.500 in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/17/2021 | 12/1/2023
Proof:	Design Method ACI 318-14 / Mech
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.236 in.
Anchor plate[R] :	l_x x l_y x t = 10.000 in. x 10.000 in. x 0.236 in.; (Recommended plate thickness: not calculated)
Profile:	Square HSS (AISC), HSS4X4X.25; (L x W x T) = 4.000 in. x 4.000 in. x 0.250 in.
Base material:	cracked concrete, 2500, f_c' = 2,500 psi; h = 4.000 in.
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, in.lb]



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Fastening point:			

1.1 Design results

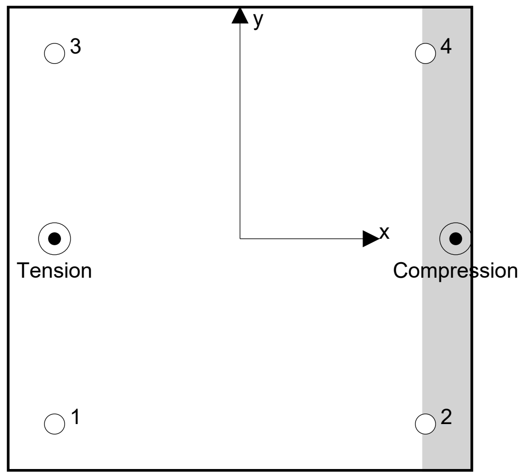
Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 0; V_x = 174; V_y = 0; M_x = 0; M_y = 12,528; M_z = 0;	yes	50

2 Load case/Resulting anchor forces

Anchor reactions [lb]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	724	44	44	0
2	0	44	44	0
3	724	44	44	0
4	0	44	44	0

max. concrete compressive strain:	0.06 [‰]
max. concrete compressive stress:	278 [psi]
resulting tension force in (x/y)=(-4.000/0.000):	1,448 [lb]
resulting compression force in (x/y)=(4.653/0.000):	1,448 [lb]



Anchor forces are calculated based on the assumption of a rigid anchor plate.

3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	724	4,869	15	OK
Pullout Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	1,448	2,896	50	OK

* highest loaded anchor **anchor group (anchors in tension)

3.1 Steel Strength

N_{sa} = ESR value   refer to ICC-ES ESR-4266
$\phi\ N_{sa} \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.05	126,204

Calculations

N_{sa} [lb]
6,493

Results

N_{sa} [lb]	ϕ_{steel}	$\phi_{nonductile}$	$\phi\ N_{sa}$ [lb]	N_{ua} [lb]
6,493	0.750	1.000	4,869	724

3.2 Concrete Breakout Failure

$N_{cbg} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ec,N}\ \psi_{ed,N}\ \psi_{c,N}\ \psi_{cp,N}\ N_b$ ACI 318-14 Eq. (17.4.2.1b)

$\phi\ N_{cbg} \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Nc} see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)

$A_{Nc0} = 9\ h_{ef}^2$ ACI 318-14 Eq. (17.4.2.1c)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2\ e'_N}{3\ h_{ef}}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.4)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.5b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.7b)

$N_b = k_c\ \lambda_a\ \sqrt{f'_c}\ h_{ef}^{1.5}$ ACI 318-14 Eq. (17.4.2.2a)

Variables

h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
2.000	0.000	0.000	6.000	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
4.375	21	1.000	2,500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
72.00	36.00	1.000	1.000	1.000	1.000	2,970

Results

N_{cbg} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi\ N_{cbg}$ [lb]	N_{ua} [lb]
5,940	0.650	0.750	1.000	2,896	1,448

4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	44	2,201	2	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	174	8,316	3	OK
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (relevant anchors)

4.1 Steel Strength

$V_{sa,eq}$ = ESR value refer to ICC-ES ESR-4266
ϕ $V_{steel} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]	$\alpha_{V,seis}$
0.05	126,204	1.000

Calculations

$V_{sa,eq}$ [lb]
3,386

Results

$V_{sa,eq}$ [lb]	ϕ $_{steel}$	$\phi_{nonductile}$	ϕ $V_{sa,eq}$ [lb]	V_{ua} [lb]
3,386	0.650	1.000	2,201	44

4.2 Pryout Strength

$V_{cpg} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N}\ \psi_{ed,N}\ \psi_{c,N}\ \psi_{cp,N}\ N_b \right]$ ACI 318-14 Eq. (17.5.3.1b)

$\phi\ V_{cpg} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Nc} see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)

