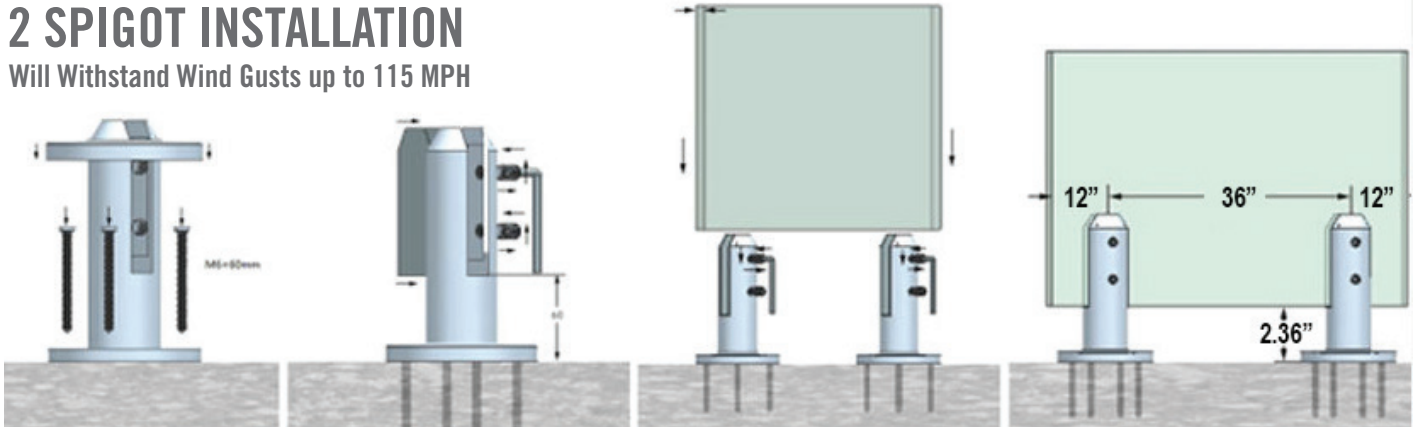
ClearView
GLASS RAILINGS

INSTALLATION WITH TWO OR THREE SPIGOTS

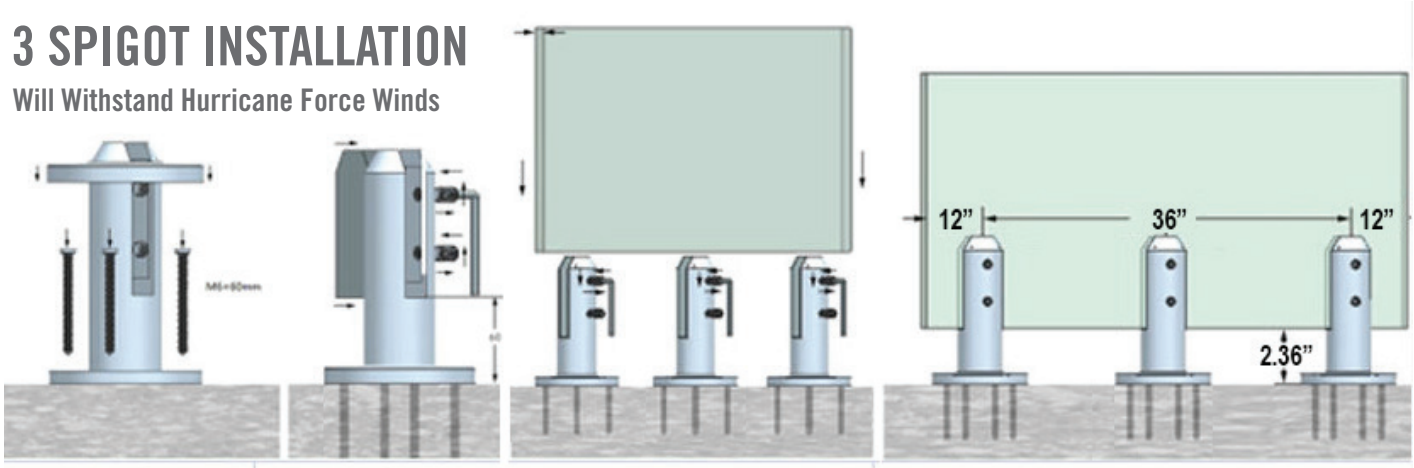
2 SPIGOT INSTALLATION

Will Withstand Wind Gusts up to 115 MPH



3 SPIGOT INSTALLATION

Will Withstand Hurricane Force Winds



Wood Deck Installation

The hold down force for each spigot is 2,500 lbs. We suggest using 3/8” diameter x 3.5” ASTM A307 Grade A structural bolts as they have sufficient capacity to resist this force. Use with flat washer to fasten spigots to wood deck. ASTM A307 Grade A structural bolts and washer should be cadmium plated or stainless steel so they do not rust.

Lag bolts must be installed into rim joists or lam beam or properly blocked sub structure. If lag bolts are attached to deck planks only failure will occur as a result of improper installation. Improper installation and failure may result in injuries or death. Do it once and do it right!

Installation of Spigots Using Wood Planks

Installation of CVGR Spigots to wood planks are fine as long as you use three 2” x10”s. You must tie the three plies of wood together with (4) #8 4” wood screws*, located 3” from spigot screws.

More installation information including additional fastener product recommendation listed on next page. Product Specifications included as well.

*Or use four RSS Rugged Structural Screws (5/16x4) by GRK Fasteners shown at top of next page.

Fastener Recommendation

