



工程指示 / 要求簡箋(E.I.)

工程指示編號：EI / 3098 / 21

修改版次：-

工程編號：J - 852

工程名稱：亞皆老街中電

工程項目：幕牆 地盤用鋁碼 (加長鋁碼) 修補方案 第2次

收件人：生統

發件人：Ant Yeung

日期：09/03 / 2021

要求提供 / 確認 事項：

- | | | |
|------------------------------------|-------------------------------------|-------------------------------|
| <input type="checkbox"/> 初步鋁料 B.M. | <input type="checkbox"/> 加工拆圖，然後生產 | <input type="checkbox"/> 尺寸表 |
| <input type="checkbox"/> 正式鋁料 B.M. | <input type="checkbox"/> 技術上資料 / 指示 | <input type="checkbox"/> 報價 |
| <input type="checkbox"/> 配件 B.M. | <input type="checkbox"/> 樣辦或貨品說明書 | <input type="checkbox"/> 分判合約 |
| <input type="checkbox"/> 其他：_____ | | |

內容：

20 件 200 長 鋁碼 請按加工圖生產(加長鋁碼)送地盤使用 (不開石矢方向孔)

請在 2021.3.15 前完成上列要求。 生統請俾先計算是否有足夠鋁料

附：

以上項目為：

- 原合約工程包 原合約工程加 / 減賬 新工程報價

原因：-

分發東莞各部門：

- | | | | |
|--|---|--|---|
| <input type="checkbox"/> 生產技術總監 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 技術部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 生產部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 機械設計部 <input type="checkbox"/> 連附件 |
| <input type="checkbox"/> 採購部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 生產統籌部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 小羅 & 清 <input type="checkbox"/> 連附件 | |
| <input type="checkbox"/> 質檢部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 會計部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 報關組 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 其他 <u>楊榮輝</u> <input type="checkbox"/> 連附件 |

分發其他分判：

- (v) 水洪 連附件

分發香港各部門：

- | | | | |
|---|--|---|---|
| <input type="checkbox"/> 行政部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 會計部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 統籌部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 工程部地盤科文 <input type="checkbox"/> 連附件 <u>祥哥</u> |
| <input type="checkbox"/> 採購部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> QS 部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 維修部 <input type="checkbox"/> 連附件 | <input type="checkbox"/> 其他 _____ <input type="checkbox"/> 連附件 |

傳遞編號：

HK 0370 / 21

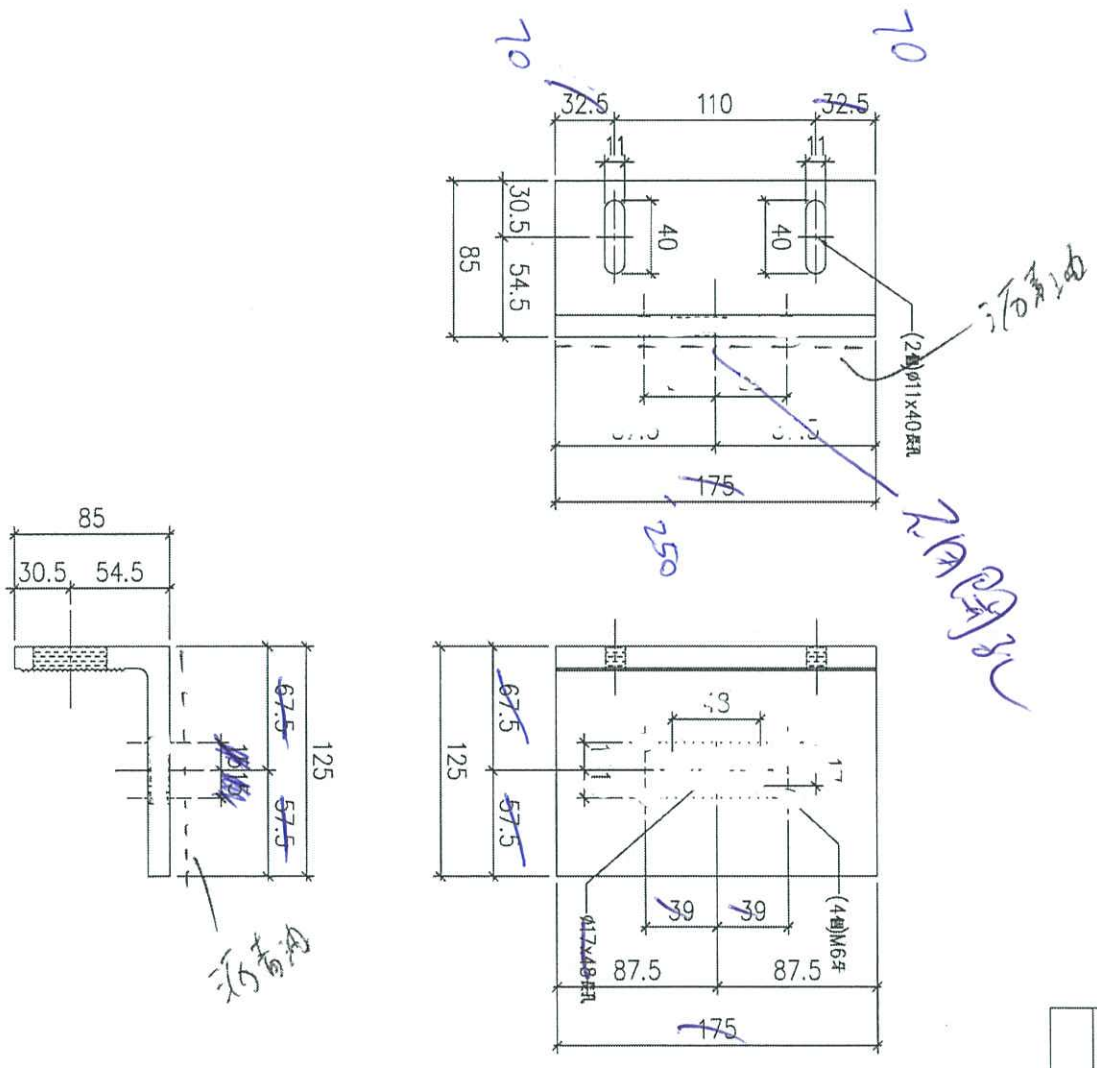
發件人簽署：

項目經理簽署：Ant Yeung


美特鋁質 有限公司
 MIDI Aluminium Fabricator Ltd.

工程號	J-852	地盤	亞皆老街
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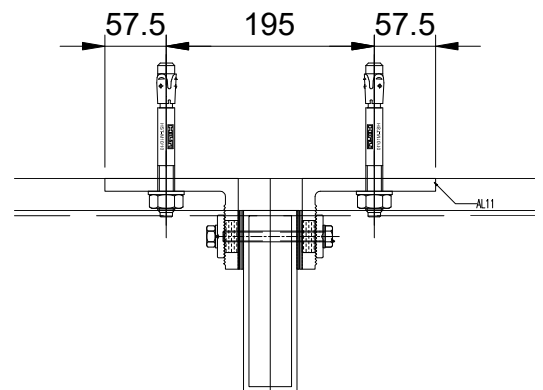
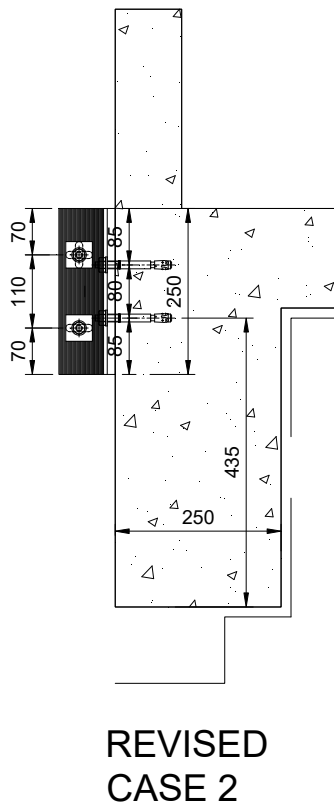
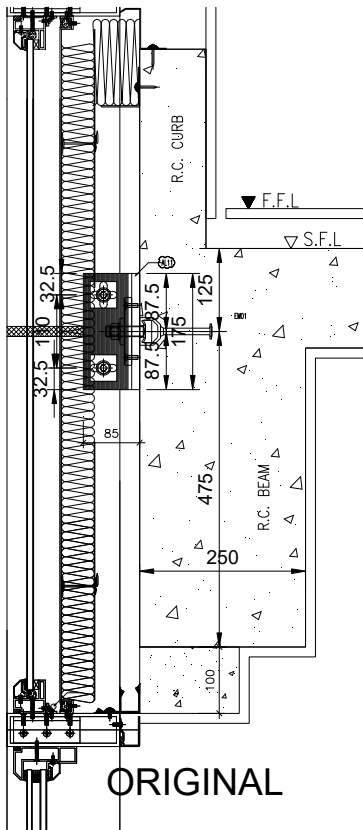
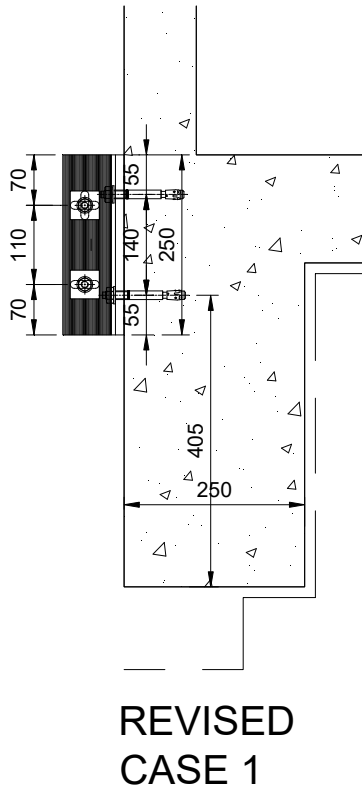
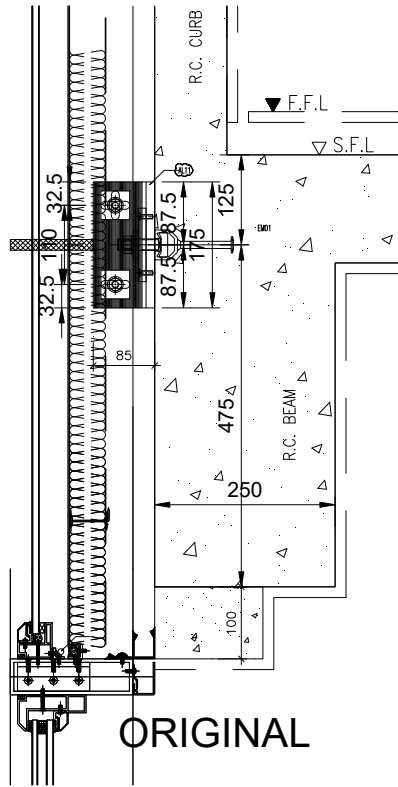
組裝用



