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 STARI INPO  
 KONZOLNI NOSILEC  
 6. 06. 2018

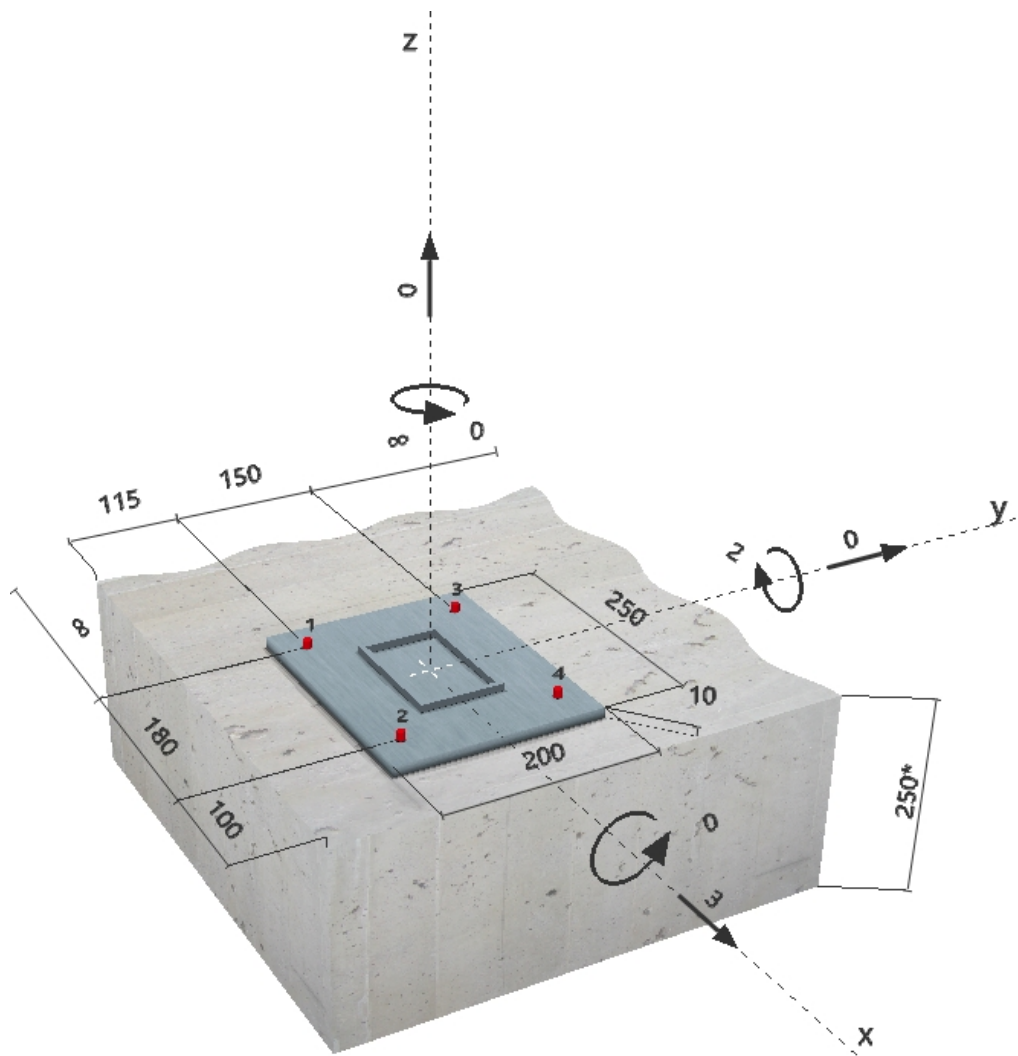
Specifier's comments: SIDRANJE

## 1 Input data

<b>Anchor type and diameter:</b>	<b>HIT-HY 200 + HIT-V (5.8) M8</b>
Effective embedment depth:	$h_{ef, opti} = 60 \text{ mm}$ ( $h_{ef, limit} = 160 \text{ mm}$ )
Material:	5.8
Evaluation Service Report:	ETA 11/0493
Issued   Valid:	3. 02. 2017   -
Proof:	Design method ETAG BOND (EOTA TR 029)
Stand-off installation:	$e_b = 0 \text{ mm}$ (no stand-off); $t = 10 \text{ mm}$
Anchor plate:	$l_x \times l_y \times t = 250 \text{ mm} \times 200 \text{ mm} \times 10 \text{ mm}$ ; (Recommended plate thickness: not calculated)
Profile:	Rectangular hollow; ( $L \times W \times T$ ) = $120 \text{ mm} \times 80 \text{ mm} \times 6 \text{ mm}$
Base material:	cracked concrete, C20/25, $f_{c, cube} = 25,00 \text{ N/mm}^2$ ; $h = 250 \text{ mm}$ , Temp. short/long: 40/24 °C
<b>Installation:</b>	<b>hammer drilled hole, Installation condition: Dry</b>
Reinforcement:	no reinforcement or reinforcement spacing $\geq 150 \text{ mm}$ (any $\varnothing$ ) or $\geq 100 \text{ mm}$ ( $\varnothing \leq 10 \text{ mm}$ ) no longitudinal edge reinforcement Reinforcement to control splitting according to EOTA TR 029, 5.2.2.6 present.



### Geometry [mm] & Loading [kN, kNm]



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## 2 Load case/Resulting anchor forces

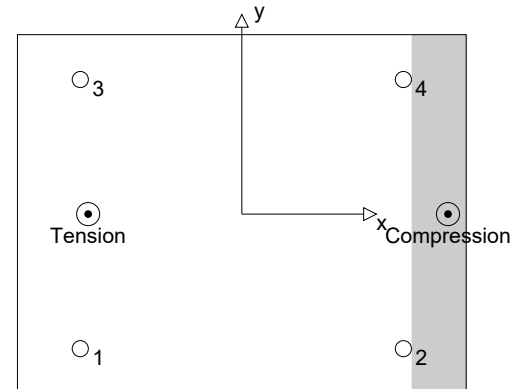
Load case: Design loads

### Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	4,866	0,750	0,750	0,000
