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Design:	Concrete - Apr 7, 2026	Date:	4/7/2026
Fastening point:			

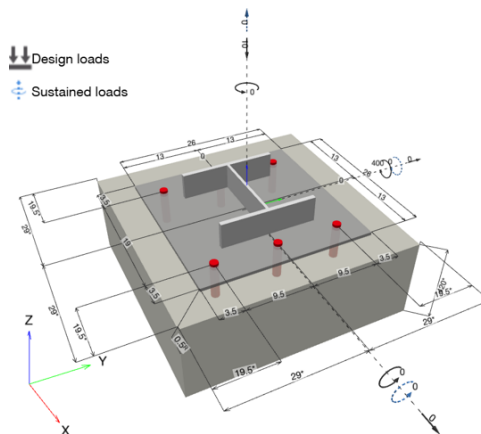
Specifier's comments:

1 Input data

Anchor type and diameter:	HIT-HY 200 V3 + HAS-V-36 (ASTM F1554 Gr.36) 1 1/4	
Item number:	not available (element) / 2334276 HIT-HY 200-R V3 (adhesive)	
Specification text:	HILTI Ø 1 1/4 IN HIT-HY 200 V3 + HAS-V-36 (ASTM F1554 GR.36) WITH 5 IN NOMINAL EMBEDMENT DEPTH PER ICC-ES ESR-4868 , HAMMER DRILL BIT INSTALLATION PER MPII	
Effective embedment depth:	$h_{ef,opti} = 5.000$ in. ($h_{ef,limit} = 25.000$ in.)	
Material:	ASTM F1554 Grade 36	
Evaluation Service Report:	ESR-4868	
Issued Valid:	11/1/2024 11/1/2026	
Proof:	Design Method ACI 318-19 / Chem	
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)	
Stand-off installation:	$e_b = 0.000$ in. (no stand-off); $t = 0.500$ in.	
Anchor plate ^R :	$l_x \times l_y \times t = 26.000$ in. x 26.000 in. x 0.500 in.; (Recommended plate thickness: not calculated)	
Profile:	W shape (AISC), W14X90; (L x W x T x FT) = 14.000 in. x 14.500 in. x 0.440 in. x 0.710 in.	
Base material:	uncracked concrete, 4000, $f'_c = 4,000$ psi; $h = 420.000$ in., Temp. short/long: 32/32 °F	
Installation:	Hammer drilled hole, Installation condition: Dry	
Reinforcement:	tension: not present, shear: not present; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar	

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

Geometry [in.] & Loading [kip, ft.kip]



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1.1 Design results

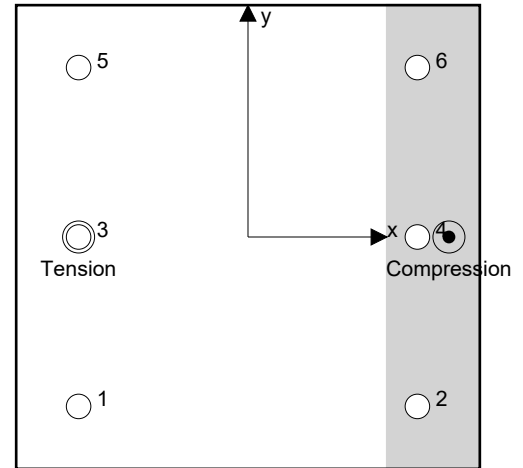
Case	Description	Forces [kip] / Moments [ft.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = -10.000; V _x = 0.000; V _y = 0.000; M _x = 0.00000; M _y = 400.00000; M _z = 0.00000;	no	903

2 Load case/Resulting anchor forces

Anchor reactions [kip]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	75.227	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000
3	75.227	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000
5	75.227	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000



Max. concrete compressive strain: 0.80 [‰]
 Max. concrete compressive stress: 3.492 [ksi]
 Resulting tension force in (x/y)=(-9.500/0.000): 225.682 [kip]
 Resulting compression force in (x/y)=(11.269/0.000): 235.682 [kip]

High moment base plate (e<crit>e) then,
 F_{pmax} shall be used.
 $F_{pmax} = 0.85 \times F_c \times A_1 \times (A_2/A_1)^{0.5} < 1.7 \times F_c \times A_1$
 $F_{pmax} = 0.65 \times 1.7 \times 4 = 4.42 \text{ ksi}$