F 7 7 7 4x19x3

序号	物料編號	數量	備註
01	AL11-01	228	

名稱	固定鋁碼加工圖	制圖	LHR	2020.9.23	修改	
材料	X85829	復核	-	-	日期	
顏色	MILL	批准			圖號	J852-CW-BR-01



LOADS

1) LOADING ANALYSIS

Span between supports

$$L := 3500\text{mm}$$

Wind load along X-axis

Design wind pressure

$$W_d := 1.4 \times 2.82\text{kPa}$$

$$W_d = 3.95\text{ kPa}$$

Load width

$$B := \frac{1030\text{mm} + 950\text{mm}}{2}$$

$$B = 990\text{ mm}$$

UDL along x axis

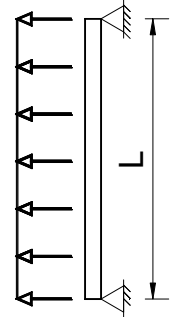
$$w := W_d \cdot B$$

$$w = 3.91 \cdot \frac{\text{kN}}{\text{m}}$$

WL per fixing

$$WL_H := w \cdot L$$

$$WL_H = 13.68\text{ kN}$$



2) Dead Load

Dead load of a unit include the followings:-

1. Weight of glass

Density of glass

$$\rho_g := 26\text{kN} \cdot \text{m}^{-3}$$

Width of glass

$$B = 990\text{ mm}$$

Total height of spandrel glass

$$H_s := 1100\text{mm}$$

Total height of vision glass

$$H_v := 1630\text{mm} + 770\text{mm} = 2400\text{ mm}$$

Thickness of spandrel glass

$$t_s := 8\text{mm}$$

Thickness of vision glass

$$t_v := 8\text{mm} + 10\text{mm}$$

Weight of glass

$$W_g := (H_s \cdot t_s + H_v \cdot t_v) \cdot \rho_g \cdot B$$

$$W_g = 1.34 \times 10^3\text{ N}$$

2. Self weight of frame

Density of aluminum

$$\rho_a := 27.2\text{kN} \cdot \text{m}^{-3}$$

Section area of transoms

$$A_t := 4000\text{mm}^2$$

(say)

Section area of mullion

$$A_m := 5000\text{mm}^2$$

(say)

Width of frame

$$B = 990\text{ mm}$$

Height of frame

$$H := 3230\text{mm}$$

Self weight of frame

$$W_f := (4\rho_a \cdot A_t \cdot B + \rho_a \cdot A_m \cdot H)$$

$$W_f = 870.13\text{ N}$$

$$DL := 1.25(W_g + W_f)$$

Max. support reaction (unfactored)

$$DL = 2.76 \times 10^3\text{ N}$$

$$DL := 4\text{ kN} \quad (\text{say})$$

Eccentricity

$$e := 200\text{mm}$$

Eccentric moment

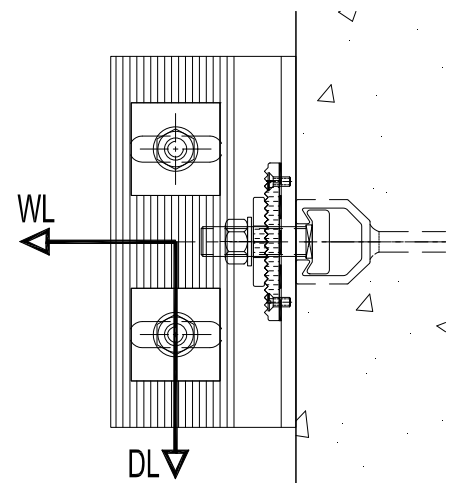
$$M_e := DL \cdot e \quad M_e = 0.8\text{ kN} \cdot \text{m}$$

Reaction force per fixing

$$WL := WL_H + \frac{M_e}{3500\text{mm}} = 13.91\text{ kN}$$

$$WL := 14\text{ kN}$$


$$DL = 4\text{ kN}$$



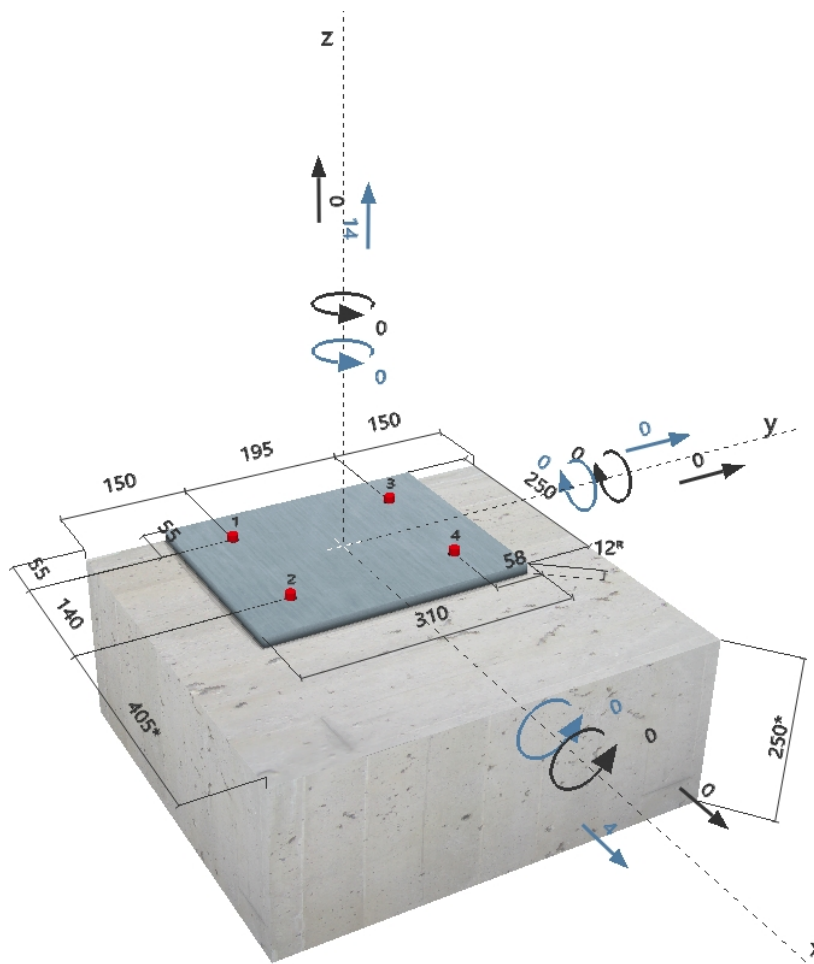
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Specifier's comments:
1 Input data

Anchor type and size:	HST3-R M12 hef2	
Return period (service life in years):	50	
Effective embedment depth:	$h_{ef} = 70 \text{ mm}$, $h_{nom} = 80 \text{ mm}$	
Material:	A4	
Approval No.:	ETA-98/0001	
Issued Valid:	02/10/2019 -	
Proof:	Design method ETAG (No. 001 Annex C/2010)	
Stand-off installation:	$e_b = 0 \text{ mm}$ (no stand-off); $t = 12 \text{ mm}$	
Baseplate:	$l_x \times l_y \times t = 250 \text{ mm} \times 310 \text{ mm} \times 12 \text{ mm}$; (Recommended plate thickness: not calculated)	
Profile:	no profile	
Base material:	cracked concrete, C35/45, $f_{c,cube} = 45.00 \text{ N/mm}^2$; $h = 250 \text{ mm}$	
Installation:	hammer drilled hole, Installation condition: Dry	
Reinforcement:	No reinforcement or Reinforcement spacing $\geq 150 \text{ mm}$ (any \varnothing) or $\geq 100 \text{ mm}$ ($\varnothing \leq 10 \text{ mm}$) with longitudinal edge reinforcement $d \geq 12$ + close mesh (stirrups, hangers) $s \leq 100$	

^R - The anchor calculation is based on a rigid baseplate assumption.

