

Table 2 — Hilti HIT-HY 270 allowable adhesive bond tension loads for threaded rods and reinforcing bars in the face of grout-filled concrete masonry walls^{1,2,3,4,5,6,7,8}

Nominal anchor diameter	Rebar size	Effective embedment in. (mm) ¹¹	Tension lb (kN)	Spacing ⁹			Edge distance ¹⁰		
				Critical s _{cr} in. (mm)	Minimum s _{min} in. (mm)	Load reduction factor @ s _{min} ¹²	Critical c _{cr} in. (mm)	Minimum c _{min} in. (mm)	Load reduction factor @ c _{min} ¹²
3/8	#3	3-3/8 (86)	1,240 (5.5)	13.5 (343)	4 (102)	0.70	12 (305)	4 (102)	0.80
1/2	#4	4-1/2 (114)	2,035 (9.1)	18 (457)		0.70	20 (508)		0.76
5/8	#5	5-5/8 (143)	2,840 (12.6)	22.5 (572)		0.50	20 (508)		0.71
3/4	#6	6-3/4 (171)	3,810 (16.9)	27 (686)		0.50	20 (508)		0.66

3.2.4

Table 3 — Hilti HIT-HY 270 allowable adhesive bond shear loads for threaded rods and reinforcing bars in the face of grout-filled concrete masonry walls^{1,2,3,4,5,6,7,8}

Nominal anchor diameter	Rebar size	Effective embedment in. (mm) ¹¹	Shear lb (kN)	Spacing ⁹			Edge distance ¹⁰			
				Critical s _{cr} in. (mm)	Minimum s _{min} in. (mm)	Load reduction factor @ s _{min} ¹²	Critical c _{cr} in. (mm)	Minimum c _{min} in. (mm)	Load reduction factor @ c _{min} ¹²	
									Load perpendicular to edge	Load parallel to edge
3/8	#3	3-3/8 (86)	850 (3.8)	13.5 (343)	4 (102)	1.00	12 (305)	4 (102)	0.88	1.00
1/2	#4	4-1/2 (114)	1,495 (6.7)	18 (457)		1.00	12 (305)		0.49	1.00
5/8	#5	5-5/8 (143)	2,615 (11.6)	22.5 (572)		0.50	20 (508)		0.40	0.78
3/4	#6	6-3/4 (171)	4,090 (18.2)	27 (686)		0.50	20 (508)		0.26	0.60

The following footnotes apply to both Tables 1 and 2:

- All values are for anchors installed in fully grouted concrete masonry with minimum masonry prism strength of 1,500 psi (103.4 MPa) for heavy-weight conforming to ASTM C90. Allowable loads are calculated using a safety factor of 5.
- Anchors may be installed in any location in the face of the masonry wall including cell, web, and mortar joints. Anchors are limited to one per masonry cell. See Figure 2
- Linear interpolation of load values between minimum spacing (s_{min}) and critical spacing (s_{cr}) and between minimum edge distance (c_{min}) and critical edge distance (c_{cr}) is permitted.
- Concrete masonry thickness must be equal to or greater than 1.5 times the anchor embedment depth. EXCEPTION: the 5/8-inch- and the 3/4-inch diameter anchors (No. 5 and No. 6 bars) may be installed in minimum nominally 8-inch thick concrete masonry.
- When using the basic load combinations in accordance with IBC Section 1605.3.1, tabulated allowable loads must not be increased for seismic or wind loading. When using the alternative basic load combinations in IBC Section 1605.3.2 that include seismic or wind loads, tabulated allowable loads may be increased by 33-1/3 percent, or the alternative basic load combinations may be reduced by a factor of 0.75.
- Allowable loads must be the lesser of the adjusted masonry or bond tabulated values and the steel values given in tables 3 and 4.
- Tabulated allowable loads shall be adjusted for increased base material temperatures in accordance with figure 13.
- For combined loading: $(T_{applied}/T_{allowable})^n + (V_{applied}/V_{allowable})^n \leq 1$ where n = 5/3 for 3/8- and 1/2-inch diameters (#3 and #4 rebar) and n = 1 for 5/8- and 3/4-inch diameters (#5 and #6 rebar).
- The critical spacing, s_{cr}, is the anchor spacing where full load values may be used. The minimum spacing, s_{min}, is the minimum anchor spacing for which values are available and installation is recommended. Spacing is measured from the center of one anchor to the center of an adjacent anchor.
- The critical edge distance, c_{cr}, is the edge distance where full load values may be used. The minimum edge distance, c_{min}, is the minimum edge distance for which values are available and installation is recommended. Edge distance is measured from the center of the anchor to the closest edge.
- Embedment depth is measured from the outside face of the concrete masonry unit.
- Load reduction factors are multiplicative: both spacing and edge distance load reduction factors, and spacing and edge distances for all adjacent anchors/ edges less than s_{cr}/c_{cr} must be considered. Load values for anchors installed at less than s_{cr} and c_{cr} must be multiplied by the appropriate load reduction factor based on actual edge distance (c) and spacing (s).

