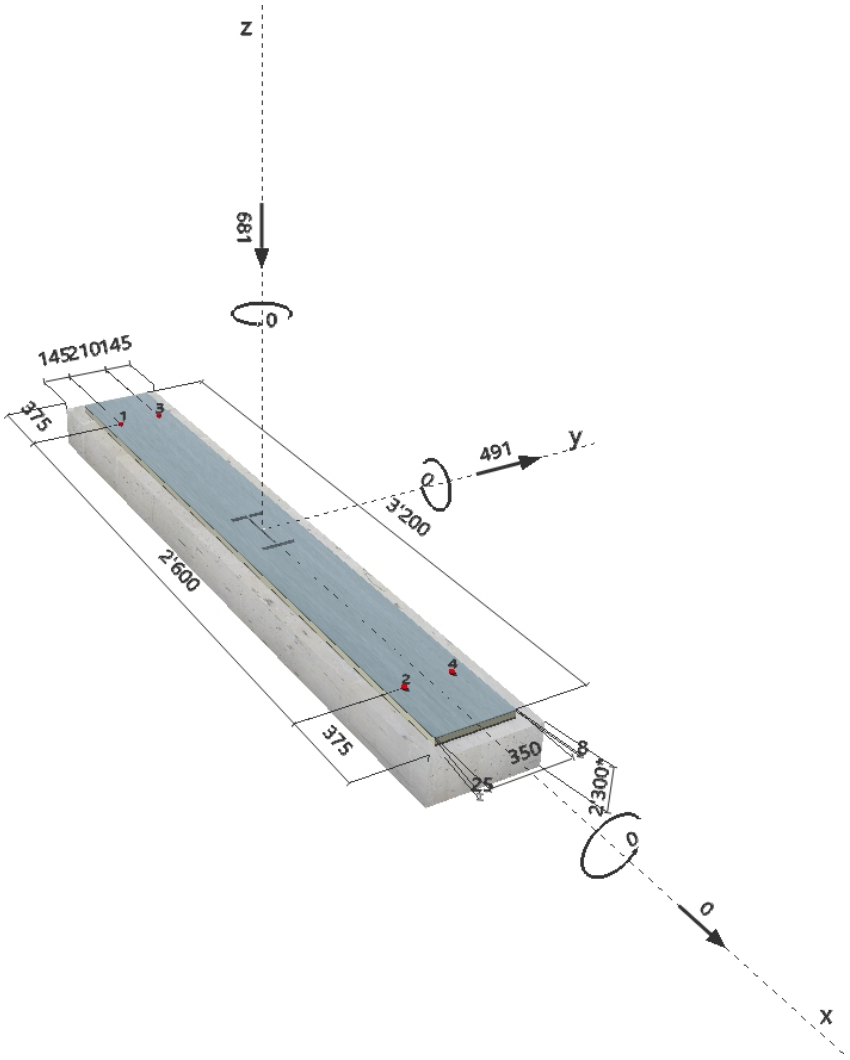
Company:	SILVANI	Page:	1
Specifier:		Project:	10640 ENPPI
Address:		Fastening Point:	TANK FOUNDATION
Phone I Fax:	|	Date:	13/04/2018
E-Mail:	alessandro.pagani@silvani.com		

Specifier's comments:

1 Input data

Anchor type and size:	**HIT-RE 500 V3 + HIT-V(5.8) M24**
Effective embedment depth:	$h_{ef,opti}$ = 96 mm ($h_{ef,limit}$ = 480 mm)
Material:	5.8
Approval No.:	ETA 16/0143
Issued I Valid:	28/07/2016 | -
Proof:	Design method ETAG BOND (EOTA TR 029)
Stand-off installation:	without clamping (anchor); restraint level (baseplate): 2.00; e_b = 25 mm; t = 8 mm
	Hilti Grout: , multipurpose, $f_{c,Grout}$ = 30.00 N/mm^2
Baseplate:	l_x x l_y x t = 3200 mm x 350 mm x 8 mm; (Recommended plate thickness: not calculated
Profile:	IPE; (L x W x T x FT) = 300 mm x 150 mm x 7 mm x 11 mm
Base material:	cracked concrete, C25/30, $f_{c,cube}$ = 30.00 N/mm^2; h = 2300 mm, Temp. short/long: 0/0 °C
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	No reinforcement or Reinforcement spacing >= 150 mm (any Ø) or >= 100 mm (Ø <= 10 mm)
	no longitudinal edge reinforcement

Geometry [mm] & Loading [kN, kNm]



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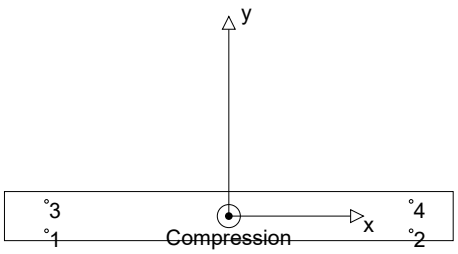
2 Load case/Resulting anchor forces

Load case: Design loads



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

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	0.000	122.750	0.000	122.750
2	0.000	122.750	0.000	122.750
3	0.000	122.750	0.000	122.750
4	0.000	122.750	0.000	122.750

max. concrete compressive strain: 0.02 [‰]
max. concrete compressive stress: 0.61 [N/mm^2]
resulting tension force in (x/y)=(0/0): 0.000 [kN]
resulting compression force in (x/y)=(0/0): 681.000 [kN]