2	0,122	0,750	0,750	0,000
3	4,866	0,750	0,750	0,000
4	0,122	0,750	0,750	0,000

max. concrete compressive strain: 0,11 [‰]  
 max. concrete compressive stress: 3,28 [N/mm<sup>2</sup>]  
 resulting tension force in (x/y)=(-86/0): 9,976 [kN]  
 resulting compression force in (x/y)=(115/0): 9,976 [kN]



## 3 Tension load (EOTA TR 029, Section 5.2.2)

	Load [kN]	Capacity [kN]	Utilization $\beta_N$ [%]	Status
Steel Strength*	4,866	12,000	41	OK
Combined pullout-concrete cone failure**	9,976	14,438	70	OK
Concrete Breakout Strength**	9,976	20,960	48	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]
18,000	1,500	12,000	4,866

### 3.2 Combined pullout-concrete cone failure

$A_{p,N}$ [mm <sup>2</sup> ]	$A_{p,N}^0$ [mm <sup>2</sup> ]	$\tau_{Rk,ucr,25}$ [N/mm <sup>2</sup> ]	$s_{cr,Np}$ [mm]	$c_{cr,Np}$ [mm]	$c_{min}$ [mm]
118800	32400	18,00	180	90	100
$\psi_c$	$\tau_{Rk,cr}$ [N/mm <sup>2</sup> ]	k	$\psi_{g,Np}^0$	$\psi_{g,Np}$	
1,000	7,50	2,300	1,447	1,019	
$e_{c1,N}$ [mm]	$\psi_{ec1,Np}$	$e_{c2,N}$ [mm]	$\psi_{ec2,Np}$	$\psi_{s,Np}$	$\psi_{re,Np}$
86	0,512	0	1,000	1,000	1,000
$N_{Rk,p}^0$ [kN]	$N_{Rk,p}$ [kN]	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	$N_{Sd}$ [kN]	
11,310	21,657	1,500	14,438	9,976	

### 3.3 Concrete Breakout Strength

$A_{c,N}$ [mm <sup>2</sup> ]	$A_{c,N}^0$ [mm <sup>2</sup> ]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]		
118800	32400	90	180		
$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
86	0,512	0	1,000	1,000	1,000
k <sub>1</sub>	$N_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	$N_{Sd}$ [kN]	
7,200	16,731	1,500	20,960	9,976	