0.67 for 8"

0.51 for 8"

Factors together are 0.34 which is what is being applied in Profis (see page 5 of attached report)

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Specifier's comments:

1 Input data

Anchor type and diameter:

HY 270 + threaded rod 5.8 3/4



Item number: 385432 HAS 5.8 3/4"x10" (element) / 2194247 HIT-HY 270 (adhesive)

Effective embedment depth: $h_{ef} = 6.750$ in.

Material: 5.8

Evaluation Service Report: Hilti Technical Data

Issued | Valid: - | -

Proof: Design Method ASD Masonry

Stand-off installation: $e_b = 0.000$ in. (no stand-off); $t = 0.375$ in.

Ledger Angle^R: $L_1 \times L_2 \times t_{L1} \times t_{L2} \times l = 4.000$ in. x 4.000 in. x 0.375 in. x 0.375 in. x 20.000 in.;

Load Point Height: $h_{pl} = 0.000$ in.

Base material: Grout-filled CMU, L x W x H: 16.000 in. x 8.000 in. x 8.000 in.;

Joints: vertical: 0.375 in.; horizontal: 0.375 in.; Head (vertical) joints are completely filled with grout or mortar

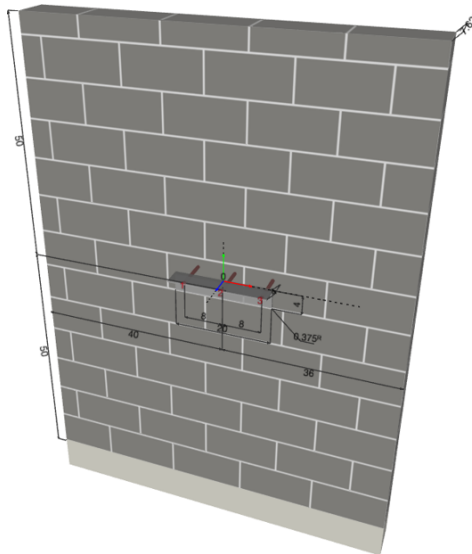
Base material temperature: 68 °F

Installation: Face installation

Seismic loads: no

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

Geometry [in.]

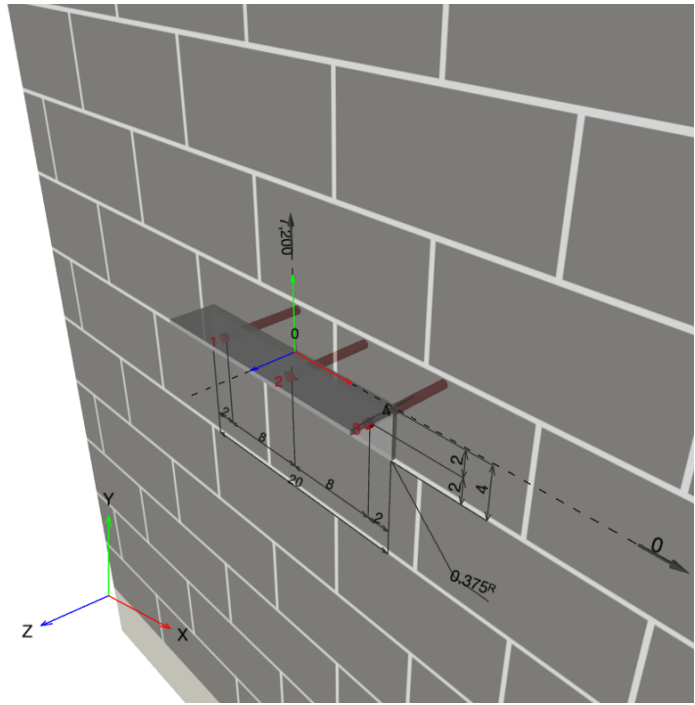


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Geometry [in.] & Loading [lb, in.lb]



