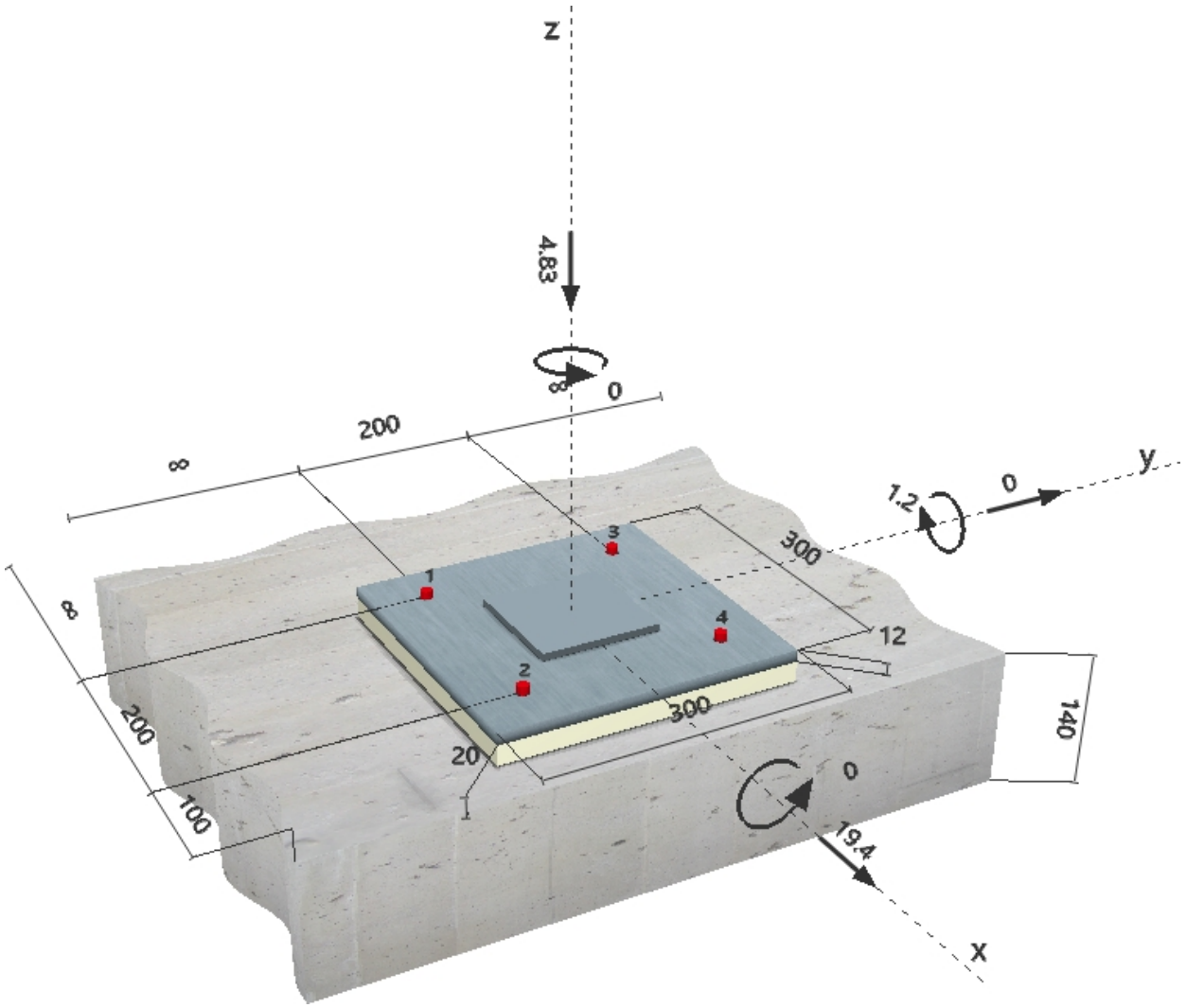
Company:	Behradin Energy	Page:	1
Specifier:	Arash Pourshafiee	Project:	Razi Insurance Building
Address:	Unit1-No. 34-Gomnam Highway-fatemi Sq.	Sub-Project I Pos. No.:	
Phone I Fax:	+98 (21) 8899 2840 | +98 (21) 8895 0741	Date:	08/24/2016
E-Mail:	info@behradin.com		