We recommend RSS Rugged Structural Screws by GRK Fasteners (product image shown). Based on their rated loads the screw has an allowable steel strength in tension of 1,415lb. Utilizing a 200lb point load at the top of a 42” glass panel with 2 spigots, the tensile load per fastener (1 per spigot) is 1,333lb. The GRK RSS 5/16x4 fasteners are strong enough to resist the applied load.

This product is available at Home Depot:

- Internet #203525067
- Model #112225
- Store SKU #518167

VERY IMPORTANT

- Apply a bit of lubricant (petrolium jelly) to the inside of the spigot’s black plastic boot where the boot meets the glass. The application of lubrication prevents the spigot’s black plastic boot from grabbing the glass panel should you slide/move the glass to adjust its position while in the spigots.
- Do not attempt to slide the glass panel while it is in the spigot if there is no lubricant on the black plastic spigot boot as the glass panel may stick and fail.
- If no lubrication is applied to the spigot boot, you must lift the glass panel out of the spigot, adjust its position as desired and then lower the glass panel back into the spigot.

Helpful Installation Tips

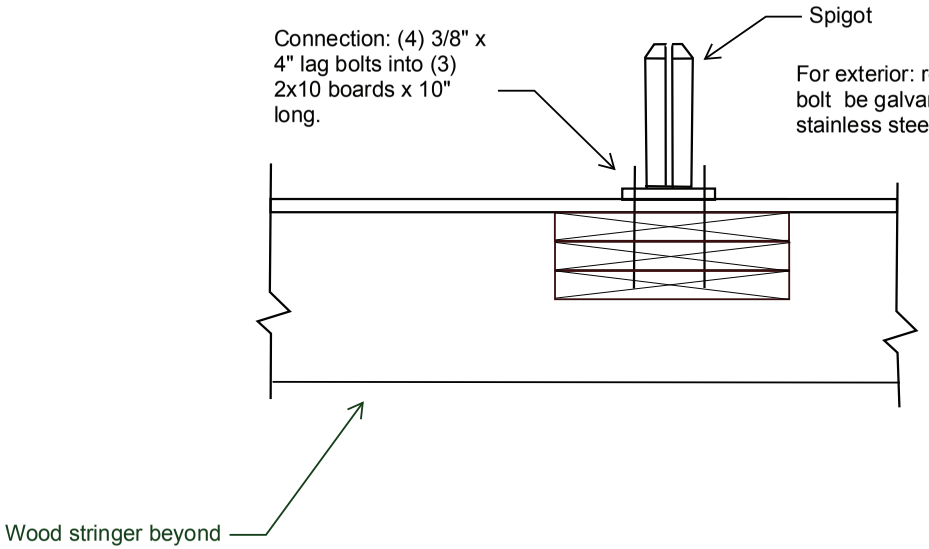
- Mark spigot location on glass panels with a crayon or wax marker. This allows for fast and easier installation of panel in proper location.
- Some clients have suggested screwing the rim joist to the joist as the screws will hold the rim joist tight to the joist where as nails may not.

