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Company:	RVint Engineering Ltd.	Page:	1
Address:	23 Nunnery Lane, YO23 1AB, York	Specifier:	Andrew Milner
Phone I Fax:	01904636494 |	E-Mail:	andrew@rvengineering.co.uk
Design:	Fulford Bronte Corner	Date:	03/08/2022
Fastening Point:			

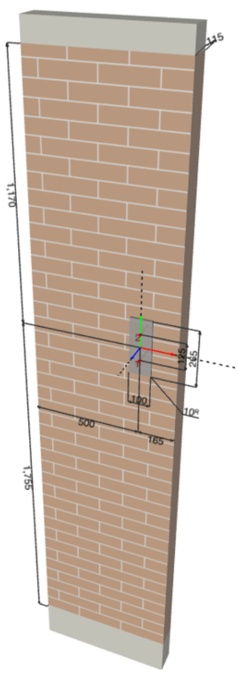
Specifier's comments:

1 Input data

Anchor type and size:	**HIT-HY 270 + HAS-U 8.8 HDG M10**
Item number:	2223948 HAS-U 8.8 HDG M10x190 (insert) / 2092828 HIT-HY 270 (mortar)
Effective embedment depth:	$h_{ef,opti}$ = 80.0 mm ($h_{ef,limit}$ = 85.0 mm)
Material:	8.8
Approval No.:	ETA-19/0160
Issued I Valid:	30/08/2019 | -
Proof:	Design Method EOTA TR054
Stand-off installation:	e_b = 0.0 mm (no stand-off); t = 10.0 mm
Baseplate^R :	l_x x l_y x t = 100.0 mm x 265.0 mm x 10.0 mm; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	Brick layout: Stretcher; Brick: Mz, NF, f=20 (solid brick), Clay, L x W x H: 240.0 mm x 115.0 mm x 72.0 mm;
	$f_{b,v}$ = 20.00 N/mm^2; E_{wall} = 4,478.00 N/mm^2
	Mortar: M2,5 - M9; Vertical joints filled: YES; vertical: 5.0 mm; horizontal: 5.0 mm
Installation/Use:	Installation condition: wet; Use condition: wet;
	Cleaning: compressed air
	Temp. short/long: 40/24 °C

^{R} - The anchor calculation is based on a rigid baseplate assumption.

Geometry [mm]



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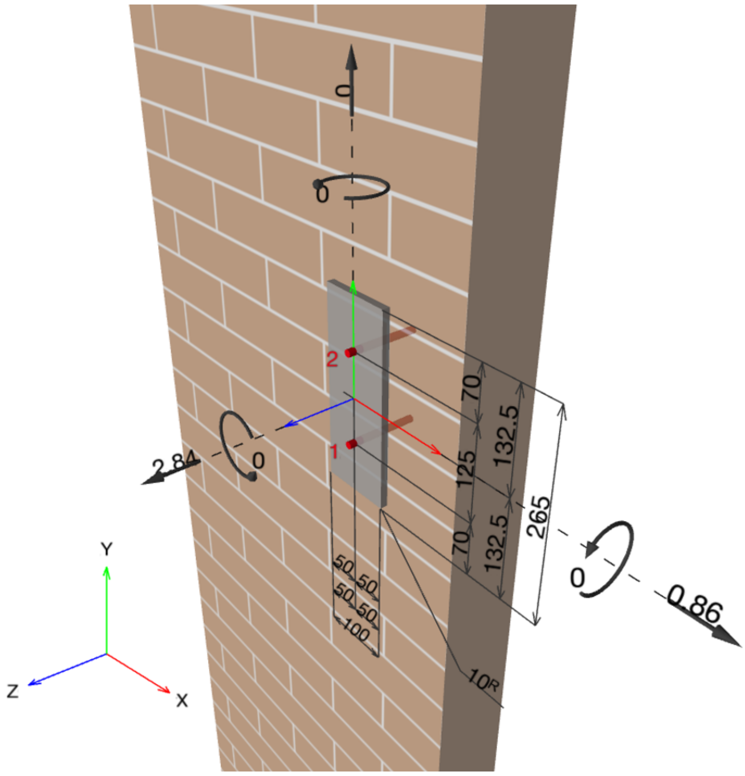
Geometry [mm] & Loading [kN, kNm]