Specifier's comments:

1 Input data

Anchor type and diameter:	**HST M12**
Effective embedment depth:	h_{ef} = 70 mm, h_{nom} = 80 mm
Material:	
Evaluation Service Report:	ETA 98/0001
Issued I Valid:	05/08/2013 | 02/20/2018
Proof:	design method ETAG (No. 001 Annex C/2010)
Stand-off installation:	without clamping (anchor); restraint level (anchor plate): 2.0; e_b = 20 mm; t = 12 mm
	Hilti Grout: , multipurpose, $f_{c,Grout}$ = 30.00 N/mm^2
Anchor plate:	l_x x l_y x t = 300 mm x 300 mm x 12 mm; (Recommended plate thickness: not calculated)
Profile:	Square bar; (L x W x T) = 120 mm x 120 mm x 0 mm
Base material:	uncracked concrete, C30/37, f_{cc} = 37.00 N/mm^2; h = 140 mm
Reinforcement:	no reinforcement or reinforcement spacing >= 150 mm (any Ø) or >= 100 mm (Ø <= 10 mm)
	no longitudinal edge reinforcement
	Reinforcement to control splitting according to ETAG 001, Annex C, 5.2.2.6 present.

Geometry [mm] & Loading [kN, kNm]



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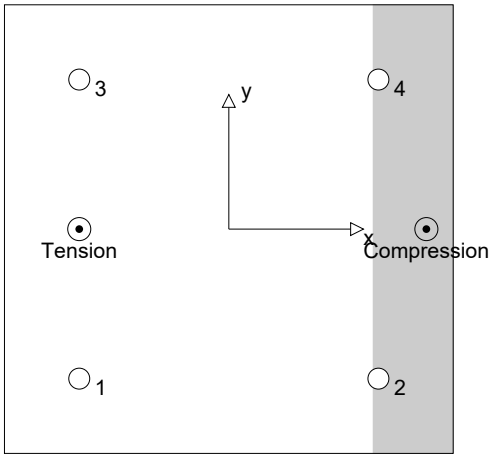
2 Load case/Resulting anchor forces

Load case: Design loads



Anchor reactions [kN]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	1.211	4.850	4.850	0.000
2	0.000	4.850	4.850	0.000
3	1.211	4.850	4.850	0.000
4	0.000	4.850	4.850	0.000

max. concrete compressive strain: 0.03 [‰]
max. concrete compressive stress: 0.90 [N/mm^2]
resulting tension force in (x/y)=(-100/0): 2.422 [kN]
resulting compression force in (x/y)=(132/0): 7.252 [kN]

3 Tension load (ETAG, Annex C, Section 5.2.2)

	Load [kN]	Capacity [kN]	Utilization β_N [%]	Status
Steel Strength*	1.211	30.000	5	OK
Pullout Strength*	1.211	16.221	8	OK
Concrete Breakout Strength**	2.422	46.832	6	OK
Splitting failure**	N/A	N/A	N/A	N/A

* anchor having the highest loading **anchor group (anchors in tension)

3.1 Steel Strength

$N_{Rk,s}$ [kN]	$\gamma_{M,s}$	$N_{Rd,s}$ [kN]	N_{Sd} [kN]
45.000	1.500	30.000	1.211

3.2 Pullout Strength

$N_{Rk,p}$ [kN]	ψ_c	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]
20.000	1.217	1.500	16.221	1.211

3.3 Concrete Breakout Strength

$A_{c,N}$ [mm^2]	$A^0_{c,N}$ [mm^2]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]
86100	44100	105	210

$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$	k_1
0	1.000	0	1.000	1.000	1.000	10.100

$N^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]
35.981	1.500	46.832	2.422

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4 Shear load (ETAG, Annex C, Section 5.2.3)

	Load [kN]	Capacity [kN]	Utilization β_V [%]	Status
Steel Strength (without lever arm)*	N/A	N/A	N/A	N/A
Steel failure (with lever arm)*	4.850	5.038	97	OK
Pryout Strength**	19.400	195.863	10	OK
Concrete edge failure in direction x+**	19.400	25.475	77	OK