Geometry [mm] & Loading [kN, kNm]


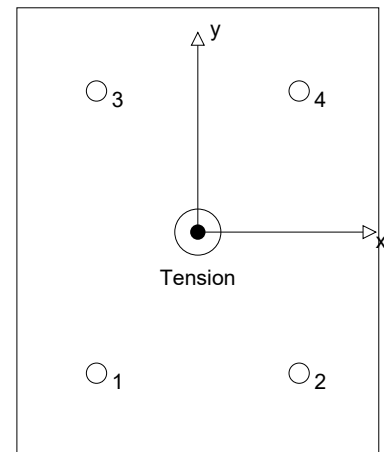
2 Load case/Resulting anchor forces

Load case 1 (2.00·permanent load + 2.00·variable load)
Load case 2 (1.0·permanent load + 2.00·variable load)
 Load case 3 (2.00·permanent load)

Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	7.000	2.000	2.000	0.000
2	7.000	2.000	2.000	0.000
3	7.000	2.000	2.000	0.000
4	7.000	2.000	2.000	0.000



max. concrete compressive strain: - [%]
 max. concrete compressive stress: - [N/mm²]
 resulting tension force in (x/y)=(0/0): 28.000 [kN]
 resulting compression force in (x/y)=(0/0): 0.000 [kN]

Anchor forces are calculated based on the assumption of a rigid baseplate.

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

	Load [kN]	Capacity [kN]	Utilisation β_N [%]	Status
Steel failure*	7.000	30.357	24	OK
Pull-out failure*	7.000	17.889	40	OK
Concrete cone failure**	28.000	44.533	63	OK
Splitting failure**	28.000	65.548	43	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]
42.500	1.400	30.357	7.000

3.2 Pull-out failure

$N_{Rk,p}$ [kN]	ψ_c	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]
20.000	1.342	1.500	17.889	7.000

3.3 Concrete cone failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]		
121,500	44,100	105	210		
$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.857	1.000
k_1	$N_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]	
7.200	28.287	1.500	44.533	28.000	

Group anchor ID
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3.4 Splitting failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,sp}$ [mm]	$s_{cr,sp}$ [mm]	$\Psi_{h,sp}$		
121,500	44,100	105	210	1.472		
$e_{c1,N}$ [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	0.857	1.000	7.200
$N_{Rk,c}^0$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]			
28.287	1.500	65.548	28.000			
<u>Group anchor ID</u>						
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4 Shear load (ETAG, Annex C, Section 5.2.3)

	Load [kN]	Capacity [kN]	Utilisation β_v [%]	Status
Steel failure (without lever arm)*	2.000	29.360	7	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	8.000	123.803	7	OK
Concrete edge failure in direction x+**	8.000	30.126	27	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]
36.700	1.250	29.360	2.000

4.2 Pryout failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k-factor	
121,500	44,100	105	210	2.780	
$e_{c1,V}$ [mm]	$\psi_{ec1,N}$	$e_{c2,V}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.857	1.000
$N_{Rk,c}^0$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	V_{Sd} [kN]		
28.287	1.500	123.803	8.000		
Group anchor ID					
1-4					

4.3 Concrete edge failure in direction x+

l_f [mm]	d_{nom} [mm]	k_1	α	β	
70	12.0	1.700	0.065	0.059	
c_1 [mm]	c_1' [mm]	$A_{c,V}$ [mm ²]	$A_{c,V}^0$ [mm ²]		
405	167	123,750	125,000		
$\psi_{s,V}$	$\psi_{h,V}$	$\psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$
0.880	1.000	1.000	0	1.000	1.400
$V_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	V_{Sd} [kN]		
37.049	1.500	30.126	8.000		

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

Steel failure

β_N	β_V	α	Utilisation $\beta_{N,V}$ [%]	Status
0.629	0.266	1.500	64	OK

$$\beta_N^\alpha + \beta_V^\alpha \leq 1.0$$

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6 Displacements (highest loaded anchor)

Short term loading:

$$\begin{aligned} N_{Sk} &= 3.500 \text{ [kN]} & \delta_N &= 0.295 \text{ [mm]} \\ V_{Sk} &= 2.000 \text{ [kN]} & \delta_V &= 0.314 \text{ [mm]} \\ & & \delta_{NV} &= 0.431 \text{ [mm]} \end{aligned}$$

Long term loading:

$$\begin{aligned} N_{Sk} &= 3.500 \text{ [kN]} & \delta_N &= 0.589 \text{ [mm]} \\ V_{Sk} &= 2.000 \text{ [kN]} & \delta_V &= 0.467 \text{ [mm]} \\ & & \delta_{NV} &= 0.752 \text{ [mm]} \end{aligned}$$

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!

7 Warnings

- The anchor design methods in PROFIS Anchor require rigid baseplates per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the baseplate are not considered - the baseplate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Anchor calculates the minimum required baseplate thickness with FEM to limit the stress of the baseplate based on the assumptions explained above. The proof if the rigid baseplate 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 ETAG 001, Annex C(2010)Section 7! The software considers that the grout is installed under the baseplate 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.
- The characteristic bond resistances depend on the return period (service life in years): 50

Fastening meets the design criteria!

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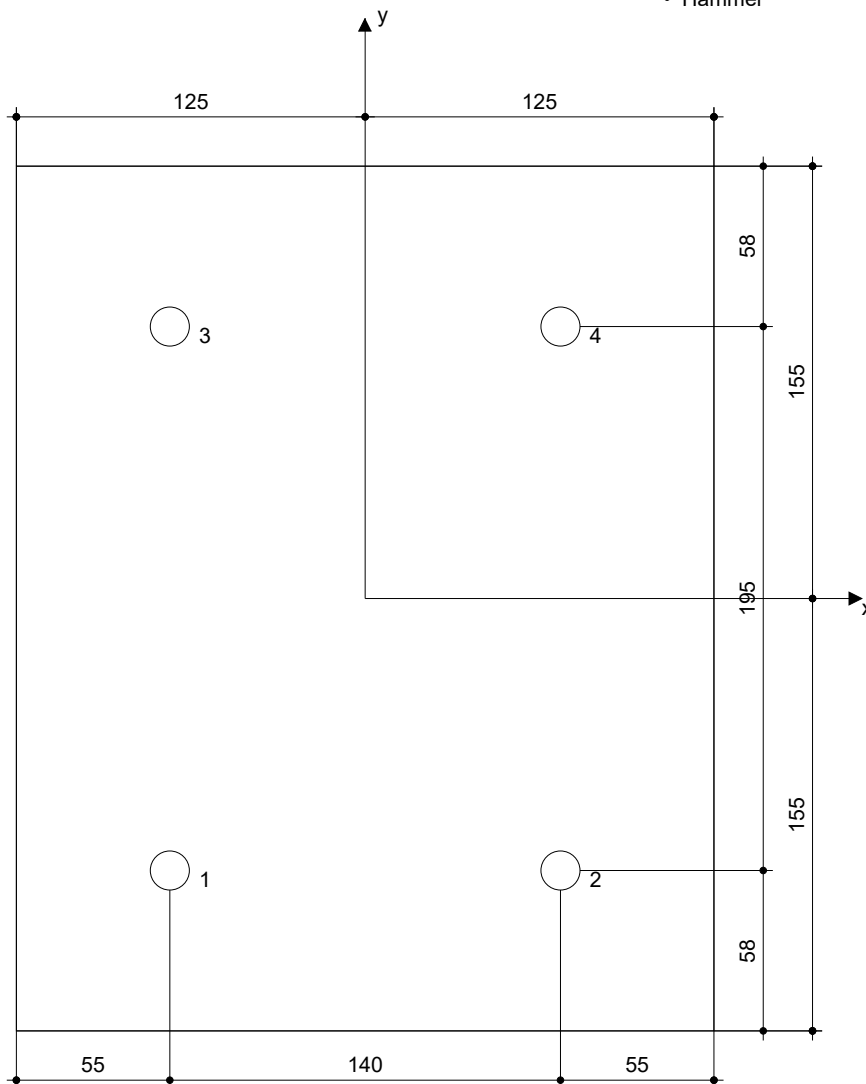
8 Installation data

Baseplate, steel: -
 Profile: no profile
 Hole diameter in the fixture: $d_f = 14 \text{ mm}$
 Plate thickness (input): 12 mm
 Recommended plate thickness: not calculated
 Drilling method: Hammer drilled
 Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Anchor type and size: HST3-R M12 hef2
 Installation torque: 0.060 kNm
 Hole diameter in the base material: 12 mm
 Hole depth in the base material: 90 mm
 Minimum thickness of the base material: 140 mm

8.1 Recommended accessories

Drilling	Cleaning	Setting
<ul style="list-style-type: none"> Suitable Rotary Hammer Properly sized drill bit 	<ul style="list-style-type: none"> Manual blow-out pump 	<ul style="list-style-type: none"> Hilti SIW 6AT-A22 + SI AT-A22 Torque wrench Hammer



Coordinates Anchor [mm]

Anchor	x	y	C-x	C+x	C-y	C+y
1	-70	-98	55	545	150	345
2	70	-98	195	405	150	345
3	-70	98	55	545	345	150
4	70	98	195	405	345	150





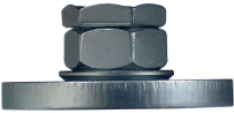
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9 Remarks; Your Cooperation Duties

- 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.