1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 0; V _x = 0; V _y = 7,200; M _x = 0; M _y = 0; M _z = 0;	no	171

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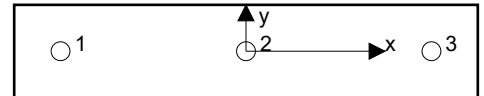
2 Load case/Resulting anchor forces

Load case: Service loads

Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	0	2,400	0	2,400
2	0	2,400	0	2,400
3	0	2,400	0	2,400



max. compressive strain: - [%]
max. 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]

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



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3 Tension load (Most utilized anchor 2)

	Load P_s [lb]	Capacity P_t [lb]	Utilization $\beta_p = P_s/P_t$ [%]	Status
Overall strength	N/A	N/A	N/A	N/A



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4 Shear load (Most utilized anchor 2)

	Load V_s [lb]	Capacity V_t [lb]	Utilization $\beta_V = V_s/V_t$ [%]	Status
Steel strength	2,400	5,445	45	OK
Bond strength para and perp, (Dir. x-) ¹	-	-	171	not recommended

¹Shear utilization may result from parallel and perpendicular shear (see details)

4.1 Steel strength

$V_{t,s}$ = Value refer to Hilti Technical Data

$$V_{t,s} \geq V_s$$

Results

$V_{t,s}$ [lb]	V_s [lb]
5,445	2,400

4.2 Bond strength parallel

$V_{t,b,Base,||}$ = Value refer to Hilti Technical Data

$$V_{t,b,||} = V_{t,b,Base,||} \cdot f_{red,E,||} \cdot f_{red,s,||} \cdot f_{red,Temp}$$

$$V_{t,b,||} \geq V_{s,||}$$

Variables

c_{min} [in.]	c_{cr} [in.]	s_{min} [in.]	s_{cr} [in.]	Temperature [°F]
4.000	20.000	4.000	27.000	68

Results

$V_{t,b, }$ [lb]	$V_{t,b,Base, }$ [lb]	$V_{s, }$ [lb]	$f_{red,E, }$	$f_{red,s, }$	$f_{red,Temp}$	Utilization $\beta_{V, }$ [%]
1,409	4,090	2,400	1.000	0.345	1.000	170

How is this being determined?

4.3 Bond strength perpendicular

$V_{t,b,Base,\perp}$ = Value refer to Hilti Technical Data

$$V_{t,b,\perp} = V_{t,b,Base,\perp} \cdot f_{red,E,\perp} \cdot f_{red,s,\perp} \cdot f_{red,Temp}$$

$$V_{t,b,\perp} \geq V_{s,\perp}$$

Variables

c_{min} [in.]	c_{cr} [in.]	s_{min} [in.]	s_{cr} [in.]	Temperature [°F]
4.000	20.000	4.000	27.000	68

Results

$V_{t,b,\perp}$ [lb]	$V_{t,b,Base,\perp}$ [lb]	$V_{s,\perp}$ [lb]	$f_{red,E,\perp}$	$f_{red,s,\perp}$	$f_{red,Temp}$	Utilization $\beta_{V,\perp}$ [%]
0	4,090	0	0.000	0.000	1.000	0



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4.4 Shear interaction

$\beta_{V,\parallel} = \frac{V_{s,\parallel}}{V_{t,\parallel}}$	$\beta_{V,\perp} = \frac{V_{s,\perp}}{V_{t,\perp}}$	δ	Utilization β_V [%]	Status
1.703	0.000	1.000	171	not recommended