$A_{Nc0} = 9\ h_{ef}^2$ ACI 318-14 Eq. (17.4.2.1c)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2\ e_N'}{3\ h_{ef}}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.4)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.5b)

$\psi_{cp,N} = \mathrm{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.7b)

$N_b = k_c\ \lambda_a\ \sqrt{f_c'}\ h_{ef}^{1.5}$ ACI 318-14 Eq. (17.4.2.2a)

Variables

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
1	2.000	0.000	0.000	6.000

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f_c' [psi]
1.000	4.375	21	1.000	2,500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
144.00	36.00	1.000	1.000	1.000	1.000	2,970

Results

V_{cpg} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi\ V_{cpg}$ [lb]	V_{ua} [lb]
11,879	0.700	1.000	1.000	8,316	174

5 Combined tension and shear loads

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.500	0.021	5/3	32	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

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6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/
- An anchor design approach for structures assigned to Seismic Design Category C, D, E or F is given in ACI 318-14, Chapter 17, Section 17.2.3.4.3 (a) that requires the governing design strength of an anchor or group of anchors be limited by ductile steel failure. If this is NOT the case, the connection design (tension) shall satisfy the provisions of Section 17.2.3.4.3 (b), Section 17.2.3.4.3 (c), or Section 17.2.3.4.3 (d). The connection design (shear) shall satisfy the provisions of Section 17.2.3.5.3 (a), Section 17.2.3.5.3 (b), or Section 17.2.3.5.3 (c).
- Section 17.2.3.4.3 (b) / Section 17.2.3.5.3 (a) require the attachment the anchors are connecting to the structure be designed to undergo ductile yielding at a load level corresponding to anchor forces no greater than the controlling design strength. Section 17.2.3.4.3 (c) / Section 17.2.3.5.3 (b) waive the ductility requirements and require the anchors to be designed for the maximum tension / shear that can be transmitted to the anchors by a non-yielding attachment. Section 17.2.3.4.3 (d) / Section 17.2.3.5.3 (c) waive the ductility requirements and require the design strength of the anchors to equal or exceed the maximum tension / shear obtained from design load combinations that include E, with E increased by ω_0.
- Hilti post-installed anchors shall be installed in accordance with the Hilti Manufacturer's Printed Installation Instructions (MPII). Reference ACI 318-14, Section 17.8.1.

Fastening meets the design criteria!

7 Installation data

Profile: Square HSS (AISC), HSS4X4X.25; (L x W x T) = 4.000 in. x 4.000 in. x 0.250 in.

Hole diameter in the fixture: d_f = 0.438 in.

Plate thickness (input): 0.236 in.

Recommended plate thickness: not calculated

Drilling method: Hammer drilled

Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Anchor type and diameter: Kwik Bolt TZ2 - CS 3/8 (2) hnom2

Item number: 2210237 KB-TZ2 3/8x3 1/2

Maximum installation torque: 361 in.lb

Hole diameter in the base material: 0.375 in.

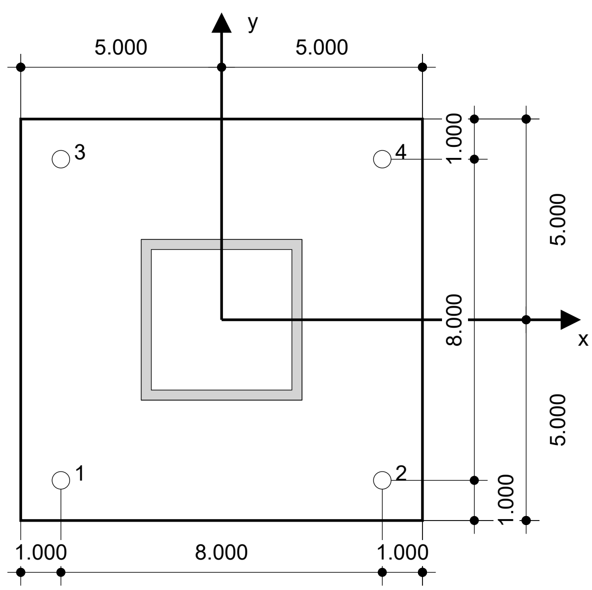
Hole depth in the base material: 2.750 in.

Minimum thickness of the base material: 4.000 in.