HST3 (-R) subject to:

Anchor size	M8	M10	M12	M16	M20	M24
Hammer drilling* 	TE2(-A) – TE30(-A)				TE40 – TE70	
Diamond core drilling* 	DD-30W, DD-EC1					
Setting tool* 	Setting tool HS-SC				-	
Hollow drill bit drilling* 	-	TE-CD, TE-YD				
Seismic Set/ Filling Set** 	Seismic/Filling Set M8-M20 (Carbon and Stainless Steel A4)				-	

***Installation methods provided in ETA-98/0001**


**Seismic set needed to fill the annular gap between anchor and fixture:
 No annular gap, double design resistance ($\alpha_{gap}=1$)

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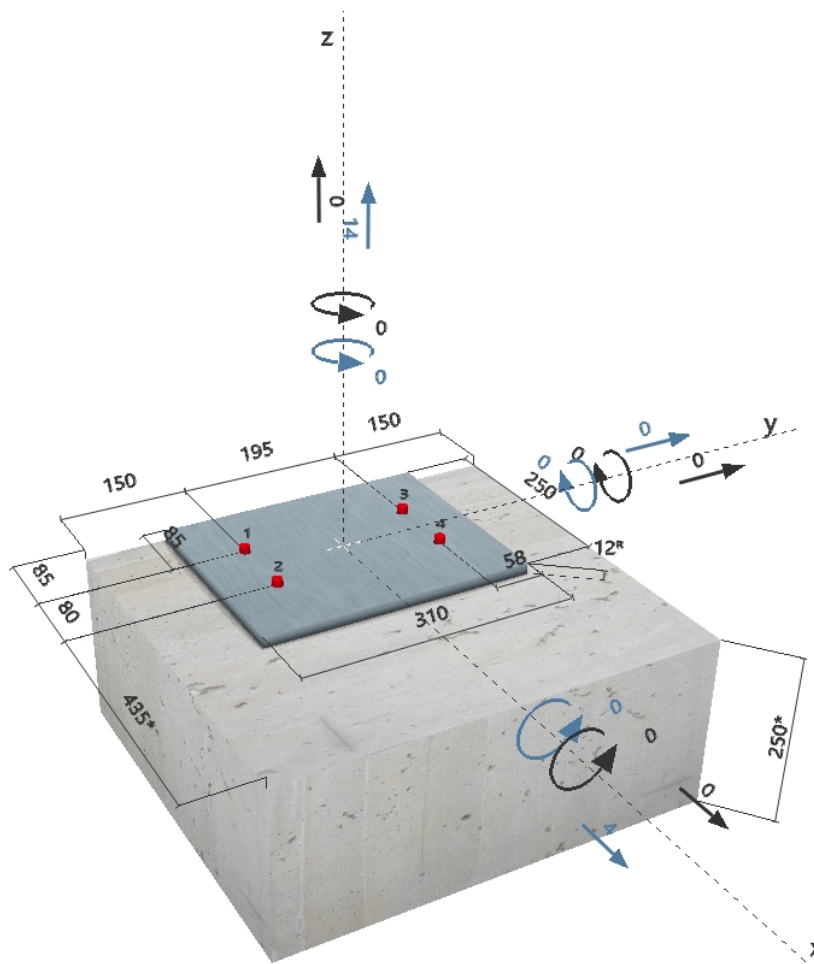
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Specifier's comments:

1 Input data

Anchor type and size:	HST3-R M12 hef2	
Return period (service life in years):	50	
Effective embedment depth:	$h_{ef} = 70 \text{ mm}$, $h_{nom} = 80 \text{ mm}$	
Material:	A4	
Approval No.:	ETA-98/0001	
Issued Valid:	02/10/2019 -	
Proof:	Design method ETAG (No. 001 Annex C/2010)	
Stand-off installation:	$e_b = 0 \text{ mm}$ (no stand-off); $t = 12 \text{ mm}$	
Baseplate:	$l_x \times l_y \times t = 250 \text{ mm} \times 310 \text{ mm} \times 12 \text{ mm}$; (Recommended plate thickness: not calculated)	
Profile:	no profile	
Base material:	cracked concrete, C35/45, $f_{c,cube} = 45.00 \text{ N/mm}^2$; $h = 250 \text{ mm}$	
Installation:	hammer drilled hole, Installation condition: Dry	
Reinforcement:	No reinforcement or Reinforcement spacing $\geq 150 \text{ mm}$ (any \varnothing) or $\geq 100 \text{ mm}$ ($\varnothing \leq 10 \text{ mm}$) with longitudinal edge reinforcement $d \geq 12$ + close mesh (stirrups, hangers) $s \leq 100$	

^R - The anchor calculation is based on a rigid baseplate assumption.

Geometry [mm] & Loading [kN, kNm]


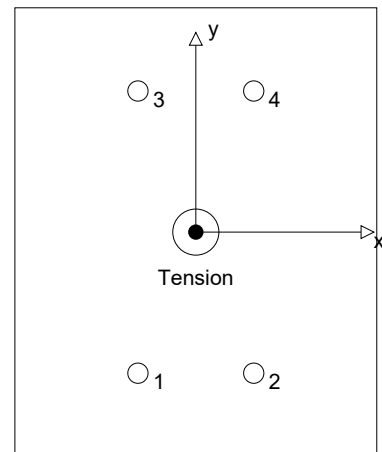
2 Load case/Resulting anchor forces

Load case 1 (2.00·permanent load + 2.00·variable load)
Load case 2 (1.0·permanent load + 2.00·variable load)
 Load case 3 (2.00·permanent load)

Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	7.000	2.000	2.000	0.000
2	7.000	2.000	2.000	0.000
3	7.000	2.000	2.000	0.000
4	7.000	2.000	2.000	0.000



max. concrete compressive strain: - [%]
 max. concrete compressive stress: - [N/mm²]
 resulting tension force in (x/y)=(0/0): 28.000 [kN]
 resulting compression force in (x/y)=(0/0): 0.000 [kN]

Anchor forces are calculated based on the assumption of a rigid baseplate.

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

	Load [kN]	Capacity [kN]	Utilisation β_N [%]	Status
Steel failure*	7.000	30.357	24	OK
Pull-out failure*	7.000	17.889	40	OK
Concrete cone failure**	28.000	44.088	64	OK
Splitting failure**	28.000	64.893	44	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]
42.500	1.400	30.357	7.000

3.2 Pull-out failure

$N_{Rk,p}$ [kN]	ψ_c	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]
20.000	1.342	1.500	17.889	7.000

3.3 Concrete cone failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]		
109,350	44,100	105	210		
$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.943	1.000
k_1	$N_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]	
7.200	28.287	1.500	44.088	28.000	

Group anchor ID
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3.4 Splitting failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,sp}$ [mm]	$s_{cr,sp}$ [mm]	$\Psi_{h,sp}$		
109,350	44,100	105	210	1.472		
$e_{c1,N}$ [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	0.943	1.000	7.200
$N_{Rk,c}^0$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]			
28.287	1.500	64.893	28.000			
<u>Group anchor ID</u>						
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4 Shear load (ETAG, Annex C, Section 5.2.3)

	Load [kN]	Capacity [kN]	Utilisation β_v [%]	Status
Steel failure (without lever arm)*	2.000	29.360	7	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	8.000	122.565	7	OK
Concrete edge failure in direction x+**	8.000	30.126	27	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]
36.700	1.250	29.360	2.000

4.2 Pryout failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k-factor	
109,350	44,100	105	210	2.780	
$e_{c1,V}$ [mm]	$\psi_{ec1,N}$	$e_{c2,V}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.943	1.000
$N_{Rk,c}^0$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	V_{Sd} [kN]		
28.287	1.500	122.565	8.000		
Group anchor ID					
1-4					

4.3 Concrete edge failure in direction x+

l_f [mm]	d_{nom} [mm]	k_1	α	β	
70	12.0	1.700	0.065	0.059	
c_1 [mm]	c_1' [mm]	$A_{c,V}$ [mm ²]	$A_{c,V}^0$ [mm ²]		
435	167	123,750	125,000		
$\psi_{s,V}$	$\psi_{h,V}$	$\psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$
0.880	1.000	1.000	0	1.000	1.400
$V_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	V_{Sd} [kN]		
37.049	1.500	30.126	8.000		

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

Steel failure

β_N	β_V	α	Utilisation $\beta_{N,V}$ [%]	Status
0.635	0.266	1.500	65	OK

$$\beta_N^\alpha + \beta_V^\alpha \leq 1.0$$

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6 Displacements (highest loaded anchor)

Short term loading:

$$\begin{aligned} N_{Sk} &= 3.500 \text{ [kN]} & \delta_N &= 0.295 \text{ [mm]} \\ V_{Sk} &= 2.000 \text{ [kN]} & \delta_V &= 0.314 \text{ [mm]} \\ & & \delta_{NV} &= 0.431 \text{ [mm]} \end{aligned}$$

Long term loading:

$$\begin{aligned} N_{Sk} &= 3.500 \text{ [kN]} & \delta_N &= 0.589 \text{ [mm]} \\ V_{Sk} &= 2.000 \text{ [kN]} & \delta_V &= 0.467 \text{ [mm]} \\ & & \delta_{NV} &= 0.752 \text{ [mm]} \end{aligned}$$

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!