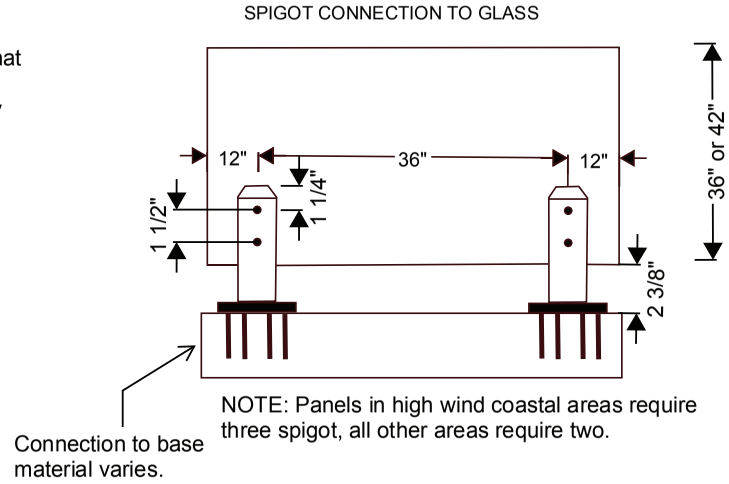
Specifications

Part Number	CVGR 316 SSOD48-180 Satin Finish
Product Name	Round Deck Mount Spigot
Spigot Size	1.9” diameter x 7.1” tall
Spigot Weight	5.5 lbs.
Glass Thickness/ Dimensions/Weight (per panel)	1/2”/ 60” width x 39.37” height/105 lbs.
Accessories Included	Base Cover, Rubber Gasket

CVGR Spigot Attachment to Wood Deck

(additional instructions)





GENERAL NOTES:
1. THIS GUARDRAIL SYSTEM IS IN COMPLIANCE WITH THE 2014 AND 2017 INTERNATIONAL BUILDING CODE (IBC) SECTION 1607.8. IT IS ALSO IN ACCORDANCE WITH 2015 IBC SECTION 2407 THAT REQUIRES ALL-GLASS HANDRAILS AND GUARDS BE "LAMINATED GLASS CONSTRUCTED OF FULLY TEMPERED OR HEAT-TREATED GLASS".
2. CONNECTION TO DECK SHOWN (4) 3/8" LAG BOLTS THROUGH DECK TO (3) 2X10 BOARDS, MEETS IBC DECK REQUIREMENTS FOR A 200 POUND POINT LOAD OR 500 POUND LINE LOAD AT ANY PLACE ON PANEL. LOADING TO BE EITHER VERTICAL OR HORIZONTAL BUT NOT SIMULTANEOUS.
2. WHEN THREE SPIGOTS ARE USED, THIS PRODUCT COMPLIES WITH THE REQUIREMENTS FOR HIGH VELOCITY HURRICANE ZONES (HVHZ).
3. SPIGOTS TO BE 316 STAINLESS STEEL.
4. CONNECTION TO BUILDING VARY BY PROJECT, TO BE DESIGNED BY PROJECT ENGINEER. CONNECTION TO WOOD STAIR STRINGER IS DESIGNBED AND SHOWN HEREIN.
5. THE ABIILITY OF THE EXISTING HOST STRUCTURE TO SAFELY SUPPORT THE LODS SHALL BE DETERMINED BY THE PROJECT ENGINEER.
6. MECHANICAL FASTENERS, AS SHOWN.