Hilti KB-TZ2 stud anchor with 2.5 in embedment, 3/8 (2) hnom2, Carbon steel, installation per ESR-4266

7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• Manual blow-out pump	• Torque controlled cordless impact tool • Torque wrench • Hammer



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-4.000	-4.000	6.000	-	-	-
2	4.000	-4.000	14.000	-	-	-
3	-4.000	4.000	6.000	-	-	-
4	4.000	4.000	14.000	-	-	-

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Fastening point:			

8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

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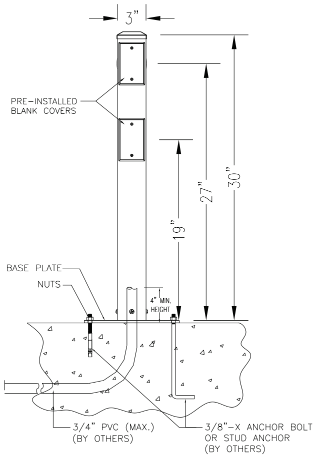
PP-30



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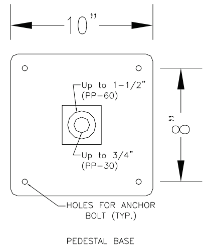

Assumptions:
- Max weight = 80 lbs
- Post is HSS3x3x13ga
  Fy = 36 ksi
- Base plate is PL3GAx10"x0'-10"
  F_y = 50 ksi
- S_{DS} < 1.8
- $F'_{C,min}$ = 2500 psi

Per ASCE 7-16 Chapter 13:

13.3.1.1 Horizontal Force. The horizontal seismic design force (F_p) shall be applied at the component's center of gravity and distributed relative to the component's mass distribution and shall be determined in accordance with Eq. (13.3-1):

$$F_p = \frac{0.4 a_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)}\left(1 + 2\frac{z}{h}\right) \tag{13.3-1}$$

F_p is not required to be taken as greater than

$$F_p = 1.6 S_{DS} I_p W_p \tag{13.3-2}$$

and F_p shall not be taken as less than

$$F_p = 0.3 S_{DS} I_p W_p \tag{13.3-3}$$

Assume "other components constructed of sheet metal framing "
a_P = 2, R_P =6, Ω_0 = 2
Z/H = 1, I_P = 1.5, S_{DS} = 1.8

F_P = (0.4)(1.8)(2.5)(80 lbs)(1 + 2(1))/(6/1.5) = 87 lbs - governs
$F_{P,max}$ = (1.6)(1.8)(1.5)(80 lbs) = 346 lbs
$F_{P,}$min = (0.3)(1.8)(1.5)(80 lbs) = 65 lbs

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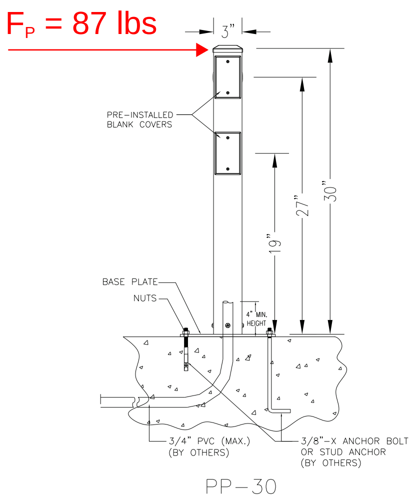

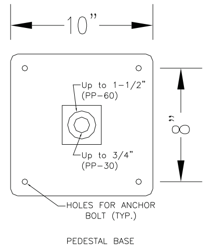

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M_u = (87 lbs)(30") = 2610 lbin

Check Bending of HSS3x3x13ga Post

$\O M_N$ = (0.9)(36 ksi)(0.96 in^3) = 31104 lbin > 2610 lbin - ok!

Check 1/4" SMS Screw

V_N = 302 lbs > (87 lbs)(0.7) = 61 lbs - ok!

Check 3/16 Fillet Weld Connecting HSS3x3x13ga Post to PL3GAx10"x0'-10" Base Plate

T_u/C_u = 2610 lbin/3" = 870 lbs = 0.87 kips

$\O T_N$ = 1.392(1")(3) = 4.17 kips > 0.87 kips - ok!

Check Pl3GAx10"x0'-10" Base Plate for Bending

$\O M_N$ = (0.9)(50 ksi)(10")(0.236")^2/4 = 6265 lbin > 2610 lbin - ok!

Check Anchorage into (E) 4" Min Thickness Concrete

See PP-60 - 12" Extension Calculations

Check Anchorage into (E) Wood

See PP-60 - 12" Extension Calculations