7 Warnings

- The anchor design methods in PROFIS Anchor require rigid baseplates per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the baseplate are not considered - the baseplate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Anchor calculates the minimum required baseplate thickness with FEM to limit the stress of the baseplate based on the assumptions explained above. The proof if the rigid baseplate 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 ETAG 001, Annex C(2010)Section 7! The software considers that the grout is installed under the baseplate 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.
- The characteristic bond resistances depend on the return period (service life in years): 50

Fastening meets the design criteria!

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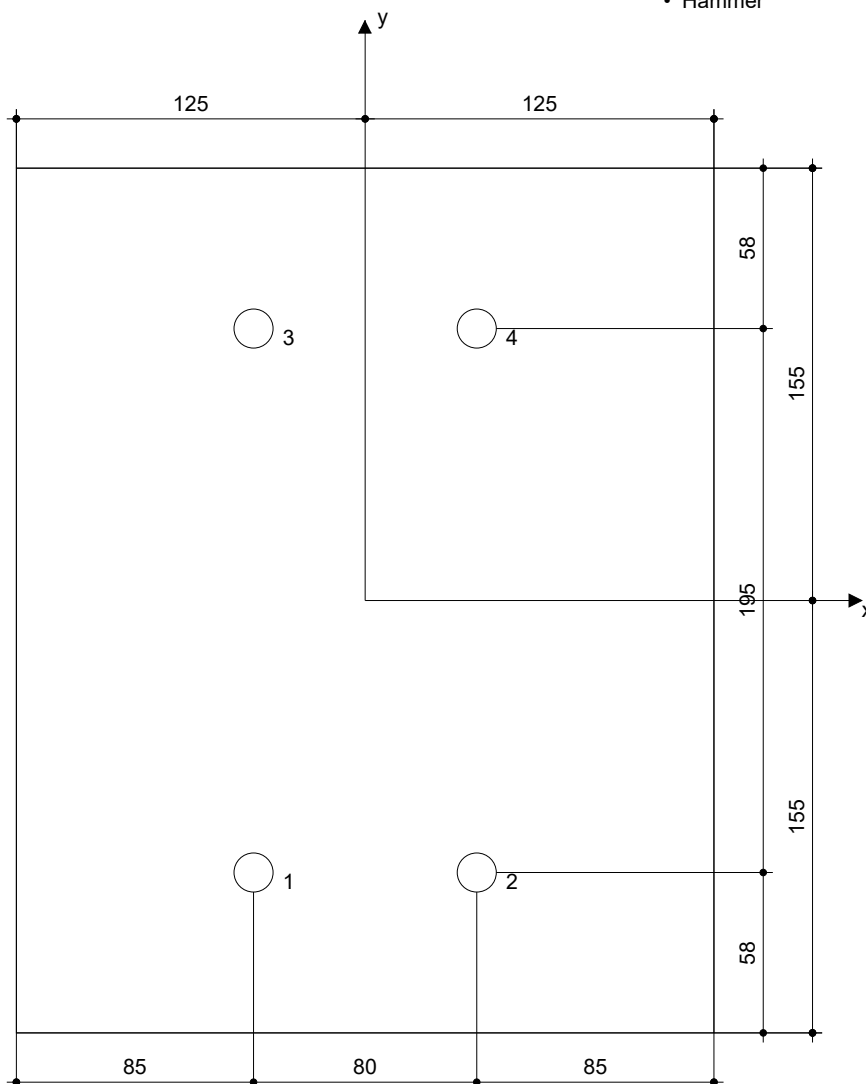
8 Installation data

Baseplate, steel: -
 Profile: no profile
 Hole diameter in the fixture: $d_f = 14 \text{ mm}$
 Plate thickness (input): 12 mm
 Recommended plate thickness: not calculated
 Drilling method: Hammer drilled
 Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Anchor type and size: HST3-R M12 hef2
 Installation torque: 0.060 kNm
 Hole diameter in the base material: 12 mm
 Hole depth in the base material: 90 mm
 Minimum thickness of the base material: 140 mm

8.1 Recommended accessories

Drilling	Cleaning	Setting
<ul style="list-style-type: none"> • Suitable Rotary Hammer • Properly sized drill bit 	<ul style="list-style-type: none"> • Manual blow-out pump 	<ul style="list-style-type: none"> • Hilti SIW 6AT-A22 + SI AT-A22 • Torque wrench • Hammer



Coordinates Anchor [mm]

Anchor	x	y	C-x	C+x	C-y	C+y
1	-40	-98	85	515	150	345
2	40	-98	165	435	150	345
3	-40	98	85	515	345	150
4	40	98	165	435	345	150





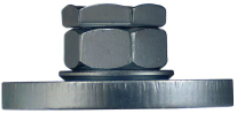
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9 Remarks; Your Cooperation Duties

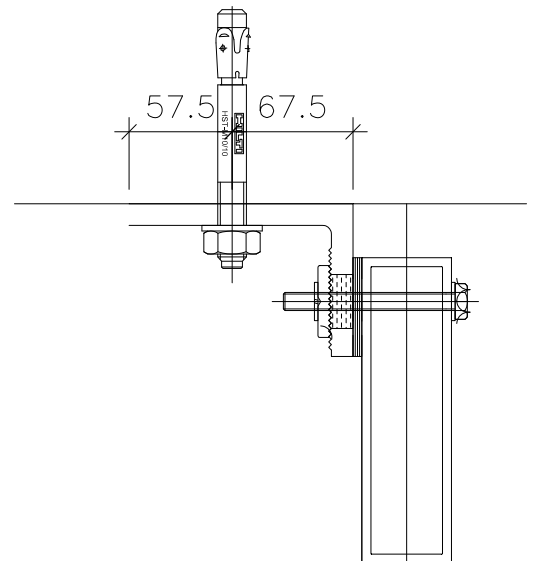
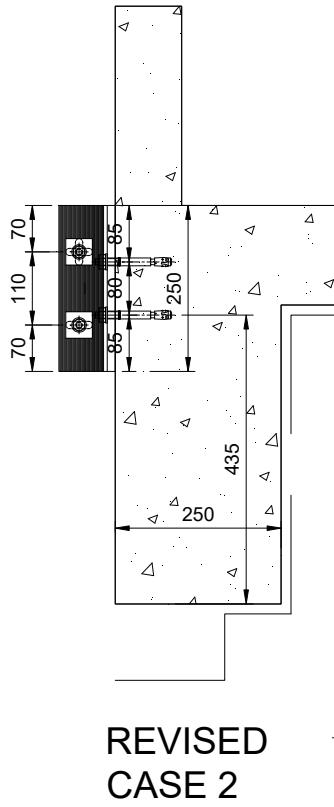
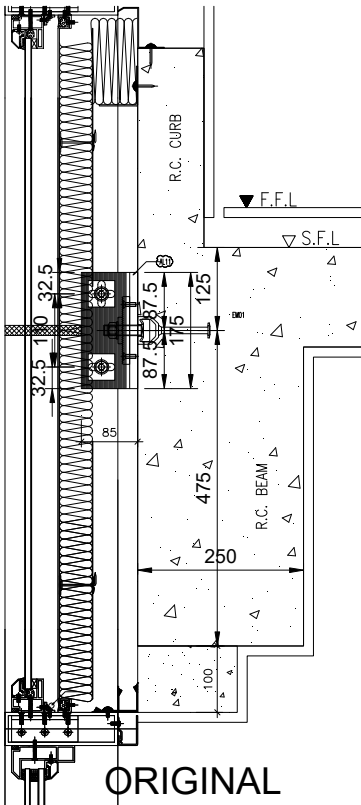
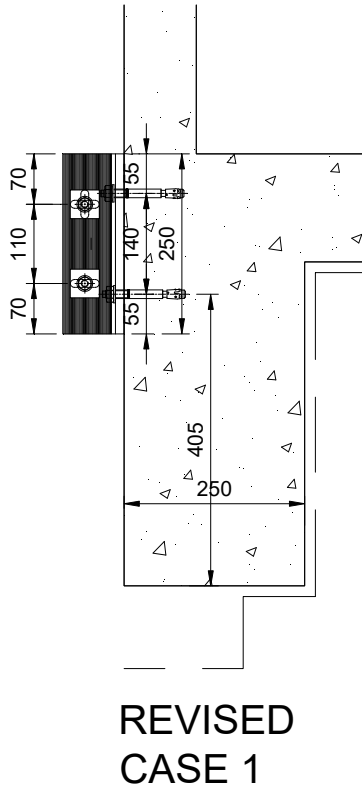
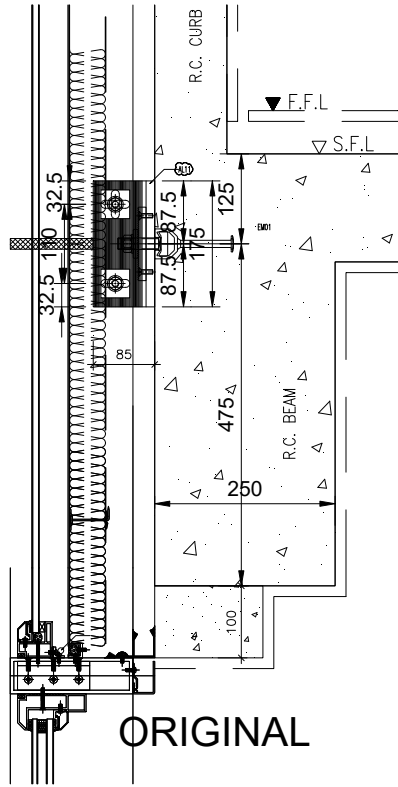
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HST3 (-R) subject to:

Anchor size	M8	M10	M12	M16	M20	M24
Hammer drilling* 	TE2(-A) – TE30(-A)				TE40 – TE70	
Diamond core drilling* 	DD-30W, DD-EC1					
Setting tool* 	Setting tool HS-SC				-	
Hollow drill bit drilling* 	-		TE-CD, TE-YD			
Seismic Set/ Filling Set** 	Seismic/Filling Set M8-M20 (Carbon and Stainless Steel A4)					-

***Installation methods provided in ETA-98/0001**

**Seismic set needed to fill the annular gap between anchor and fixture:
 No annular gap, double design resistance ($\alpha_{gap}=1$)



LOADS

1) LOADING ANALYSIS

Span between supports $L := 3500\text{mm}$

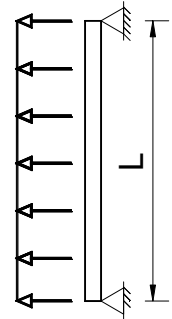
Wind load along X-axis

Design wind pressure $W_d := 1.4 \times 2.82\text{kPa}$ $W_d = 3.95\text{ kPa}$

Load width $B := \frac{1030\text{mm}}{2}$ $B = 515\text{ mm}$

UDL along x axis $w := W_d \cdot B$ $w = 2.03 \cdot \frac{\text{kN}}{\text{m}}$

WL per fixing $WL_H := w \cdot L$ $WL_H = 7.12\text{ kN}$



2) Dead Load

Dead load of a unit include the followings:-

1. Weight of glass

Density of glass $\rho_g := 26\text{kN} \cdot \text{m}^{-3}$

Width of glass $B = 515\text{ mm}$

Total height of spandrel glass $H_s := 1100\text{mm}$ Total height of vision glass $H_v := 1630\text{mm} + 770\text{mm} = 2400\text{ mm}$

Thickness of spandrel glass $t_s := 8\text{mm}$ Thickness of vision glass $t_v := 8\text{mm} + 10\text{mm}$

Weight of glass $W_g := (H_s \cdot t_s + H_v \cdot t_v) \cdot \rho_g \cdot B$ $W_g = 696.28\text{ N}$

2. Self weight of frame

Density of aluminum $\rho_a := 27.2\text{kN} \cdot \text{m}^{-3}$

Section area of transoms $A_t := 4000\text{mm}^2$ (say)

Section area of mullion $A_m := 5000\text{mm}^2$ (say)

Width of frame $B = 515\text{ mm}$

Height of frame $H := 3230\text{mm}$

Self weight of frame $W_f := (4\rho_a \cdot A_t \cdot B + \rho_a \cdot A_m \cdot H)$

$$W_f = 663.41\text{ N}$$

$$DL := 1.25(W_g + W_f)$$

Max.support reaction (unfactored) $DL = 1.7 \times 10^3\text{ N}$

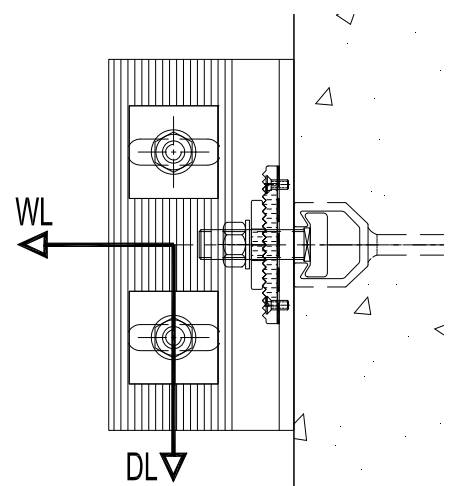
$$DL := 2.1\text{kN} \quad (\text{say})$$

Eccentricity $e := 200\text{mm}$

Eccentric moment $M_e := DL \cdot e$ $M_e = 0.42\text{ kN} \cdot \text{m}$


Reaction force per fixing $WL := WL_H + \frac{M_e}{3500\text{mm}} = 7.24\text{ kN}$

$$DL = 2.1\text{ kN}$$

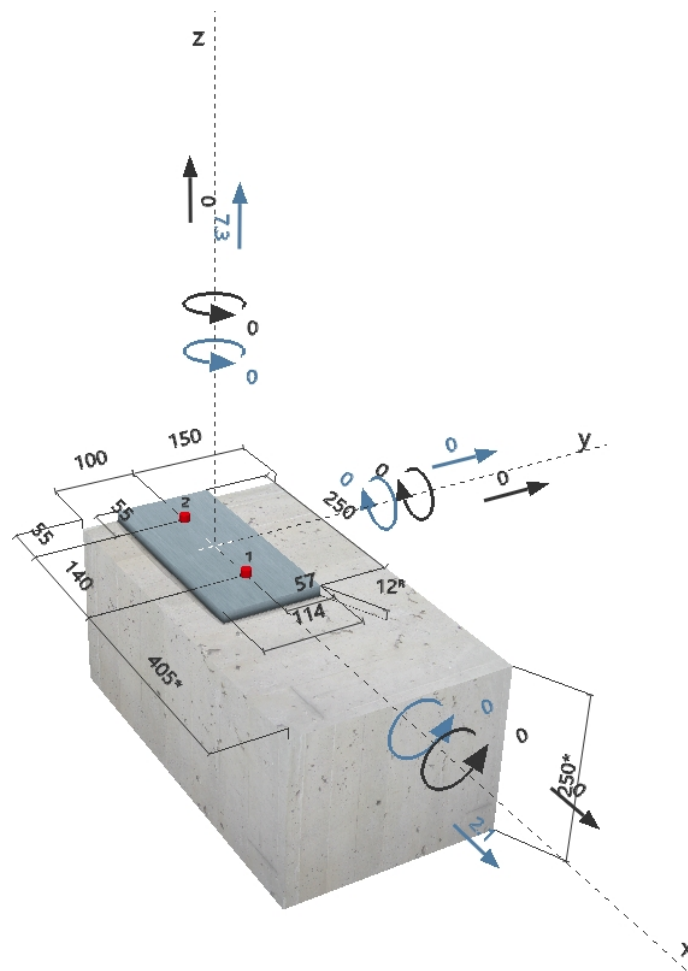


Specifier's comments:

1 Input data

Anchor type and size:	HST3-R M12 hef2	
Return period (service life in years):	50	
Effective embedment depth:	$h_{ef} = 70 \text{ mm}$, $h_{nom} = 80 \text{ mm}$	
Material:	A4	
Approval No.:	ETA-98/0001	
Issued Valid:	02/10/2019 -	
Proof:	Design method ETAG (No. 001 Annex C/2010)	
Stand-off installation:	$e_b = 0 \text{ mm}$ (no stand-off); $t = 12 \text{ mm}$	
Baseplate:	$l_x \times l_y \times t = 250 \text{ mm} \times 114 \text{ mm} \times 12 \text{ mm}$; (Recommended plate thickness: not calculated)	
Profile:	no profile	
Base material:	cracked concrete, C35/45, $f_{c,cube} = 45.00 \text{ N/mm}^2$; $h = 250 \text{ mm}$	
Installation:	hammer drilled hole, Installation condition: Dry	
Reinforcement:	No reinforcement or Reinforcement spacing $\geq 150 \text{ mm}$ (any \emptyset) or $\geq 100 \text{ mm}$ ($\emptyset \leq 10 \text{ mm}$) with longitudinal edge reinforcement $d \geq 12$ + close mesh (stirrups, hangers) $s \leq 100$	

^R - The anchor calculation is based on a rigid baseplate assumption.

Geometry [mm] & Loading [kN, kNm]


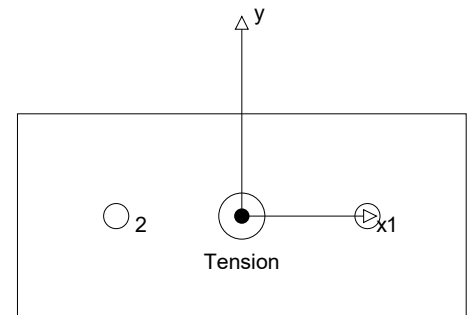
2 Load case/Resulting anchor forces

Load case 1 (2.00·permanent load + 2.00·variable load)
Load case 2 (1.0·permanent load + 2.00·variable load)
 Load case 3 (2.00·permanent load)

Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	7.300	2.100	2.100	0.000
2	7.300	2.100	2.100	0.000



max. concrete compressive strain: - [%]
 max. concrete compressive stress: - [N/mm²]
 resulting tension force in (x/y)=(0/0): 14.600 [kN]
 resulting compression force in (x/y)=(0/0): 0.000 [kN]

Anchor forces are calculated based on the assumption of a rigid baseplate.