$\beta_V = \beta_{V,\parallel}^\delta + \beta_{V,\perp}^\delta \leq 1.0$

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!
- 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/>
- The min. sizes of the bricks, the masonry compressive strength, the type / strength of the mortar and the grout (in case of fully grouted CMU walls) has to fulfill the requirements given in the relevant ESR-approval or in the PTG.
- Only the local load transfer from the anchor(s) to the wall is considered, a further load transfer in the wall is not covered by PROFIS!
- Wall is assumed as being perfectly aligned vertically – checking required(!): Noncompliance can lead to significantly different distribution of forces and higher tension loads than those calculated by PROFIS. Masonry wall must not have any damages (neither visible nor not visible)! While installation, the positioning of the anchors needs to be maintained as in the design phase i.e. either relative to the brick or relative to the mortar joints.
- The effect of the joints on the compressive stress distribution on the plate / bricks was not taken into consideration.
- If no significant resistance is felt over the entire depth of the hole when drilling (e.g. in unfilled butt joints), the anchor should not be set at this position or the area should be assessed and reinforced. Hilti recommends the anchoring in masonry always with sieve sleeve. Anchors can only be installed without sieve sleeves in solid bricks when it is guaranteed that it has not any hole or void.
- The accessories and installation remarks listed on this report are for the information of the user only. In any case, the instructions for use provided with the product have to be followed to ensure a proper installation.
- The compliance with current standards (e.g. 2018, 2015, 2012, 2009 and 2006 IBC) is the responsibility of the user.
- Drilling method (hammer, rotary) to be in accordance with the approval!
- Masonry needs to be built in a regular way in accordance with state-of the art guidelines!

Fastening does not meet the design criteria!

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6 Installation data

Hole diameter in the fixture: $d_f = 0.812$ in.

Plate thickness (input): 0.375 in.

Drilling method: Drilled in hammer mode

Anchor type and diameter: HY 270 + threaded rod 5.8 3/4
 Item number: 385432 HAS 5.8 3/4"x10" (element) /
 2194247 HIT-HY 270 (adhesive)

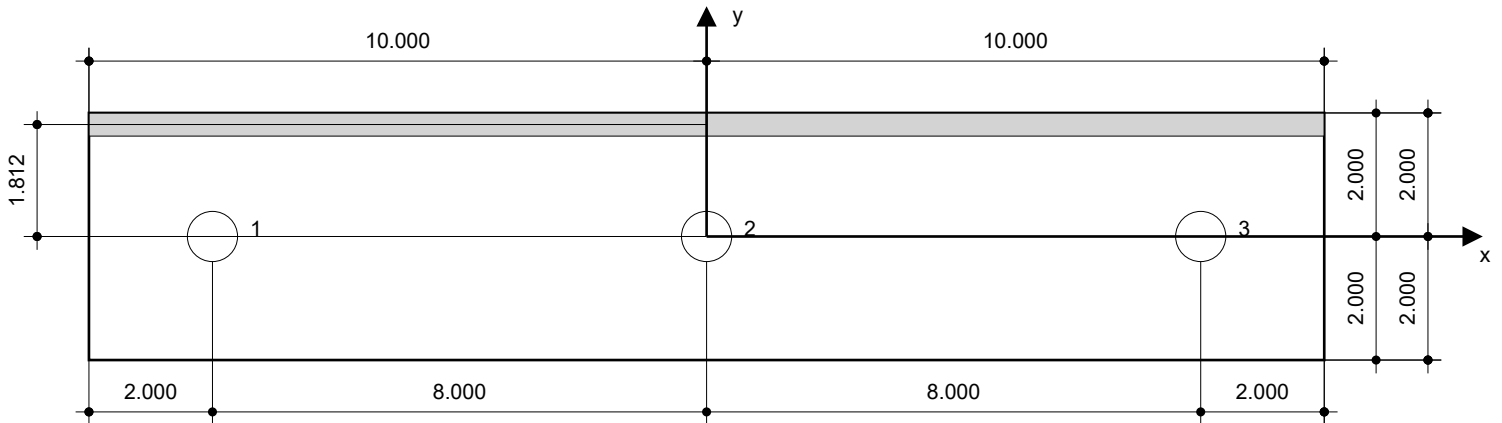
Maximum installation torque: 120 in.lb

Hole diameter in the base material: 0.875 in.

Hole depth in the base material: 6.750 in.

Minimum thickness of the base material: 7.625 in.

Hilti HIT-V threaded rod with HIT-HY 270 injection mortar with 6.75 in embedment h_{ef} , 3/4, Steel galvanized, Hammer drilled installation per instruction for use



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-8.000	0.000	32.000	44.000	50.000	50.000
2	0.000	0.000	40.000	36.000	50.000	50.000
3	8.000	0.000	48.000	28.000	50.000	50.000



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7 Remarks; Your Cooperation Duties

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