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## 4 Shear load (EOTA TR 029, Section 5.2.3)

	Load [kN]	Capacity [kN]	Utilization $\beta_v$ [%]	Status
Steel Strength (without lever arm)*	0,750	7,200	11	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	3,000	56,345	6	OK
Concrete edge failure in direction x+**	3,000	10,964	28	OK

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

### 4.1 Steel Strength (without lever arm)

$V_{Rk,s}$ [kN]	$\gamma_{M,s}$	$V_{Rd,s}$ [kN]	$V_{Sd}$ [kN]
9,000	1,250	7,200	0,750

### 4.2 Pryout Strength (Bond Strength controls)

$A_{p,N}$ [mm <sup>2</sup> ]	$A_{p,N}^0$ [mm <sup>2</sup> ]	$\tau_{Rk,ucr,25}$ [N/mm <sup>2</sup> ]	$c_{cr,Np}$ [mm]	$s_{cr,Np}$ [mm]	$c_{min}$ [mm]
118800	32400	18,00	90	180	100
$\psi_c$	$\tau_{Rk,cr}$ [N/mm <sup>2</sup> ]	k	$\psi_{g,Np}^0$	$\psi_{g,Np}$	k-factor
1,000	7,50	2,300	1,447	1,019	2,000
$e_{c1,v}$ [mm]	$\psi_{ec1,Np}$	$e_{c2,v}$ [mm]	$\psi_{ec2,Np}$	$\psi_{s,Np}$	$\psi_{re,Np}$
0	1,000	0	1,000	1,000	1,000
$N_{Rk,p}^0$ [kN]	$N_{Rk,p}$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	$V_{Sd}$ [kN]	
11,310	42,259	1,500	56,345	3,000	

### 4.3 Concrete edge failure in direction x+

$h_{ef}$ [mm]	$d_{nom}$ [mm]	$k_1$	$\alpha$	$\beta$	
60	8,0	1,700	0,077	0,060	
$c_1$ [mm]	$A_{c,v}$ [mm <sup>2</sup> ]	$A_{c,v}^0$ [mm <sup>2</sup> ]			
100	62250	45000			
$\psi_{s,v}$	$\psi_{h,v}$	$\psi_{a,v}$	$e_{c,v}$ [mm]	$\psi_{ec,v}$	$\psi_{re,v}$
0,930	1,000	1,000	0	1,000	1,000
$V_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	$V_{Sd}$ [kN]		
12,784	1,500	10,964	3,000		

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

$\beta_N$	$\beta_V$	$\alpha$	Utilization $\beta_{N,v}$ [%]	Status
0,691	0,274	1,500	72	OK

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

## 6 Displacements (highest loaded anchor)

Short term loading:

$N_{Sk}$	=	3,605 [kN]	$\delta_N$	=	0,167 [mm]
$V_{Sk}$	=	0,556 [kN]	$\delta_V$	=	0,033 [mm]
			$\delta_{NV}$	=	0,171 [mm]

Long term loading:

$N_{Sk}$	=	3,605 [kN]	$\delta_N$	=	0,382 [mm]
$V_{Sk}$	=	0,556 [kN]	$\delta_V$	=	0,050 [mm]
			$\delta_{NV}$	=	0,386 [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!

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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.
- 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.
- Edge reinforcement is not required to avoid splitting failure

**Fastening meets the design criteria!**

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## 8 Installation data

Anchor plate, steel: -  
 Profile: Rectangular hollow; 120 x 80 x 6 mm  
 Hole diameter in the fixture:  $d_f = 9$  mm  
 Plate thickness (input): 10 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 (5.8) M8  
 Installation torque: 0,010 kNm  
 Hole diameter in the base material: 10 mm  
 Hole depth in the base material: 60 mm  
 Minimum thickness of the base material: 100 mm