1.1 Load combination

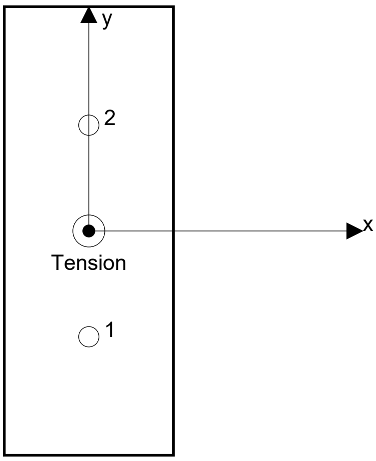
Case	Description	Forces [kN] / Moments [kNm]	Seismic	Fire	Max. Util. Anchor [%]
1	Load case: Design loads	N = 2.840; V_x = 0.860; V_y = 0.000; M_x = 0.000; M_y = 0.000; M_z = 0.000;	no	no	100

2 Load case/Resulting anchor forces

Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	1.420	0.430	0.430	0.000
2	1.420	0.430	0.430	0.000



max. compressive strain: - [‰]
max. compressive stress: - [N/mm^2]
resulting tension force in (x/y)=(0.0/0.0): 2.840 [kN]
resulting compression force in (x/y)=(0.0/0.0): 0.000 [kN]

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

3 Tension load (EOTA TR054, Section 4.2.1)

	Load [kN]	Capacity [kN]	Utilization β_N [%]	Status
Steel failure*	1.420	30.933	5	OK
Pull-out failure*	1.420	1.600	89	OK
Brick breakout**	2.840	3.200	89	OK
Pullout of one brick**	1.420	46.699	4	OK

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

3.1 Steel failure

$N_{Rk,s}$ [kN]	$\gamma_{M,s}$	$N_{Rd,s}$ [kN]	N_{Sd} [kN]	A-ID
46.400	1.500	30.933	1.420	2

3.2 Pull-out failure

$N_{Rk,p}$ [kN]	α_j	$\gamma_{M,m}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]	A-ID
4.000	1.000	2.500	1.600	1.420	1

3.3 Brick breakout

$s_{\parallel}$ [mm]	$c_{\parallel}$ [mm]	$s_{ETA,\parallel}$ [mm]	$c_{ETA,\parallel}$ [mm]	$\alpha_{g,N,\parallel}$	$e_{c,N,\parallel}$ [mm]	$\psi_{g,N,\parallel}$
0.0	0.0	0.0	0.0	1.000	0.0	1.000

$s_{\perp}$ [mm]	$c_{\perp}$ [mm]	$s_{ETA,\perp}$ [mm]	$c_{ETA,\perp}$ [mm]	$\alpha_{g,N,\perp}$	$e_{c,N,\perp}$ [mm]	$\psi_{g,N,\perp}$
125.0	165.0	115.0	115.0	2.000	0.0	1.000

$N_{Rk,b,ETA}$ [kN]	$N_{Rk,b}$ [kN]	c_j [mm]	$c_{j,min,ETA}$ [mm]	α_j
4.000	8.000	42.5	50.0	1.000

$\gamma_{M,m}$	$N_{Rd,b}$ [kN]	N_{sd} [kN]
2.500	3.200	2.840

3.4 Pullout of one brick

A^H_{act} [mm^2]	A^V_{act} [mm^2]	f_{vko} [N/mm^2]	σ_d [N/mm^2]
55,200	8,280	0.20	5.00