* anchor having the highest loading **anchor group (relevant anchors)

4.1 Steel failure (with lever arm)

l [mm]	α_M
32	2.00

$N_{Sd} / N_{Rd,s}$	$1 - N_{Sd} / N_{Rd,s}$	M^0_{Rk} [kNm]	$M_{Rk,s} = M^0_{Rk,s} (1 - N_{Sd}/N_{Rd,s})$ [kNm]
0.040	0.960	0.105	0.101

$V^M_{Rk,s} = \alpha_M * M_{Rk,s} / l$ [kN]	$\gamma_{Ms,b,V}$	$V^M_{Rd,s}$ [kN]	V_{Sd} [kN]
6.298	1.250	5.038	4.850

4.2 Pryout Strength

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k-factor
166050	44100	105	210	2.200

$e_{c1,V}$ [mm]	$\psi_{ec1,N}$	$e_{c2,V}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$	$N^0_{Rk,c}$ [kN]
0	1.000	0	1.000	0.986	1.000	35.981

$\gamma_{M,c,p}$	$V_{Rd,c1}$ [kN]	V_{Sd} [kN]
1.500	195.863	19.400

4.3 Concrete edge failure in direction x+

l_f [mm]	d_{nom} [mm]	k_1	α	β
70	12.0	2.400	0.084	0.065

c_1 [mm]	$A_{c,V}$ [mm²]	$A^0_{c,V}$ [mm²]
100	70000	45000

$\psi_{s,V}$	$\psi_{h,V}$	$\psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$
1.000	1.035	1.000	0	1.000	1.000

$V^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	V_{Sd} [kN]
23.733	1.500	25.475	19.400

5 Combined tension and shear loads (ETAG, Annex C, Section 5.2.4)

β_N	β_V	α	Utilization $\beta_{N,V}$ [%]	Status
0.075	0.963	1.000	87	OK

$(\beta_N + \beta_V) / 1.2 <= 1$

Company:	Behradin Energy	Page:	4
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6 Displacements (highest loaded anchor)

Short term loading:

N_{Sk} = 0.000 [kN]
V_{Sk} = 7.185 [kN]

δ_N = 0.000 [mm]
δ_V = 1.329 [mm]
δ_{NV} = 1.329 [mm]

Long term loading:

N_{Sk} = 0.000 [kN]
V_{Sk} = 7.185 [kN]

δ_N = 0.000 [mm]
δ_V = 1.976 [mm]
δ_{NV} = 1.976 [mm]

Comments: Tension displacements are valid with half of the required installation torque moment for uncracked concrete! Shear displacements are valid without friction between the concrete and the anchor plate! The gap due to the drilled hole and clearance hole tolerances are not included in this calculation!

The acceptable anchor displacements depend on the fastened construction and must be defined by the designer!

7 Warnings

- To avoid failure of the anchor plate the required thickness can be calculated in PROFIS Anchor. Load re-distributions 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 loading!
- Checking the transfer of loads into the base material is required in accordance with ETAG 001, Annex C(2010)Section 7! The software considers that the grout is installed under the anchor plate without creating air voids and before application of the loads.
- The design is only valid if the clearance hole in the fixture is not larger than the value given in Table 4.1 of ETAG 001, Annex C! For larger diameters of the clearance hole see Chapter 1.1. of ETAG 001, Annex C!
- The accessory list in this report is 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.

Fastening meets the design criteria!