### 8.1 Recommended accessories

#### Drilling

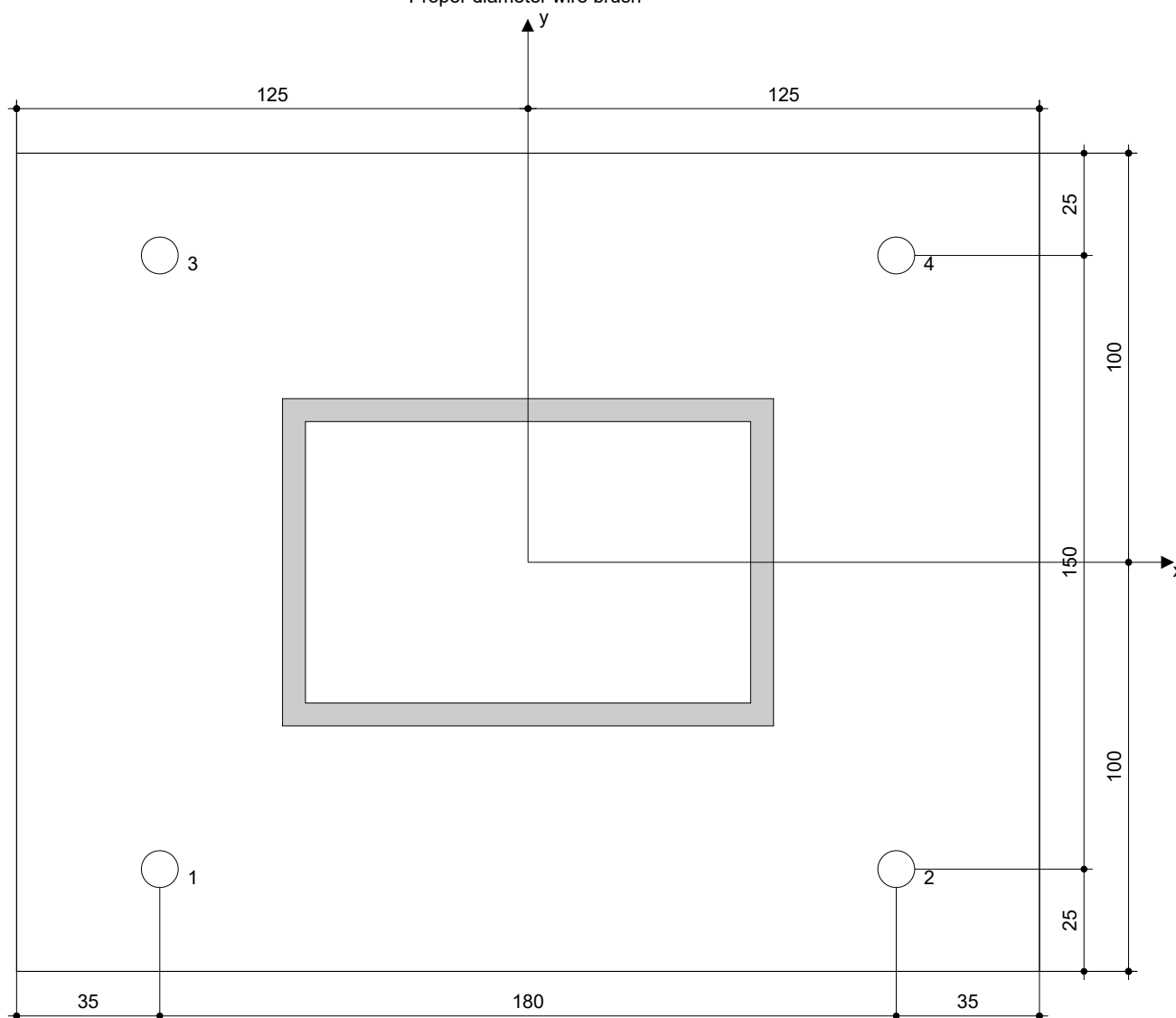
- Suitable Rotary Hammer
- Properly sized drill bit

#### Cleaning

- Compressed air with required accessories to blow from the bottom of the hole
- Proper diameter wire brush

#### Setting

- Dispenser including cassette and mixer
- Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	C <sub>-x</sub>	C <sub>+x</sub>	C <sub>-y</sub>	C <sub>+y</sub>
1	-90	-75	-	280	115	-
2	90	-75	-	100	115	-
3	-90	75	-	280	265	-
4	90	75	-	100	265	-

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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.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.