$N_{Rk,pb}$ [kN]	$\gamma_{M,m}$	$N_{Rd,pb}$ [kN]	N_{Sd} [kN]
116.748	2.500	46.699	1.420

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4 Shear load (EOTA TR054, Section 4.2.2)

	Load [kN]	Capacity [kN]	Utilization β_V [%]	Status
Steel failure (without lever arm)*	0.430	18.560	3	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Local brick failure*	-	-	31	OK
Brick edge failure in direction x+**	-	-	19	OK
Pushing out of one brick in direction x+**	0.860	69.552	2	OK

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

4.1 Steel failure (without lever arm)

$V_{Rk,s}$ [kN]	$\gamma_{M,s}$	$V_{Rd,s}$ [kN]	V_{Sd} [kN]	A-ID
23.200	1.250	18.560	0.430	2

4.2 Local brick failure

A1-ID	A2-ID	s [mm]	c [mm]
1	2	125.0	165.0

$s_{ETA,\parallel}$ [mm]	$c_{ETA,\parallel}$ [mm]	$V_{Rk,b,ETA,\parallel}$ [kN]	$\alpha_{g,V,\parallel}$	$e_{c,V,\parallel}$ [mm]	$\psi_{g,V,\parallel}$	$\alpha_{j,\parallel}$
0.0	0.0	0.000	0.000	0.0	0.000	0.000

$s_{ETA,\perp}$ [mm]	$c_{ETA,\perp}$ [mm]	$V_{Rk,b,ETA,\perp}$ [kN]	$\alpha_{g,V,\perp}$	$e_{c,V,\perp}$ [mm]	$\psi_{g,V,\perp}$	$\alpha_{j,\perp}$
75.0	120.0	7.000	1.000	0.0	1.000	1.000

$\gamma_{M,m}$
2.500

$V_{Rk,b,\parallel}$ [kN]	$V_{Rd,b,\parallel}$ [kN]	$V_{sd,\parallel}$ [kN]	$\beta_{\parallel}$
0.000	0.000	0.000	-

$V_{Rk,b,\perp}$ [kN]	$V_{Rd,b,\perp}$ [kN]	$V_{sd,\perp}$ [kN]	$\beta_{\perp}$
7.000	2.800	0.860	0.307

$\beta_{\parallel+\perp}$
0.307

4.3 Brick edge failure in direction x+

A1-ID	A2-ID	s [mm]	c [mm]
1	2	125.0	165.0

$s_{ETA,\|\|}$ [mm]	$c_{ETA,\|\|}$ [mm]	$V_{Rk,c,ETA,\|\|}$ [kN]	$\alpha_{g,V,\|\|}$	$\alpha_{j,\|\|}$
-	-	-	-	-

$s_{ETA,\perp}$ [mm]	$c_{ETA,\perp}$ [mm]	$\alpha_{g,V,\perp}$	$\alpha_{j,\perp}$	$e_{c,V,\perp}$ [mm]	$\psi_{g,V,\perp}$
75.0	120.0	1.000	1.000	0.0	1.000

k	d_{nom} [mm]	h_{ef} [mm]	$f_{b,v}$ [N/mm^2]	$\gamma_{M,m}$
0.250	10.0	80.0	20.00	2.500

$V_{Rk,c,\|\|}$ [kN]	$V_{Rd,c,\|\|}$ [kN]	$V_{sd,\|\|}$ [kN]	$\beta_{\|\|}$
-	-	-	-

$V_{Rk,c,\perp}$ [kN]	$V_{Rd,c,\perp}$ [kN]	$V_{sd,\perp}$ [kN]	$\beta_{\perp}$
11.358	4.543	0.860	0.189

$\beta_{\|\|+\perp}$
0.189

4.4 Pushing out of one brick in direction x+

A^H_{act} [mm^2]	f_{vko} [N/mm^2]	σ_d [N/mm^2]
82,800	0.20	5.00

$V_{Rk,pb}$ [kN]	$\gamma_{M,m}$	$V_{Rd,pb}$ [kN]	V_{Sd} [kN]
173.880	2.500	69.552	0.860