3 Tension load (EOTA TR 029, Section 5.2.2)

	Load [kN]	Capacity [kN]	Utilisation β_N [%]	Status
Steel failure*	N/A	N/A	N/A	N/A
Combined pullout-concrete cone failure**	N/A	N/A	N/A	N/A
Concrete cone failure**	N/A	N/A	N/A	N/A
Splitting failure**	N/A	N/A	N/A	N/A

* most unfavourable anchor **anchor group (anchors in tension)

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4 Shear load (EOTA TR 029, Section 5.2.3)

	Load [kN]	Capacity [kN]	Utilisation β_V [%]	Status
Steel failure (without lever arm)*	N/A	N/A	N/A	N/A
Steel failure (with lever arm)*	122.750	21.904	561	not recommended
Pryout failure**	491.000	171.043	288	not recommended
Concrete edge failure in direction y+**	491.000	38.605	1272	not recommended

* most unfavourable anchor **anchor group (relevant anchors)

4.1 Steel failure (with lever arm)

l [mm]	α_M
41	2.00

$N_{Sd} / N_{Rd,s}$	$1 - N_{Sd} / N_{Rd,s}$	$M^0_{Rk,s}$ [kNm]	$M_{Rk,s} = M^0_{Rk,s} (1 - N_{Sd}/N_{Rd,s})$ [kNm]
0.000	1.000	0.561	0.561

$V^M_{Rk,s} = \alpha_M * M_{Rk,s} / l$ [kN]	$\gamma_{Ms,b,V}$	$V^M_{Rd,s}$ [kN]	V_{Sd} [kN]
27.379	1.250	21.904	122.750

4.2 Pryout failure (concrete cone relevant)

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k-factor	k_1
286848	82944	144	288	2.000	7.200

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

$N^0_{Rk,c}$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	V_{Sd} [kN]
37.094	1.500	171.043	491.000

4.3 Concrete edge failure in direction y+

h_{ef} [mm]	d_{nom} [mm]	k_1	α	β
96	24.0	1.700	0.081	0.070

c_1 [mm]	$A_{c,V}$ [mm²]	$A^0_{c,V}$ [mm²]
145	189225	94613

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

$V^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	V_{Sd} [kN]
28.953	1.500	38.605	491.000

5 Displacements (highest loaded anchor)

Short term loading:

N_{Sk} = 0.000 [kN] δ_N = 0.000 [mm]

V_{Sk} = 181.852 [kN] δ_V = 5.456 [mm]

δ_{NV} = 5.456 [mm]

Long term loading:

N_{Sk} = 0.000 [kN] δ_N = 0.000 [mm]

V_{Sk} = 181.852 [kN] δ_V = 9.093 [mm]

δ_{NV} = 9.093 [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 baseplate! 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!

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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!
- 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.
- Characteristic bond resistances depend on short- and long-term temperatures.
- Please contact Hilti to check feasibility of HIT-V rod supply.
- Edge reinforcement is not required to avoid splitting failure

Fastening does not meet the design criteria!

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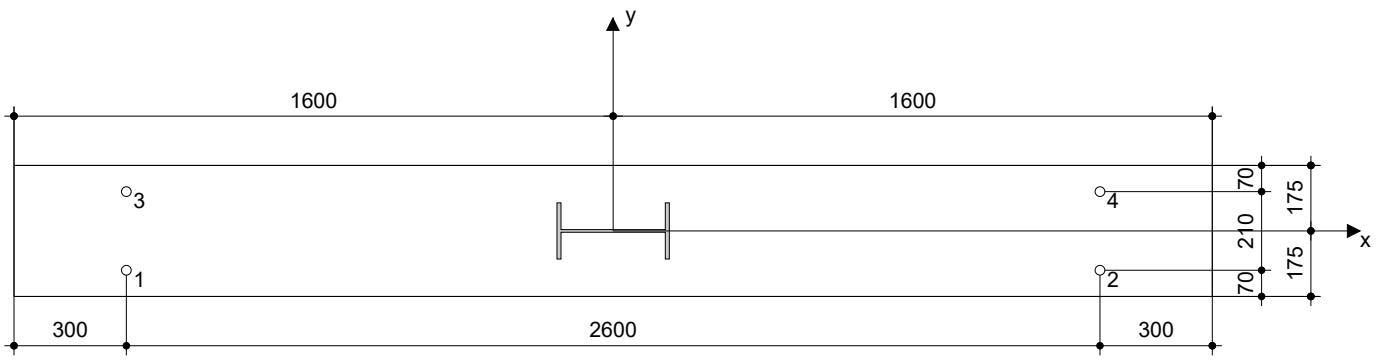
7 Installation data

Baseplate, steel: -
Profile: IPE; 300 x 150 x 7 x 11 mm
Hole diameter in the fixture: d_f = 26 mm
Plate thickness (input): 8 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 size: HIT-RE 500 V3 + HIT-V(5.8) M24
Installation torque: 0.200 kNm
Hole diameter in the base material: 28 mm
Hole depth in the base material: 96 mm
Minimum thickness of the base material: 152 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 • Hilti seismic filling set • Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-1300	-105	375	2975	145	355
2	1300	-105	2975	375	145	355
3	-1300	105	375	2975	355	145
4	1300	105	2975	375	355	145

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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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