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

3 Tension load

	Load N _{ua} [kip]	Capacity ϕN_n [kip]	Utilization $\beta_N = N_{ua}/\phi N_n$	Status
Steel Strength*	75.227	42.157	179	not recommended
Bond Strength**	225.682	45.285	499	not recommended
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	225.682	25.003	903	not recommended

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



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3.1 Steel Strength

N_{sa} = ESR value refer to ICC-ES ESR-4868
 $\phi N_{sa} \geq N_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,N}$ [in. ²]	f_{uta} [ksi]
0.97	58.000

Calculations

N_{sa} [kip]
56.210

Results

N_{sa} [kip]	ϕ_{steel}	ϕN_{sa} [kip]	N_{ua} [kip]
56.210	0.750	42.157	75.227



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3.2 Bond Strength

$$N_{ag} = \left(\frac{A_{Na}}{A_{Na0}} \right) \Psi_{ec1,Na} \Psi_{ec2,Na} \Psi_{ed,Na} \Psi_{cp,Na} N_{ba} \quad \text{ACI 318-19 Eq. (17.6.5.1b)}$$

$$\phi N_{ag} \geq N_{ua} \quad \text{ACI 318-19 Table 17.5.2}$$

A_{Na} see ACI 318-19, Section 17.6.5.1, Fig. R 17.6.5.1(b)

$$A_{Na0} = (2 c_{Na})^2 \quad \text{ACI 318-19 Eq. (17.6.5.1.2a)}$$

$$c_{Na} = 10 d_a \sqrt{\frac{\tau_{uncr}}{1100}} \quad \text{ACI 318-19 Eq. (17.6.5.1.2b)}$$

$$\Psi_{ec,Na} = \left(\frac{1}{1 + \frac{e_N}{c_{Na}}} \right) \leq 1.0 \quad \text{ACI 318-19 Eq. (17.6.5.3.1)}$$

$$\Psi_{ed,Na} = 0.7 + 0.3 \left(\frac{c_{a,min}}{c_{Na}} \right) \leq 1.0 \quad \text{ACI 318-19 Eq. (17.6.5.4.1b)}$$

$$\Psi_{cp,Na} = \text{MAX} \left(\frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-19 Eq. (17.6.5.5.1b)}$$

$$N_{ba} = \lambda_a \cdot \tau_{k,c} \cdot \pi \cdot d_a \cdot h_{ef} \quad \text{ACI 318-19 Eq. (17.6.5.2.1)}$$

Variables

$\tau_{k,c,uncr}$ [ksi]	d_a [in.]	h_{ef} [in.]	$c_{a,min}$ [in.]	$\alpha_{overhead}$	$\tau_{k,c}$ [ksi]
2.327	1.250	5.000	19.500	1.000	2.327
$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	c_{ac} [in.]	λ_a		
0.000	0.000	6.223	1.000		

Calculations

c_{Na} [in.]	A_{Na} [in. ²]	A_{Na0} [in. ²]	$\Psi_{ed,Na}$
18.098	1,997.88	1,310.15	1.000
$\Psi_{ec1,Na}$	$\Psi_{ec2,Na}$	$\Psi_{cp,Na}$	N_{ba} [kip]
1.000	1.000	1.000	45.687

Results

N_{ag} [kip]	ϕ_{bond}	ϕN_{ag} [kip]	N_{ua} [kip]
69.669	0.650	45.285	225.682



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3.3 Concrete Breakout Failure

$$N_{cbg} = \left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \quad \text{ACI 318-19 Eq. (17.6.2.1b)}$$

$$\phi N_{cbg} \geq N_{ua} \quad \text{ACI 318-19 Table 17.5.2}$$

$$A_{Nc} \text{ see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)}$$

$$A_{Nc0} = 9 h_{ef}^2 \quad \text{ACI 318-19 Eq. (17.6.2.1.4)}$$

$$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 e_N}{3 h_{ef}}} \right) \leq 1.0 \quad \text{ACI 318-19 Eq. (17.6.2.3.1)}$$

$$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0 \quad \text{ACI 318-19 Eq. (17.6.2.4.1b)}$$

$$\psi_{cp,N} = \text{MAX} \left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-19 Eq. (17.6.2.6.1b)}$$

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \quad \text{ACI 318-19 Eq. (17.6.2.2.1)}$$