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

	Load [kN]	Capacity [kN]	Utilisation β_N [%]	Status
Steel failure*	7.300	30.357	25	OK
Pull-out failure*	7.300	17.889	41	OK
Concrete cone failure**	14.600	22.542	65	OK
Splitting failure**	14.600	33.179	45	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]
42.500	1.400	30.357	7.300

3.2 Pull-out failure

$N_{Rk,p}$ [kN]	ψ_c	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]
20.000	1.342	1.500	17.889	7.300

3.3 Concrete cone failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]		
61,500	44,100	105	210		
$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.857	1.000
k_1	$N_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]	
7.200	28.287	1.500	22.542	14.600	

Group anchor ID
1, 2

3.4 Splitting failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,sp}$ [mm]	$s_{cr,sp}$ [mm]	$\psi_{h,sp}$		
61,500	44,100	105	210	1.472		
$e_{c1,N}$ [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	0.857	1.000	7.200
$N_{Rk,c}^0$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]			
28.287	1.500	33.179	14.600			

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

	Load [kN]	Capacity [kN]	Utilisation β_v [%]	Status
Steel failure (without lever arm)*	2.100	29.360	8	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	4.200	62.666	7	OK
Concrete edge failure in direction x+**	4.200	14.178	30	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]
36.700	1.250	29.360	2.100

4.2 Pryout failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k-factor	
61,500	44,100	105	210	2.780	
$e_{c1,V}$ [mm]	$\Psi_{ec1,N}$	$e_{c2,V}$ [mm]	$\Psi_{ec2,N}$	$\Psi_{s,N}$	$\Psi_{re,N}$
0	1.000	0	1.000	0.857	1.000
$N_{Rk,c}^0$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	V_{Sd} [kN]		
28.287	1.500	62.666	4.200		
Group anchor ID					
1, 2					

4.3 Concrete edge failure in direction x+

l_f [mm]	d_{nom} [mm]	k_1	α	β	
70	12.0	1.700	0.065	0.059	
c_1 [mm]	c_1' [mm]	$A_{c,V}$ [mm ²]	$A_{c,V}^0$ [mm ²]		
405	167	62,500	125,000		
$\Psi_{s,V}$	$\Psi_{h,V}$	$\Psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\Psi_{ec,V}$	$\Psi_{re,V}$
0.820	1.000	1.000	0	1.000	1.400
$V_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	V_{Sd} [kN]		
37.049	1.500	14.178	4.200		

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

Steel failure

β_N	β_V	α	Utilisation $\beta_{N,V}$ [%]	Status
0.648	0.296	1.500	69	OK

$$\beta_N^\alpha + \beta_V^\alpha \leq 1.0$$

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6 Displacements (highest loaded anchor)

Short term loading:

$$\begin{aligned} N_{Sk} &= 3.650 \text{ [kN]} & \delta_N &= 0.307 \text{ [mm]} \\ V_{Sk} &= 2.100 \text{ [kN]} & \delta_V &= 0.330 \text{ [mm]} \\ & & \delta_{NV} &= 0.451 \text{ [mm]} \end{aligned}$$

Long term loading:

$$\begin{aligned} N_{Sk} &= 3.650 \text{ [kN]} & \delta_N &= 0.615 \text{ [mm]} \\ V_{Sk} &= 2.100 \text{ [kN]} & \delta_V &= 0.490 \text{ [mm]} \\ & & \delta_{NV} &= 0.786 \text{ [mm]} \end{aligned}$$

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!

7 Warnings

- The anchor design methods in PROFIS Anchor require rigid baseplates per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the baseplate are not considered - the baseplate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Anchor calculates the minimum required baseplate thickness with FEM to limit the stress of the baseplate based on the assumptions explained above. The proof if the rigid baseplate 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 ETAG 001, Annex C(2010)Section 7! The software considers that the grout is installed under the baseplate 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.
- The characteristic bond resistances depend on the return period (service life in years): 50

Fastening meets the design criteria!





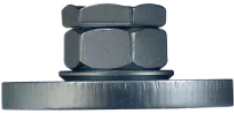
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9 Remarks; Your Cooperation Duties

- 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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HST3 (-R) subject to:

Anchor size	M8	M10	M12	M16	M20	M24
Hammer drilling* 	TE2(-A) – TE30(-A)				TE40 – TE70	
Diamond core drilling* 	DD-30W, DD-EC1					
Setting tool* 	Setting tool HS-SC				-	
Hollow drill bit drilling* 	-		TE-CD, TE-YD			
Seismic Set/ Filling Set** 	Seismic/Filling Set M8-M20 (Carbon and Stainless Steel A4)					-

***Installation methods provided in ETA-98/0001**


**Seismic set needed to fill the annular gap between anchor and fixture:
 No annular gap, double design resistance ($\alpha_{gap}=1$)

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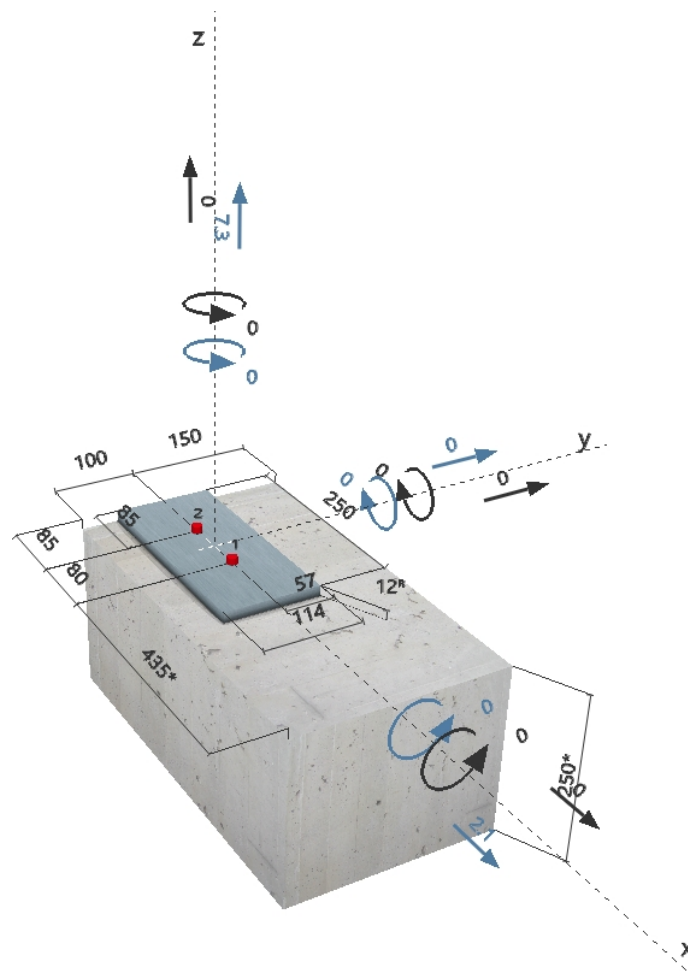
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Specifier's comments:

1 Input data

Anchor type and size:	HST3-R M12 hef2	
Return period (service life in years):	50	
Effective embedment depth:	$h_{ef} = 70 \text{ mm}$, $h_{nom} = 80 \text{ mm}$	
Material:	A4	
Approval No.:	ETA-98/0001	
Issued Valid:	02/10/2019 -	
Proof:	Design method ETAG (No. 001 Annex C/2010)	
Stand-off installation:	$e_b = 0 \text{ mm}$ (no stand-off); $t = 12 \text{ mm}$	
Baseplate:	$l_x \times l_y \times t = 250 \text{ mm} \times 114 \text{ mm} \times 12 \text{ mm}$; (Recommended plate thickness: not calculated)	
Profile:	no profile	
Base material:	cracked concrete, C35/45, $f_{c,cube} = 45.00 \text{ N/mm}^2$; $h = 250 \text{ mm}$	
Installation:	hammer drilled hole, Installation condition: Dry	
Reinforcement:	No reinforcement or Reinforcement spacing $\geq 150 \text{ mm}$ (any \emptyset) or $\geq 100 \text{ mm}$ ($\emptyset \leq 10 \text{ mm}$) with longitudinal edge reinforcement $d \geq 12 + \text{close mesh}$ (stirrups, hangers) $s \leq 100$	

^R - The anchor calculation is based on a rigid baseplate assumption.

Geometry [mm] & Loading [kN, kNm]


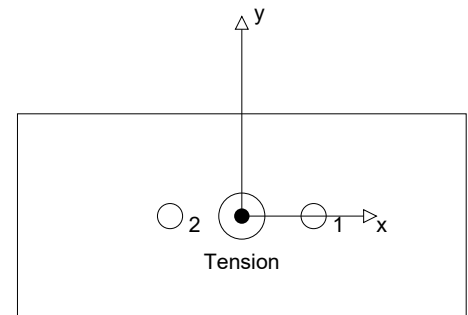
2 Load case/Resulting anchor forces

Load case 1 (2.00·permanent load + 2.00·variable load)
Load case 2 (1.0·permanent load + 2.00·variable load)
Load case 3 (2.00·permanent load)

Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	7.300	2.100	2.100	0.000
2	7.300	2.100	2.100	0.000



max. concrete compressive strain: - [%]
max. concrete compressive stress: - [N/mm²]
resulting tension force in (x/y)=(0/0): 14.600 [kN]
resulting compression force in (x/y)=(0/0): 0.000 [kN]

Anchor forces are calculated based on the assumption of a rigid baseplate.

