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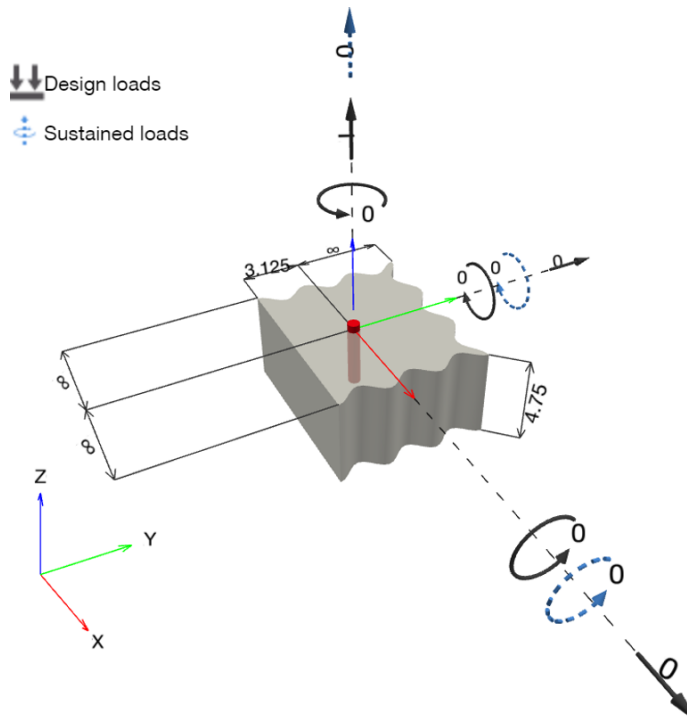
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Design:	#5 DIA REBAR	Date:	5/3/2023
Fastening point:			

**Specifier's comments:**

**1 Input data**

<b>Anchor type and diameter:</b>	<b>HIT-HY 200 V3 + Rebar A 615 Gr.60 #5</b>	
Item number:	not available (element) / 2334276 HIT-HY 200-R V3 (adhesive)	
Effective embedment depth:	$h_{ef,opti} = 3.125$ in. ( $h_{ef,limit} = 3.250$ in.)	
Material:	ASTM A 615 GR.60	
Evaluation Service Report:	ESR-4868	
Issued   Valid:	11/1/2022   11/1/2024	
Proof:	Design Method ACI 318-14 / Chem	
Stand-off installation:		
Profile:		
Base material:	cracked concrete, 4000, $f'_c = 4,000$ psi; $h = 4.750$ in., Temp. short/long: 32/32 °F	
<b>Installation:</b>	<b>hammer drilled hole, Installation condition: Dry</b>	
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar	

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





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1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 1; V <sub>x</sub> = 0; V <sub>y</sub> = 0; M <sub>x</sub> = 0; M <sub>y</sub> = 0; M <sub>z</sub> = 0; N <sub>sus</sub> = 0; M <sub>x,sus</sub> = 0; M <sub>y,sus</sub> = 0;	no	1

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	1	0	0	0

max. concrete compressive strain: - [%]  
max. concrete compressive stress: - [psi]  
resulting tension force in (x/y)=(0.000/0.000): 0 [lb]  
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

3 Tension load

	Load N <sub>ua</sub> [lb]	Capacity $\phi$ N <sub>n</sub> [lb]	Utilization $\beta_N = N_{ua} / \phi N_n$	Status
Steel Strength*	1	16,119	1	OK
Bond Strength**	1	2,649	1	OK
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	1	2,896	1	OK

\* 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 318-14 Table 17.3.1.1

**Variables**

$A_{se,N}$ [in. <sup>2</sup> ]	$f_{uta}$ [psi]
0.31	80,000

**Calculations**

$N_{sa}$ [lb]
24,799

**Results**

$N_{sa}$ [lb]	$\phi_{steel}$	$\phi N_{sa}$ [lb]	$N_{ua}$ [lb]
24,799	0.650	16,119	1