Part Number	CVGR 316 SSOD48-180 Satin Finish
Product Name	Round Deck Mount Spigot
Spigot Size	1.9" diameter x 7.1" tall
Spigot Weight	5.5 pounds
Glass Thickness/ Dimensions/Weight (per panel	13.5 mm/60" wide x 39.37" tall/ 98.5 pounds
Accessories Included	Base Cover, Rubber Gasket

CLEARVIEW GLASS RAILINGS • 737 Quentin Avenue South • Lakeland, MN 55043 • ClearViewGlassRailings.com

ClearView Glass Railings Attachment to Concrete

CVGRailings spigot baseplate is about 4” diameter. With this, we have come up with the following:

We are specifying an adhesive anchor system by HILTI: 3/8” diameter HIT-Z anchor, with their HY200-R adhesive. Effective embedment = 2 3/8”. HILTI has many anchors and it is important that they use this exact anchor. We have attached the HILTI report that describes this design. It is important that they closely follow the installation steps, especially the hole preparation: the most common failure mechanism is a lack of bond between the adhesive and the concrete because the installer did not remove all dust within the hole before injecting the adhesive. A lack of correct preparation will void these calculations and HILTI’s support of their anchor. This is important.

This design assumes a 3.15” spacing between anchors, into a concrete slab. Anchors to be at least 6” from all embedded PT cables and from the edge of the concrete slab. The location of the cables to be determined by others.

Note that the loads shown in the report come from my computer modeling of a 200 pound/ft (plf) horizontal line load applied to the top of the 42” tall panel. As a reminder, the IBC requires guardrails be designed to resist a 50 plf horizontal line load @ the top of the panel; the code has increased this by a factor of 4 for all-glass panels such as yours, hence, the 200 plf.

The installer of a PT deck can order the anchor and adhesive directly from HILTI through their website if they don’t have a local rep (Home Depot carries HILTI products).

AMERICAN ENGINEERING TESTING, INC.

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Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Apr 5, 2021	Date:	4/5/2021
Fastening point:			

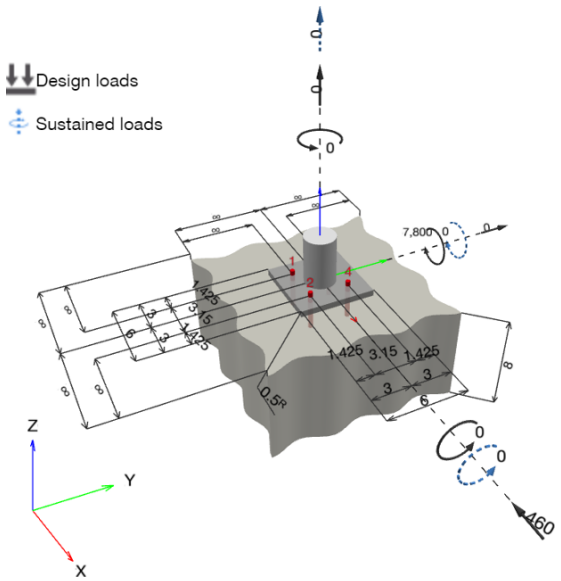
Specifier's comments:

1 Input data

Anchor type and diameter:	**HIT-HY 200 + HIT-Z 3/8**
Item number:	2018440 HIT-Z 3/8" x 4 3/8" (element) / 2022793 HIT-HY 200-R (adhesive)
Effective embedment depth:	$h_{ef,opti}$ = 2.375 in. ($h_{ef,limit}$ = 4.500 in.)
Material:	DIN EN ISO 4042
Evaluation Service Report:	ESR-3187
Issued I Valid:	4/1/2020 | 3/1/2022
Proof:	Design Method ACI 318-08 / Chem
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate[R]:	l_x x l_y x t = 6.000 in. x 6.000 in. x 0.500 in.; (Recommended plate thickness: not calculated)
Profile:	Round bars (AISC), 2 1/2; (L x W x T) = 2.500 in. x 2.500 in.
Base material:	cracked concrete, 4000, f_c' = 4,000 psi; h = 8.000 in., Temp. short/long: 32/32 °F
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)	no