Company:	Behradin Energy	Page:	5
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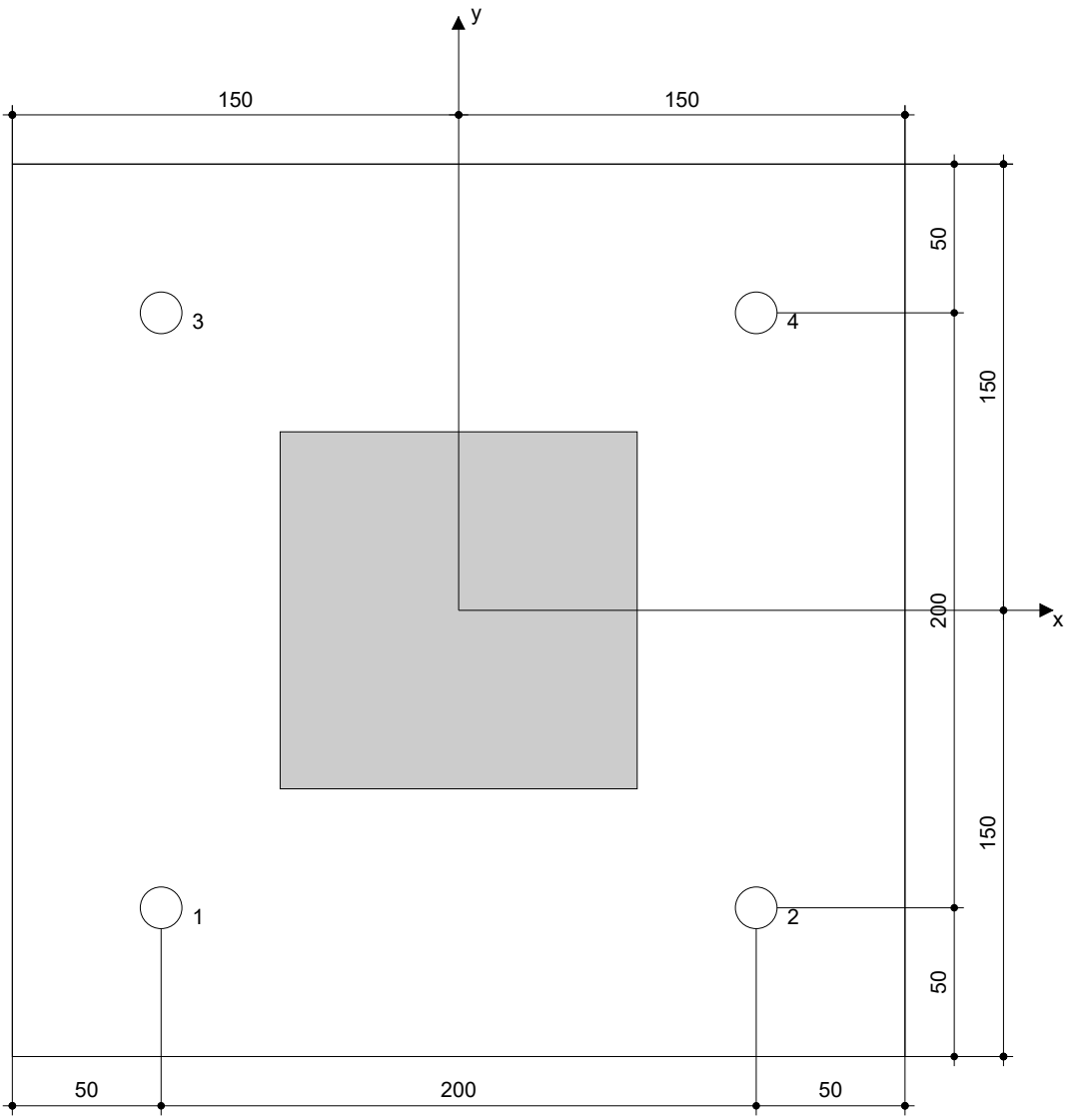
8 Installation data

Anchor plate, steel: -
Profile: Square bar; 120 x 120 x 0 mm
Hole diameter in the fixture: d_f = 14 mm
Plate thickness (input): 12 mm
Recommended plate thickness: not calculated
Anchor type and diameter: HST, M12
Installation torque: 0.060 kNm
Hole diameter in the base material: 12 mm
Hole depth in the base material: 95 mm
Minimum thickness of the base material: 140 mm
Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

8.1 Required accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer	• Manual blow-out pump	• Torque wrench
• Properly sized drill bit		• Hammer



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-100	-100	-	300	-	-
2	100	-100	-	100	-	-
3	-100	100	-	300	-	-
4	100	100	-	100	-	-

Company:	Behradin Energy	Page:	6
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9 Remarks; Your Cooperation Duties

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