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

	Load [kN]	Capacity [kN]	Utilisation β_N [%]	Status
Steel failure*	7.300	30.357	25	OK
Pull-out failure*	7.300	17.889	41	OK
Concrete cone failure**	14.600	22.316	66	OK
Splitting failure**	14.600	32.847	45	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]
42.500	1.400	30.357	7.300

3.2 Pull-out failure

$N_{Rk,p}$ [kN]	ψ_c	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]
20.000	1.342	1.500	17.889	7.300

3.3 Concrete cone failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]		
55,350	44,100	105	210		
$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.943	1.000
k_1	$N_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]	
7.200	28.287	1.500	22.316	14.600	

Group anchor ID
1, 2

3.4 Splitting failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,sp}$ [mm]	$s_{cr,sp}$ [mm]	$\psi_{h,sp}$		
55,350	44,100	105	210	1.472		
$e_{c1,N}$ [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	0.943	1.000	7.200
$N_{Rk,c}^0$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]			
28.287	1.500	32.847	14.600			

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

	Load [kN]	Capacity [kN]	Utilisation β_v [%]	Status
Steel failure (without lever arm)*	2.100	29.360	8	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	4.200	62.039	7	OK
Concrete edge failure in direction x+**	4.200	14.178	30	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]
36.700	1.250	29.360	2.100

4.2 Pryout failure

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k-factor	
55,350	44,100	105	210	2.780	
$e_{c1,V}$ [mm]	$\psi_{ec1,N}$	$e_{c2,V}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.943	1.000
$N_{Rk,c}^0$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	V_{Sd} [kN]		
28.287	1.500	62.039	4.200		
Group anchor ID					
1, 2					

4.3 Concrete edge failure in direction x+

l_f [mm]	d_{nom} [mm]	k_1	α	β	
70	12.0	1.700	0.065	0.059	
c_1 [mm]	c_1' [mm]	$A_{c,V}$ [mm ²]	$A_{c,V}^0$ [mm ²]		
435	167	62,500	125,000		
$\psi_{s,V}$	$\psi_{h,V}$	$\psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$
0.820	1.000	1.000	0	1.000	1.400
$V_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	V_{Sd} [kN]		
37.049	1.500	14.178	4.200		

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

Steel failure

β_N	β_V	α	Utilisation $\beta_{N,V}$ [%]	Status
0.654	0.296	1.500	70	OK

$$\beta_N^\alpha + \beta_V^\alpha \leq 1.0$$

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6 Displacements (highest loaded anchor)

Short term loading:

$$\begin{aligned} N_{Sk} &= 3.650 \text{ [kN]} & \delta_N &= 0.307 \text{ [mm]} \\ V_{Sk} &= 2.100 \text{ [kN]} & \delta_V &= 0.330 \text{ [mm]} \\ & & \delta_{NV} &= 0.451 \text{ [mm]} \end{aligned}$$

Long term loading:

$$\begin{aligned} N_{Sk} &= 3.650 \text{ [kN]} & \delta_N &= 0.615 \text{ [mm]} \\ V_{Sk} &= 2.100 \text{ [kN]} & \delta_V &= 0.490 \text{ [mm]} \\ & & \delta_{NV} &= 0.786 \text{ [mm]} \end{aligned}$$

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!

7 Warnings

- The anchor design methods in PROFIS Anchor require rigid baseplates per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the baseplate are not considered - the baseplate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Anchor calculates the minimum required baseplate thickness with FEM to limit the stress of the baseplate based on the assumptions explained above. The proof if the rigid baseplate 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 ETAG 001, Annex C(2010)Section 7! The software considers that the grout is installed under the baseplate 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.
- The characteristic bond resistances depend on the return period (service life in years): 50

Fastening meets the design criteria!

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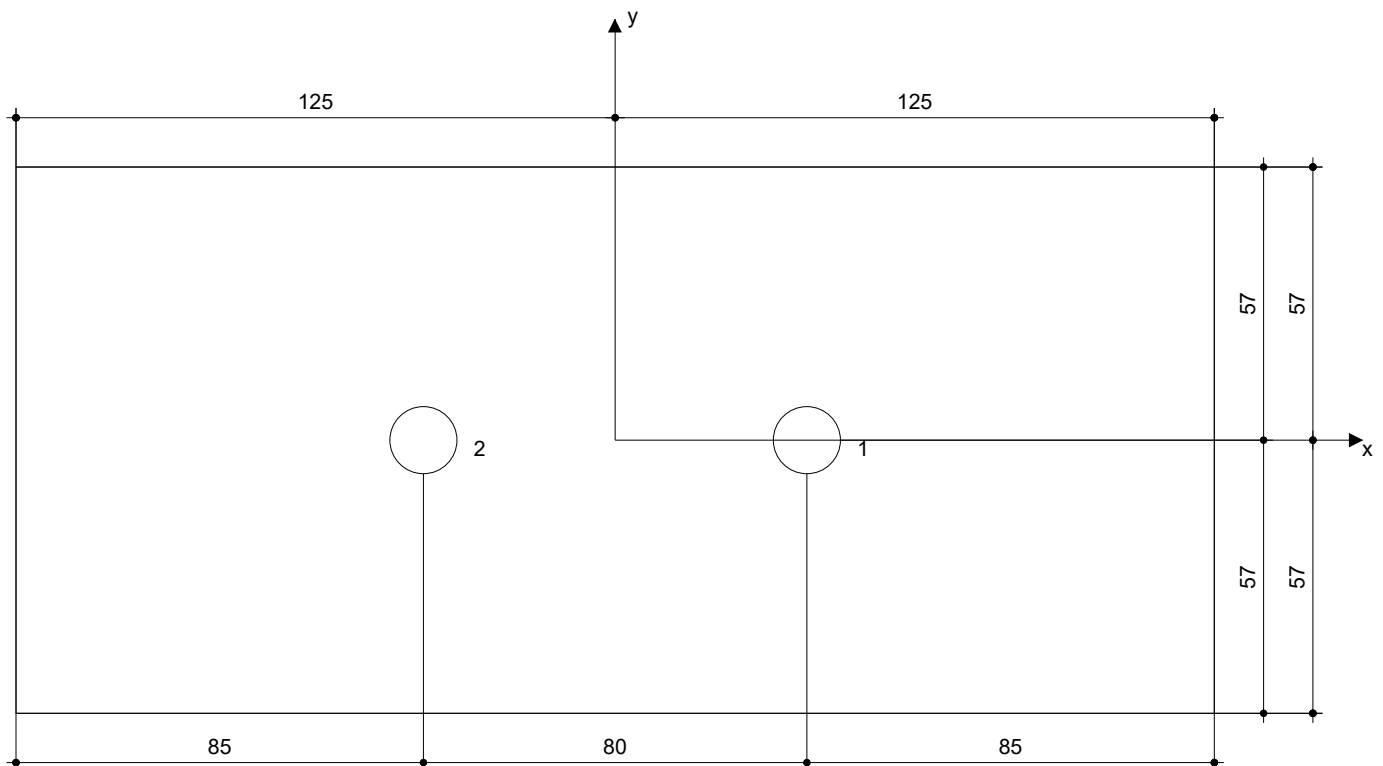
8 Installation data

Baseplate, steel: -
 Profile: no profile
 Hole diameter in the fixture: $d_f = 14 \text{ mm}$
 Plate thickness (input): 12 mm
 Recommended plate thickness: not calculated
 Drilling method: Hammer drilled
 Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Anchor type and size: HST3-R M12 hef2
 Installation torque: 0.060 kNm
 Hole diameter in the base material: 12 mm
 Hole depth in the base material: 90 mm
 Minimum thickness of the base material: 140 mm

8.1 Recommended accessories

Drilling	Cleaning	Setting
<ul style="list-style-type: none"> Suitable Rotary Hammer Properly sized drill bit 	<ul style="list-style-type: none"> Manual blow-out pump 	<ul style="list-style-type: none"> Hilti SIW 6AT-A22 + SI AT-A22 Torque wrench Hammer



Coordinates Anchor [mm]

Anchor	x	y	C _{-x}	C _{+x}	C _{-y}	C _{+y}
1	40	0	165	435	100	150
2	-40	0	85	515	100	150





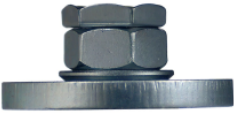
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Setting tool* 	Setting tool HS-SC				-	
Hollow drill bit drilling* 	-	TE-CD, TE-YD				
Seismic Set/ Filling Set** 	Seismic/Filling Set M8-M20 (Carbon and Stainless Steel A4)				-	

***Installation methods provided in ETA-98/0001**

**Seismic set needed to fill the annular gap between anchor and fixture:
 No annular gap, double design resistance ($\alpha_{gap}=1$)