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**3.2 Bond Strength**

$$N_a = \left( \frac{A_{Na}}{A_{Na0}} \right) \Psi_{ed,Na} \Psi_{cp,Na} N_{ba} \quad \text{ACI 318-14 Eq. (17.4.5.1a)}$$

$$\phi N_a \geq N_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

$$A_{Na} \text{ see ACI 318-14, Section 17.4.5.1, Fig. R 17.4.5.1(b)}$$

$$A_{Na0} = (2 c_{Na})^2 \quad \text{ACI 318-14 Eq. (17.4.5.1c)}$$

$$c_{Na} = 10 d_a \sqrt{\frac{\tau_{uncr}}{1100}} \quad \text{ACI 318-14 Eq. (17.4.5.1d)}$$

$$\Psi_{ed,Na} = 0.7 + 0.3 \left( \frac{c_{a,min}}{c_{Na}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.4b)}$$

$$\Psi_{cp,Na} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.5b)}$$

$$N_{ba} = \lambda_a \cdot \tau_{k,c} \cdot \pi \cdot d_a \cdot h_{ef} \quad \text{ACI 318-14 Eq. (17.4.5.2)}$$

**Variables**

$\tau_{k,c,uncr}$ [psi]	$d_a$ [in.]	$h_{ef}$ [in.]	$c_{a,min}$ [in.]	$\alpha_{overhead}$	$\tau_{k,c}$ [psi]
1,636	0.625	3.125	3.125	1.000	1,142
$c_{ac}$ [in.]	$\lambda_a$				
6.794	1.000				

**Calculations**

$c_{Na}$ [in.]	$A_{Na}$ [in. <sup>2</sup> ]	$A_{Na0}$ [in. <sup>2</sup> ]	$\Psi_{ed,Na}$
7.587	162.54	230.24	0.824
$\Psi_{cp,Na}$	$N_{ba}$ [lb]		
1.000	7,010		

**Results**

$N_a$ [lb]	$\phi_{bond}$	$\phi N_a$ [lb]	$N_{ua}$ [lb]
4,076	0.650	2,649	1



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**3.3 Concrete Breakout Failure**

$$N_{cb} = \left( \frac{A_{Nc}}{A_{Nc0}} \right) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \quad \text{ACI 318-14 Eq. (17.4.2.1a)}$$

$$\phi N_{cb} \geq N_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

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

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

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

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

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

**Variables**

$h_{ef}$ [in.]	$c_{a,min}$ [in.]	$\Psi_{c,N}$	$c_{ac}$ [in.]	$k_c$	$\lambda_a$	$f_c$ [psi]
3.125	3.125	1.000	6.794	17	1.000	4,000

**Calculations**

$A_{Nc}$ [in. <sup>2</sup> ]	$A_{Nc0}$ [in. <sup>2</sup> ]	$\Psi_{ed,N}$	$\Psi_{cp,N}$	$N_b$ [lb]
73.24	87.89	0.900	1.000	5,940

**Results**

$N_{cb}$ [lb]	$\phi_{concrete}$	$\phi N_{cb}$ [lb]	$N_{ua}$ [lb]
4,455	0.650	2,896	1



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### 4 Shear load

	Load $V_{ua}$ [lb]	Capacity $\phi V_n$ [lb]	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 (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.
- 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://submittals.us.hilti.com/PROFISAnchorDesignGuide/>
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. Reference ACI 318-14, Section 17.8.1.

**Fastening meets the design criteria!**



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## 6 Installation data

Profile: -

Hole diameter in the fixture: -

Plate thickness (input): -

Drilling method: Hammer drilled

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

#5 Rebar with Hilti HIT-HY 200 V3 Safe Set System

Anchor type and diameter: HIT-HY 200 V3 + Rebar A 615

Gr.60 #5

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

Maximum installation torque: -

Hole diameter in the base material: 0.750 in.

Hole depth in the base material: 3.125 in.

Minimum thickness of the base material: 4.625 in.

### 6.1 Recommended accessories

#### Drilling

- Suitable Rotary Hammer
- Properly sized drill bit

#### Cleaning

- Compressed air with required accessories to blow from the bottom of the hole
- Proper diameter wire brush

#### Setting

- Dispenser including cassette and mixer
- For deep installations, a piston plug is necessary
- Torque wrench

### Coordinates Anchor in.

Anchor	x	y	C <sub>-x</sub>	C <sub>+x</sub>	C <sub>-y</sub>	C <sub>+y</sub>
1	0.000	0.000	-	-	3.125	-



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## 7 Remarks; Your Cooperation Duties

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