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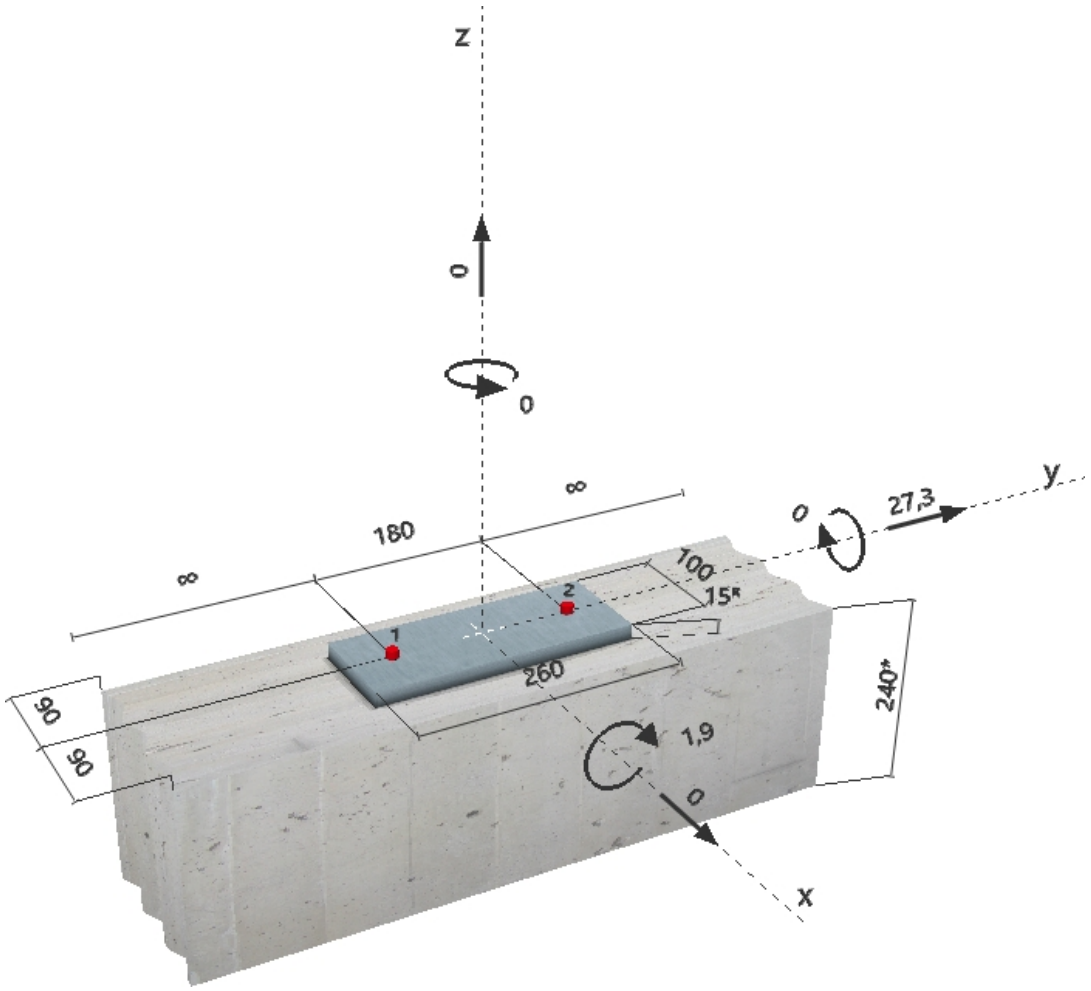
Specifier's comments:

1 Input data

Anchor type and size:	**HIT-HY 200-A + HIT-V (8.8) M12**
Effective embedment depth:	$h_{ef,opti}$ = 161 mm ($h_{ef,limit}$ = 210 mm)
Material:	8.8
Approval No.:	ETA 11/0493
Issued I Valid:	28/07/2017 | -
Proof:	Design method ETAG BOND (EOTA TR 029)
Stand-off installation:	e_b = 0 mm (no stand-off); t = 15 mm
Baseplate:	l_x x l_y x t = 100 mm x 260 mm x 15 mm; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, C25/30, $f_{c,cube}$ = 30,00 N/mm^2; h = 240 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) with longitudinal edge reinforcement d >= 12

R - user is responsible to ensure a rigid base plate for the entered thickness with appropriate solutions (stiffeners,...)