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

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

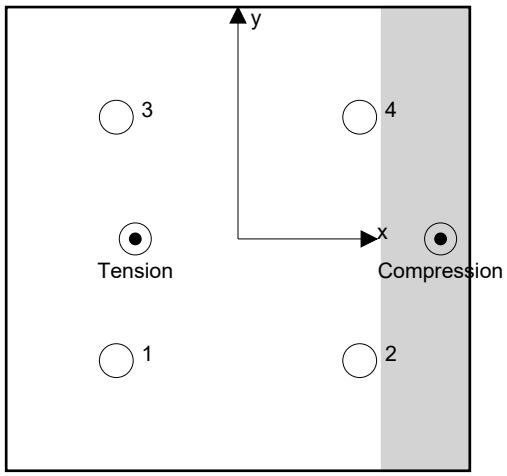


Company:		Page:	2
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Apr 5, 2021	Date:	4/5/2021
Fastening point:			

1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 0; V_x = -460; V_y = 0; M_x = 0; M_y = 7,800; M_z = 0; N_{sus} = 0; $M_{x,sus}$ = 0; $M_{y,sus}$ = 0;	no	51

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	910	115	-115	0
2	77	115	-115	0
3	910	115	-115	0
4	77	115	-115	0

max. concrete compressive strain:	0.13 [‰]
max. concrete compressive stress:	580 [psi]
resulting tension force in (x/y)=(-1.329/0.000):	1,974 [lb]
resulting compression force in (x/y)=(2.622/0.000):	1,974 [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*	910	4,749	20	OK
Pullout Strength*	910	5,169	18	OK
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	1,974	3,874	51	OK

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

Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Apr 5, 2021	Date:	4/5/2021
Fastening point:			

3.1 Steel Strength

N_{sa} = ESR value refer to ICC-ES ESR-3187
$\phi\ N_{sa} \geq N_{ua}$ ACI 318-08 Eq. (D-1)

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.08	94,200

Calculations

N_{sa} [lb]
7,306

Results

N_{sa} [lb]	ϕ_{steel}	$\phi\ N_{sa}$ [lb]	N_{ua} [lb]
7,306	0.650	4,749	910

3.2 Pullout Strength

N_{pn} = N_p refer to ICC-ES ESR-3187
$\phi\ N_{pn} \geq N_{ua}$ ACI 318-08 Eq. (D-1)

Variables

N_p [lb]
7,952

Calculations

-
-

Results

N_{pn} [lb]	$\phi_{concrete}$	$\phi\ N_{pn}$ [lb]	N_{ua} [lb]
7,952	0.650	5,169	910

Company:		Page:	4
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Apr 5, 2021	Date:	4/5/2021
Fastening point:			

3.3 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 318-08 Eq. (D-5)

$\phi\ N_{cbg} \geq N_{ua}$ ACI 318-08 Eq. (D-1)

A_{Nc} see ACI 318-08, Part D.5.2.1, Fig. RD.5.2.1(b)

$A_{Nc0} = 9\ h_{ef}^2$ ACI 318-08 Eq. (D-6)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2\ e'_N}{3\ h_{ef}}}\right) \leq 1.0$ ACI 318-08 Eq. (D-9)

$\psi_{ed,N} = 0.7 + 0.3\left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ ACI 318-08 Eq. (D-11)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ ACI 318-08 Eq. (D-13)

$N_b = k_c\ \lambda\ \sqrt{f'_c}\ h_{ef}^{1.5}$ ACI 318-08 Eq. (D-7)

Variables

h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
2.375	1.329	0.000	∞	1.000

c_{ac} [in.]	k_c	λ	f'_c [psi]
3.563	17	1	4,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
105.58	50.77	0.728	1.000	1.000	1.000	3,935

Results

N_{cbg} [lb]	$\phi_{concrete}$	$\phi\ N_{cbg}$ [lb]	N_{ua} [lb]
5,960	0.650	3,874	1,974

Company:		Page:	5
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Apr 5, 2021	Date:	4/5/2021
Fastening point:			

4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	115	1,929	6	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Concrete Breakout Strength controls)**	460	5,729	9	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} = ESR value refer to ICC-ES ESR-3187
ϕ $V_{steel} \geq V_{ua}$ ACI 318-08 Eq. (D-2)

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]	$\alpha_{V,seis}$
0.08	94,200	1.000

Calculations

V_{sa} [lb]
3,215

Results

V_{sa} [lb]	ϕ_{steel}	ϕ V_{sa} [lb]	V_{ua} [lb]
3,215	0.600	1,929	115

Company:		Page:	6
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Apr 5, 2021	Date:	4/5/2021
Fastening point:			