5 Combined tension and shear loads ((EOTA TR054, Section 4.2.3))

β_N	β_V	α	Utilization $\beta_{N,V}$ [%]	Status
0.887	0.307	1.000	100	OK

$(\beta_N + \beta_V) / 1.2 \leq 1$

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6 Warnings

- The anchor design methods in PROFIS Engineering require rigid baseplates 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 baseplate are not considered - the baseplate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required baseplate thickness with CBFEM to limit the stress of the baseplate based on the assumptions explained above. The proof if the rigid baseplate 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!
- 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. EOTA TR054, EOTA TR053) is the responsibility of the user.
- The Young's modulus of the wall E_{wall} (not plastered!) is determined in accordance to EN 1996-1-1:2012
- 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!
- Please note that, for ETA approved masonry units, the resistance and parameters are only valid for that particular brick (hollow/solid) or for bricks of the same base material with larger size and larger compressive strength (solid), according to EOTA TR054.

Fastening meets the design criteria!

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7 Installation data

Baseplate, steel: S 235; E = 210,000.00 N/mm^2; f_{yk} = 235.00 N/mm^2

Profile: no profile

Hole diameter in the fixture: d_f = 12.0 mm

Plate thickness (input): 10.0 mm

Recommended plate thickness: not calculated

Drilling method: Drilled in hammer mode

Cleaning: compressed air

Fastening option: Pre-fastening

Anchor type and size: HIT-HY 270 + HAS-U 8.8 HDG M10

Item number: 2223948 HAS-U 8.8 HDG M10x190 (insert) / 2092828 HIT-HY 270 (mortar)

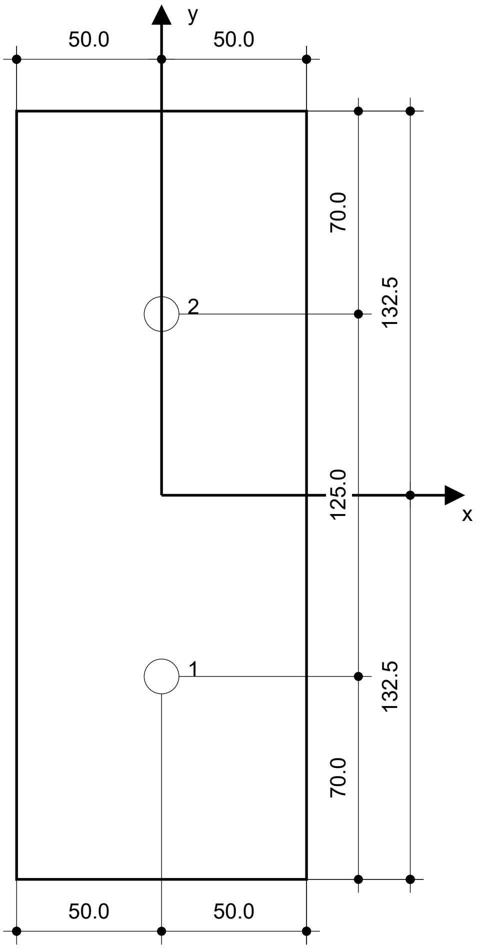
Maximum installation torque: 8 Nm

Hole diameter in the base material: 12.0 mm

Hole depth in the base material: 80.0 mm

Minimum thickness of the base material: 110.0 mm

Hilti HAS-U threaded rod with HIT-HY 270 injection mortar with 80 mm embedment h_ef, M10, Hot dip galvanized, Hammer drilling installation per ETA-19/0160



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0.0	-62.5	500.0	165.0	1,692.5	1,232.5
2	0.0	62.5	500.0	165.0	1,817.5	1,107.5

8 Remarks; Your Cooperation Duties

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