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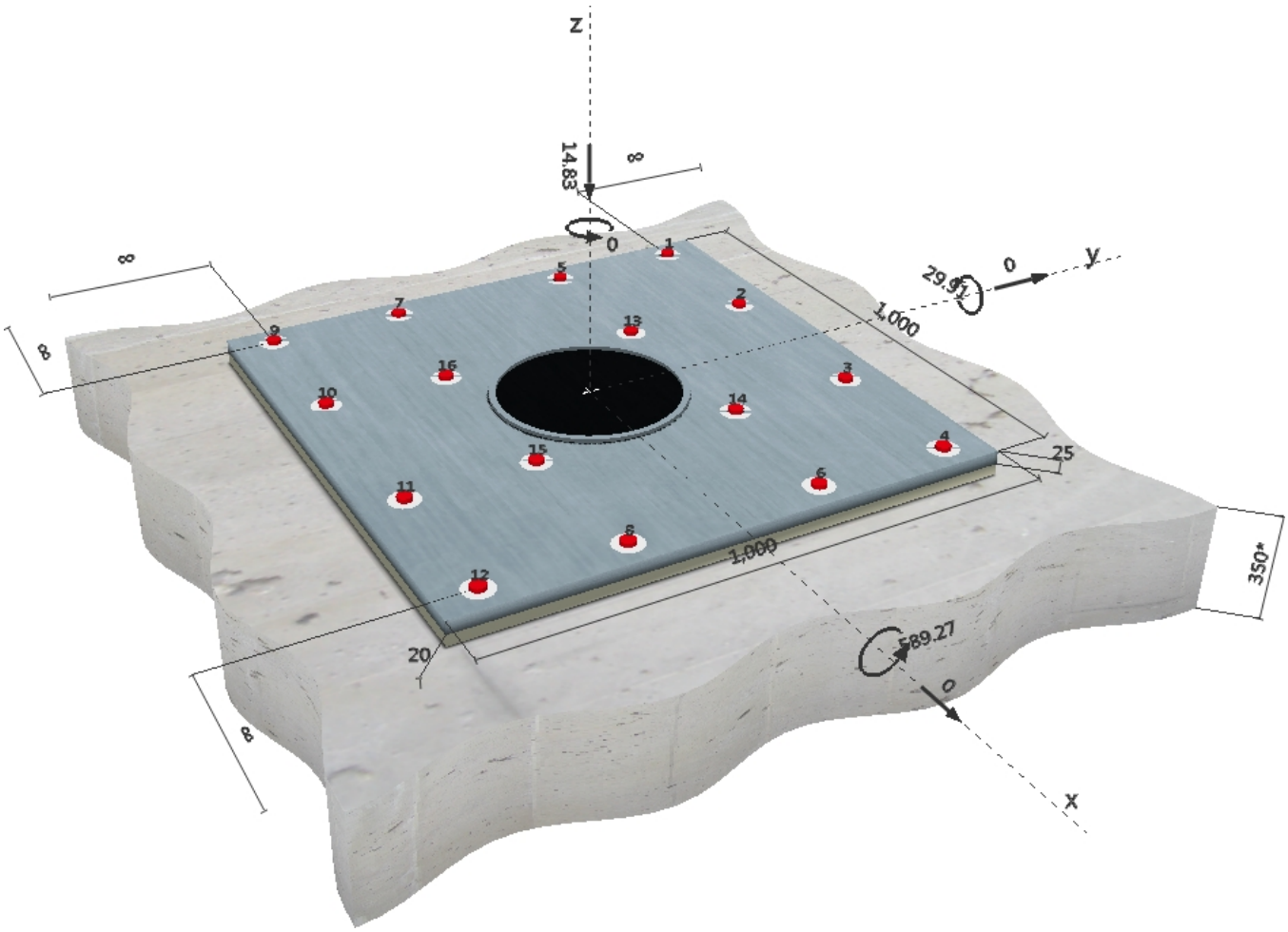
Specifier's comments: Check of Existing Base plate (B6)- According to max. forces on Node No. 11979 , LC 1.4(D.L.+WX)