Geometry [mm] & Loading [kN, kNm]



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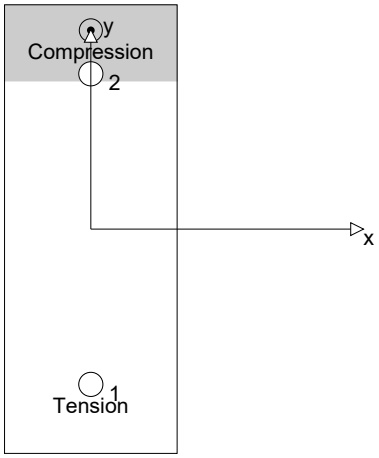
2 Load case/Resulting anchor forces

Load case: Design loads



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

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	9,260	13,650	0,000	13,650
2	0,000	13,650	0,000	13,650

max. concrete compressive strain: 0,14 [‰]
max. concrete compressive stress: 4,17 [N/mm²]
resulting tension force in (x/y)=(0/-90): 9,260 [kN]
resulting compression force in (x/y)=(0/115): 9,260 [kN]

Anchor forces based on a rigid base plate assumption!

3 Tension load (EOTA TR 029, Section 5.2.2)

	Load [kN]	Capacity [kN]	Utilisation β_N [%]	Status
Steel failure*	9,260	44,667	21	OK
Combined pullout-concrete cone failure**	9,260	14,359	65	OK
Concrete cone failure**	9,260	16,249	57	OK
Splitting failure**	9,260	14,363	65	OK

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

3.1 Steel failure

$N_{Rk,s}$ [kN]	$\gamma_{M,s}$	$N_{Rd,s}$ [kN]	N_{Sd} [kN]
67,000	1,500	44,667	9,260

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]
66.925	138.240	18,00	372	186	90

ψ_c	$\tau_{Rk,cr}$ [N/mm²]	k	$\psi^0_{g,Np}$	$\psi_{g,Np}$
1,020	8,67	2,300	1,000	1,000

$e_{c1,N}$ [mm]	$\psi_{ec1,Np}$	$e_{c2,N}$ [mm]	$\psi_{ec2,Np}$	$\psi_{s,Np}$	$\psi_{re,Np}$
0	1,000	0	1,000	0,845	1,000

$N^0_{Rk,p}$ [kN]	$N_{Rk,p}$ [kN]	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]
52,636	21,539	1,500	14,359	9,260

3.3 Concrete cone failure

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]
86.940	233.289	242	483

$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1,000	0	1,000	0,812	1,000

k_1	$N^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]
7,200	80,562	1,500	16,249	9,260

3.4 Splitting failure

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,sp}$ [mm]	$s_{cr,sp}$ [mm]	$\psi_{h,sp}$
111.096	380.936	309	617	1,164

$e_{c1,N}$ [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	0,787	1,000	7,200

$N^0_{Rk,c}$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]
80,562	1,500	14,363	9,260

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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)*	13,650	27,200	51	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	27,300	44,608	62	OK
Concrete edge failure in direction x+**	27,300	50,583	54	OK

* most unfavourable 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]
34,000	1,250	27,200	13,650

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
119.340	233.289	242	483	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	0,812	1,000

$N^0_{Rk,c}$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	V_{Sd} [kN]
80,562	1,500	44,608	27,300