Variables

h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
5.000	0.000	0.000	19.500	1.000
c_{ac} [in.]	k_c	λ_a	f'_c [psij]	
6.223	24	1.000	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 [kip]
510.00	225.00	1.000	1.000	1.000	1.000	16.971

Results

N_{cbg} [kip]	$\phi_{concrete}$	ϕN_{cbg} [kip]	N_{ua} [kip]
38.467	0.650	25.003	225.682



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4 Shear load

	Load V_{ua} [kip]	Capacity ϕV_n [kip]	Utilization $\beta_v = V_{ua} / \phi V_n$	Status
Steel Strength*	N/A	N/A	N/A	N/A
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Bond Strength controls)*	N/A	N/A	N/A	N/A
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

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

5 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (EN1992-4, AS5216, 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 FEM 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!
- The equations presented in this report are based on imperial units. When inputs are displayed in metric units, the user should be aware that the equations remain in their imperial format.
- 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.
- For additional information about ACI 318 strength design provisions, please go to <https://viewer.joomag.com/profis-design-guide-us-en-summer-2021/0841849001625154758?short&/>
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. Reference ACI 318-19, Section 26.7.

Fastening does not meet the design criteria!

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6 Installation data

Profile: W shape (AISC), W14X90; (L x W x T x FT) = 14.000 in. x 14.500 in. x 0.440 in. x 0.710 in.

Hole diameter in the fixture: $d_f = 1.375$ in.

Plate thickness (input): 0.500 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: HIT-HY 200 V3 + HAS-V-36 (ASTM F1554 Gr.36) 1 1/4

Item number: not available (element) / 2334276 HIT-HY 200-R V3 (adhesive)

Maximum installation torque: 0.20000 ft.kip

Hole diameter in the base material: 1.375 in.

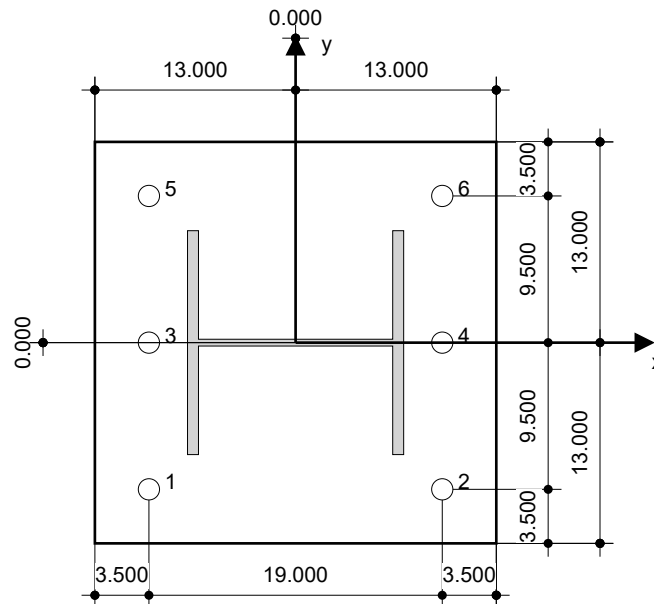
Hole depth in the base material: 5.000 in.

Minimum thickness of the base material: 7.750 in.

Hilti \varnothing 1 1/4 in HIT-HY 200 V3 + HAS-V-36 (ASTM F1554 Gr.36) with 5 in nominal embedment depth per ICC-ES ESR-4868 , Hammer drill bit installation per MPII

6.1 Recommended accessories

Drilling	Cleaning	Setting
<ul style="list-style-type: none"> Suitable Rotary Hammer Properly sized drill bit 	<ul style="list-style-type: none"> Proper diameter wire brush 	<ul style="list-style-type: none"> Dispenser including cassette and mixer Torque wrench



Coordinates Anchor [in.]

Anchor	x	y	c _{-x}	c _{+x}	c _{-y}	c _{+y}	Anchor	x	y	c _{-x}	c _{+x}	c _{-y}	c _{+y}
1	-9.500	-9.500	19.500	38.500	19.500	38.500	4	9.500	0.000	38.500	19.500	29.000	29.000
2	9.500	-9.500	38.500	19.500	19.500	38.500	5	-9.500	9.500	19.500	38.500	38.500	19.500
3	-9.500	0.000	19.500	38.500	29.000	29.000	6	9.500	9.500	38.500	19.500	38.500	19.500

Input data and results must be checked for conformity with the existing conditions and for plausibility!
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7 Remarks; Your Cooperation Duties

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