1 Input data

Anchor type and diameter:	**HIT-HY 200 + HIT-V-F (8.8) M27**
Seismic/Filling set or any suitable annular gap filling solution	
Effective embedment depth:	$h_{ef,act}$ = 290 mm ($h_{ef,limit}$ = - mm)
Material:	8.8
Evaluation Service Report:	ETA 11/0493
Issued I Valid:	2/3/2017 | -
Proof:	Engineering judgement SOFA BOND - based on ETAG BOND testing
Stand-off installation:	without clamping (anchor); restraint level (anchor plate): 2.00; e_b = 20 mm; t = 25 mm
	Hilti Grout: , multipurpose, $f_{c,Grout}$ = 30.00 N/mm^2
Anchor plate:	l_x x l_y x t = 1000 mm x 1000 mm x 25 mm; (Recommended plate thickness: not calculated
Profile:	Pipe; (L x W x T) = 355 mm x 355 mm x 12 mm
Base material:	uncracked concrete, , $f_{c,cube}$ = 60.00 N/mm^2; h = 350 mm, Temp. short/long: 40/24 °C
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	reinforcement spacing < 150 mm (any Ø) or < 100 mm (Ø <= 10 mm)
	with longitudinal edge reinforcement d >= 12 + close mesh (stirrups, hangers) s <=

Geometry [mm] & Loading [kN, kNm]



Company: Obeikan Tensile Struct
Specifier: Mohamed Maher
Address: Riyadh, KSA
Phone I Fax: |
E-Mail:

1.1 Load combination

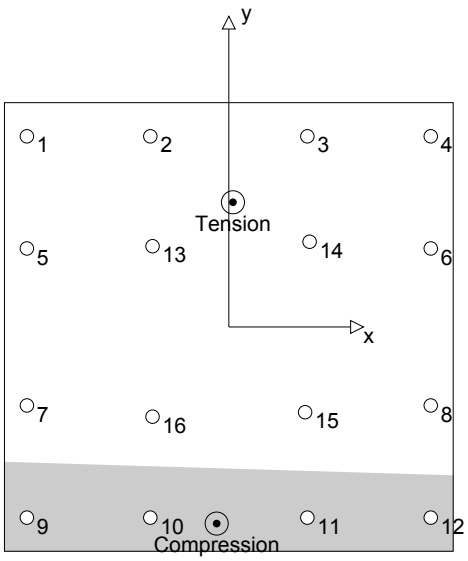
Case	Description	Forces [kN] / Moments [kNm]	Seismic	Fire	Max. Util. [%]
1	LC1 NODE 9416	V_x = 0.000; V_y = 0.000; N = -22.700; M_x = 571.350; M_y = -35.100; M_z = 0.000	no	no	151
2	LC1 NODE 9421	V_x = 0.000; V_y = 0.000; N = -18.690; M_x = 563.600; M_y = -76.480; M_z = 0.000	no	no	153
3	**LC3 NODE 9421**	**V_x = 0.000; V_y = 0.000; N = -14.830; M_x = 589.270; M_y = -29.910; M_z = 0.000**	**no**	**no**	**157**
4	LC3 NODE 9429	V_x = 0.000; V_y = 0.000; N = -30.420; M_x = -252.380; M_y = 222.760; M_z = 0.000	no	no	82
5	LC5 NODE 9429	V_x = 0.000; V_y = 0.000; N = -9.480; M_x = -211.760; M_y = 371.820; M_z = 0.000	no	no	103
6	LC6 NODE 9429	V_x = 0.000; V_y = 0.000; N = -10.550; M_x = -310.550; M_y = 296.940; M_z = 0.000	no	no	108
7	LC14 NODE 9429	V_x = 0.000; V_y = 0.000; N = -45.560; M_x = -247.180; M_y = 386.420; M_z = 0.000	no	no	107

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	108.198	0.000	0.000	0.000
2	109.426	0.000	0.000	0.000
3	110.989	0.000	0.000	0.000
4	112.217	0.000	0.000	0.000
5	70.997	0.000	0.000	0.000
6	75.016	0.000	0.000	0.000
7	18.916	0.000	0.000	0.000
8	22.934	0.000	0.000	0.000
9	0.000	0.000	0.000	0.000
10	0.000	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000
13	72.992	0.000	0.000	0.000
14	76.042	0.000	0.000	0.000
15	19.452	0.000	0.000	0.000
16	16.446	0.000	0.000	0.000



max. concrete compressive strain: 0.32 [‰]
max. concrete compressive stress: 9.70 [N/mm²]
resulting tension force in (x/y)=(9/278): 813.627 [kN]
resulting compression force in (x/y)=(-27/-438): 828.457 [kN]