4.3 Concrete edge failure in direction x+

h_{ef} [mm]	d_{nom} [mm]	k_1	α	β
144	12,0	1,700	0,126	0,067

c_1 [mm]	$A_{c,V}$ [mm²]	$A^0_{c,V}$ [mm²]
90	60.750	36.450

$\psi_{s,V}$	$\psi_{h,V}$	$\psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$
1,000	1,000	2,500	0	1,000	1,200

$V^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	V_{Sd} [kN]
15,175	1,500	50,583	27,300

5 Combined tension and shear loads (EOTA TR 029, Section 5.2.4)

β_N	β_V	α	Utilisation $\beta_{N,V}$ [%]	Status
0,645	0,612	1,500	100	OK

$\beta_N^\alpha + \beta_V^\alpha \leq 1,0$

6 Displacements (highest loaded anchor)

Short term loading:

N_{Sk} = 6,859 [kN]
V_{Sk} = 10,111 [kN]

δ_N = 0,079 [mm]
δ_V = 0,506 [mm]
δ_{NV} = 0,512 [mm]

Long term loading:

N_{Sk} = 6,859 [kN]
V_{Sk} = 10,111 [kN]

δ_N = 0,181 [mm]
δ_V = 0,809 [mm]
δ_{NV} = 0,829 [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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7 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.
- Drilled 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.
- Edge reinforcement is not required to avoid splitting failure

Fastening meets the design criteria!

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8 Installation data

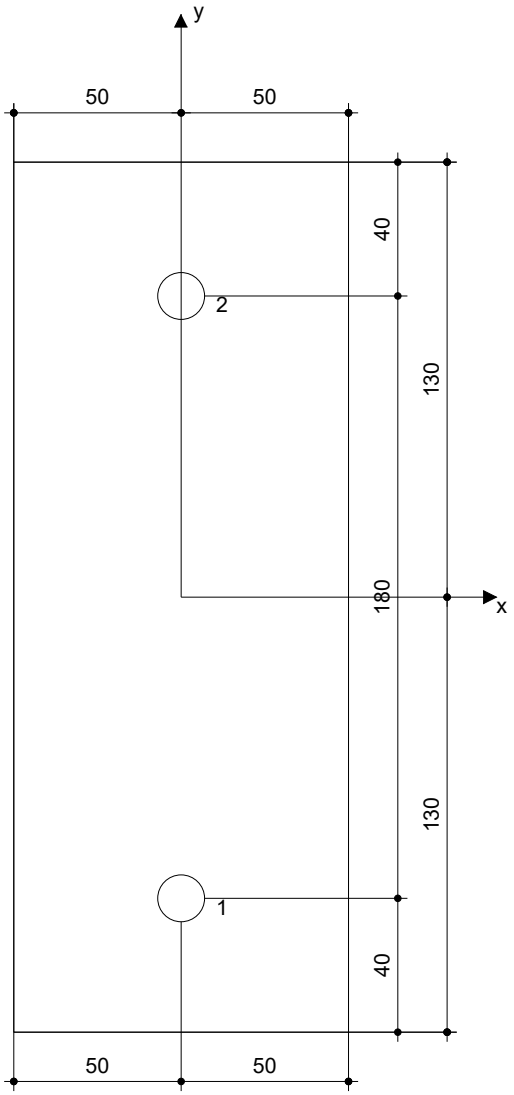
Baseplate, steel: -
Profile: no profile
Hole diameter in the fixture: d_f = 14 mm
Plate thickness (input): 15 mm
Recommended plate thickness: not calculated
Drilling method: Hammer drilled
Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

Anchor type and size: HIT-HY 200-A + HIT-V (8.8) M12
Installation torque: 0,040 kNm
Hole diameter in the base material: 14 mm
Hole depth in the base material: 161 mm
Minimum thickness of the base material: 191 mm

R - user is responsible to ensure a rigid base plate for the entered thickness with appropriate solutions (stiffeners,...)

8.1 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 • Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0	-90	90	90	-	-
2	0	90	90	90	-	-

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9 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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