4.2 Pryout Strength (Concrete Breakout Strength controls)

$V_{cpg} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right]$ ACI 318-08 Eq. (D-31)

$\phi V_{cpg} \geq V_{ua}$ ACI 318-08 Eq. (D-2)

A_{Nc} see ACI 318-08, Part D.5.2.1, Fig. RD.5.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-08 Eq. (D-6)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 e'_N}{3 h_{ef}}} \right) \leq 1.0$ ACI 318-08 Eq. (D-9)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-08 Eq. (D-11)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-08 Eq. (D-13)

$N_b = k_c \lambda \sqrt{f'_c} h_{ef}^{1.5}$ ACI 318-08 Eq. (D-7)

Variables

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
1	2.375	0.000	0.000	∞

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ	f'_c [psi]
1.000	3.563	17	1	4,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
105.58	50.77	1.000	1.000	1.000	1.000	3,935

Results

V_{cpg} [lb]	$\phi_{concrete}$	ϕV_{cpg} [lb]	V_{ua} [lb]
8,184	0.700	5,729	460

5 Combined tension and shear loads

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.510	0.080	5/3	35	OK

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

6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2018, 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.
- Design Strengths of adhesive anchor systems are influenced by the cleaning method. Refer to the INSTRUCTIONS FOR USE given in the Evaluation Service Report for cleaning and installation instructions.
- The present version of the software does not account for special design provisions for overhead applications. Refer to related approval (e.g. section 4.1.1 of the ICC-ESR 2322) for details.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/

Fastening meets the design criteria!

Company:		Page:	8
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Apr 5, 2021	Date:	4/5/2021
Fastening point:			

7 Installation data

Profile: Round bars (AISC), 2 1/2; (L x W x T) = 2.500 in. x 2.500 in.

Hole diameter in the fixture (pre-setting) : d_f = 0.438 in.

Hole diameter in the fixture (through fastening) : d_f = 0.500 in.

Plate thickness (input): 0.500 in.

Recommended plate thickness: not calculated

Drilling method: Hammer drilled

Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

Anchor type and diameter: HIT-HY 200 + HIT-Z 3/8

Item number: 2018440 HIT-Z 3/8" x 4 3/8" (element) / 2022793 HIT-HY 200-R (adhesive)

Maximum installation torque: 177 in.lb

Hole diameter in the base material: 0.438 in.

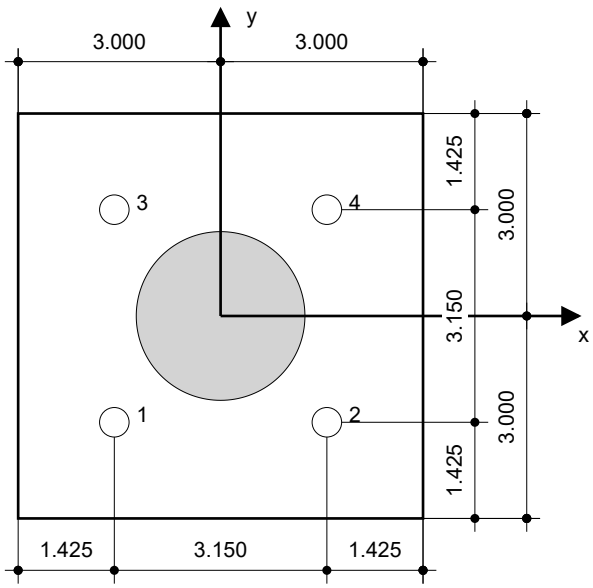
Hole depth in the base material: 2.375 in.

Minimum thickness of the base material: 4.625 in.

3/8 Hilti HIT-Z Carbon steel non-cleaning bonded expansion anchor with Hilti HIT-HY 200 Safe Set System

7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• -	• Dispenser including cassette and mixer • Torque wrench



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-1.575	-1.575	-	-	-	-
2	1.575	-1.575	-	-	-	-
3	-1.575	1.575	-	-	-	-
4	1.575	1.575	-	-	-	-

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.
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