3 Tension load (EOTA TR 029, Section 5.2.2)

	Load [kN]	Capacity [kN]	Utilization β_N [%]	Status
Steel Strength*	112.217	244.667	46	OK
Combined pullout-concrete cone failure**	813.627	863.004	95	OK
Concrete Breakout Strength**	813.627	666.309	123	not recommended
Splitting failure**	813.627	521.167	157	not recommended

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

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3.1 Steel Strength

$N_{Rk,s}$ [kN]	$\gamma_{M,s}$	$N_{Rd,s}$ [kN]	N_{Sd} [kN]
367.000	1.500	244.667	112.217

3.2 Combined pullout-concrete cone failure

$A_{p,N}$ [mm²]	$A^0_{p,N}$ [mm²]	$\tau_{Rk,ucr,25}$ [N/mm²]	$s_{cr,Np}$ [mm]	$c_{cr,Np}$ [mm]	c_{min} [mm]
2520701	699840	18.00	837	418	∞

ψ_c	$\tau_{Rk,ucr}$ [N/mm²]	k	$\psi^0_{g,Np}$	$\psi_{g,Np}$
1.101	19.82	3.200	1.000	1.000

$e_{c1,N}$ [mm]	$\psi_{ec1,Np}$	$e_{c2,N}$ [mm]	$\psi_{ec2,Np}$	$\psi_{s,Np}$	$\psi_{re,Np}$
8	0.980	138	0.752	1.000	1.000

$N^0_{Rk,p}$ [kN]	$N_{Rk,p}$ [kN]	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]
487.537	1294.507	1.500	863.004	813.627

3.3 Concrete Breakout Strength

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]
2628750	756900	435	870

$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
8	0.981	138	0.759	1.000	1.000

k_1	$N^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]
10.100	386.362	1.500	666.309	813.627

3.4 Splitting failure

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,sp}$ [mm]	$s_{cr,sp}$ [mm]	$\psi_{h,sp}$
4262267	1718197	655	1311	1.000

$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$	k_1
8	0.987	138	0.826	1.000	1.000	10.100

$N^0_{Rk,c}$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]
386.362	1.500	521.167	813.627

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4 Shear load (EOTA TR 029, 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)*	N/A	N/A	N/A	N/A
Pryout Strength*	N/A	N/A	N/A	N/A
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

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

5 Displacements (highest loaded anchor)

Short term loading:

N_{Sk} = 83.124 [kN] δ_N = 0.068 [mm]

V_{Sk} = 0.000 [kN] δ_V = 0.000 [mm]

δ_{NV} = 0.068 [mm]

Long term loading:

N_{Sk} = 83.124 [kN] δ_N = 0.135 [mm]

V_{Sk} = 0.000 [kN] δ_V = 0.000 [mm]

δ_{NV} = 0.135 [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!

6 Warnings

- The anchor design methods in PROFIS Anchor require rigid anchor plates per current regulations (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 Anchor 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 base plate assumption is valid is not carried out by PROFIS Anchor. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Checking the transfer of loads into the base material is required in accordance with EOTA TR 029, Section 7!
- The design is only valid if the clearance hole in the fixture is not larger than the value given in Table 4.1 of EOTA TR029! For larger diameters of the clearance hole see Chapter 1.1. of EOTA TR029!
- Your design has selected filled holes. Please ensure that there is a proper method to fill the annular gap between the fixture and HIT-HY 200 + HIT-V-F (8.8) M27, and contact Hilti in case of any questions.
- 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.
- Bore hole cleaning must be performed according to instructions for use (blow twice with oil-free compressed air (min. 6 bar), brush twice, blow twice with oil-free compressed air (min. 6 bar)).
- Characteristic bond resistances depend on short- and long-term temperatures.
- Please contact Hilti to check feasibility of HIT-V rod supply.
- The design method SOFA assumes that no hole clearance between the anchors and the fixture is present. This can be achieved by filling the gap with mortar of sufficient compressive strength (e.g. by using the HILTI Seismic/Filling set) or by other suitable means
- The compliance with current standards (e.g. EC3) is the responsibility of the user
- An SLS-check is not performed for SOFA and has to be provided by the user!

Fastening does not meet the design criteria!

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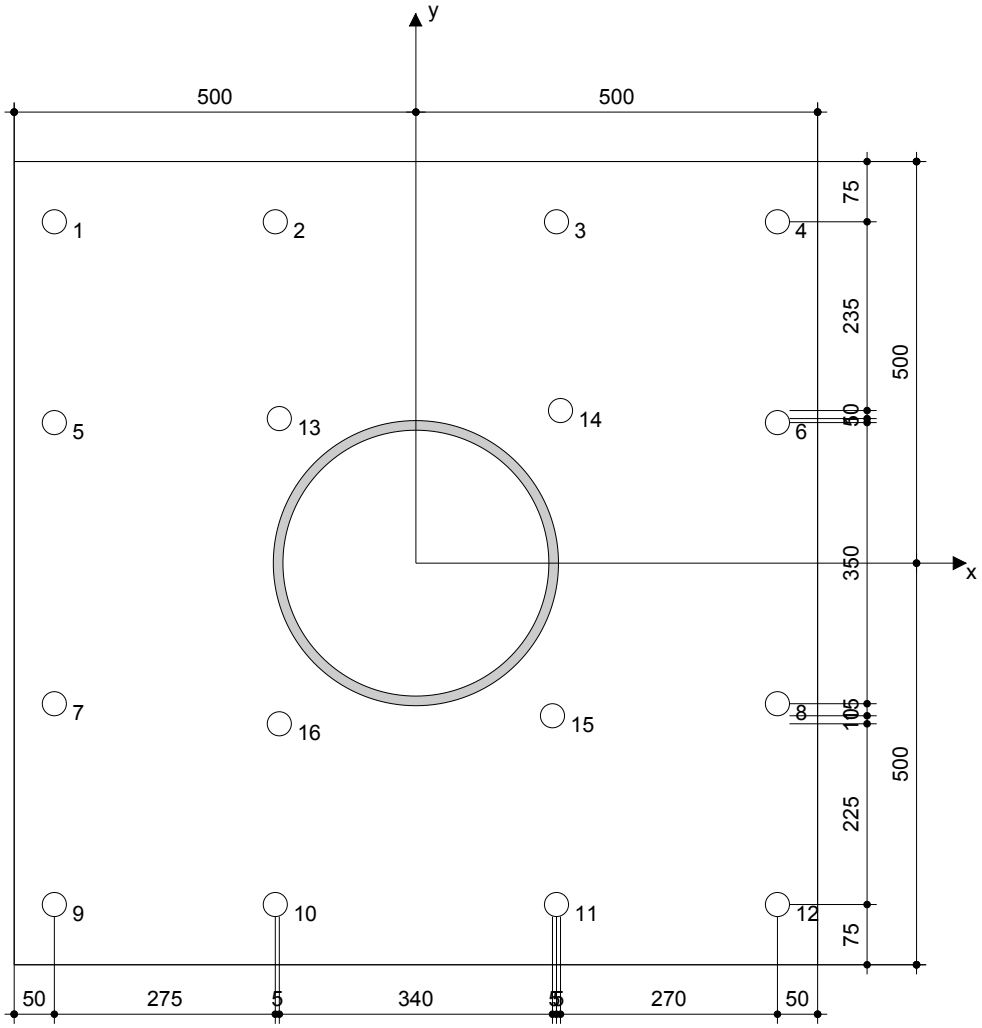
7 Installation data

Anchor plate, steel: -
Profile: Pipe; 355 x 355 x 12 mm
Hole diameter in the fixture: d_f = 30 mm
Plate thickness (input): 25 mm
Recommended plate thickness: not calculated
Drilling method: Hammer drilled
Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

Anchor type and diameter: HIT-HY 200 + HIT-V-F (8.8) M27
Installation torque: 0.270 kNm
Hole diameter in the base material: 30 mm
Hole depth in the base material: 290 mm
Minimum thickness of the base material: 350 mm

7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• Compressed air with required accessories to blow from the bottom of the hole • Proper diameter wire brush	• Dispenser including cassette and mixer • Seismic/Filling set • Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-450	425	-	-	-	-
2	-175	425	-	-	-	-
3	175	425	-	-	-	-
4	450	425	-	-	-	-
5	-450	175	-	-	-	-
6	450	175	-	-	-	-
7	-450	-175	-	-	-	-
8	450	-175	-	-	-	-

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
9	-450	-425	-	-	-	-
10	-175	-425	-	-	-	-
11	175	-425	-	-	-	-
12	450	-425	-	-	-	-
13	-170	180	-	-	-	-
14	180	190	-	-	-	-
15	170	-190	-	-	-	-
16	-170	-200	-	-	-	-

8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
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