美 特 鋁 質 有 限 公 司
MIDI ALUMINIUM FABRICATOR LTD.

工程指示 / 要求簡箋(E.I.)

工程指示編號：**EI / 3195 / 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 現場修補方案用配件 **(M12)**

收件人 ：林哥 發件人 ： **Ant Yeung** 日 期 ：**23/03/2021**

☐要求提供 / ☐確認 事項 ：

( ) 初步鋁料 B.M. ( ) 加工拆圖，然後生產` ( ) 尺寸表

( ) 正式鋁料 B.M. ( ) 技術上資料 / 指示 ( ) 報價

( ) 配件 B.M. ( ) 樣辦或貨品說明書 ( ) 分判合約

內容 ：

請按 BM 訂購 M12 拉爆送地盤，現場修補方案打拉爆用

本項目修補方案只有一款 HST3-R M12，已出信 MC40013

請在 **2021.03.31** 前完成上列要求。

附：1 頁 BM，1 頁圖，36 頁數

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 ：

( )生產技術總監☐連附件 ( )技術部 ☐連附件 ( )生產部 ☐連附件 ( )機械設計部☐連附件

( )採購部 ☐連附件 ( )生產統籌部☐連附件 ( )小羅&清 ☐連附件

( )質檢部 ☐連附件 ( )會計部 ☐連附件 ( )報關組 ☐連附件 ( )其他 _____☐連附件

分發其他分判 ：

(v)水洪 ☐連附件

分發香港各部門 ：

( )行政部☐連附件 ( )會計部☐連附件 (林哥)統籌部☐連附件 ( )工程部地盤科文☐連附件 祥哥

( )採購部☐連附件 ( )QS 部 ☐連附件 ( )維修部☐連附件 ( )其他 _____☐連附件

傳遞編號：

HK / 21

發件人簽署：

項目經理簽署：

美特鋁質有限公司 MIDI Aluminium Fabricator Ltd.	工程號: J852	計算:	CJM	日期:		送呈:	
	地盤名稱: 亞皆老街	核對:	wsh	日期:		副本:	
幕墻地盤用配件B.M.表	項目類別: 幕墻（1F~23F）	批准:		日期:		此BM依據施工圖 來計算	
BM編號:	A/C Code:	修改說明：					

序號	修改標示	配件圖號	物料編號	配件名稱	顏色	實用	後備	總數	單位	備注
1			HILTI HST3-R	M12X95mm拉爆	A4-70	100		100	粒	幕牆修補方案用
2										
3										
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美 特 鋁 質 有 限 公 司
MIDI ALUMINIUM FABRICATOR LTD.

Our ref. MC/40013/852

9th March 2021

Gammon Engineering & Construction Company Limited
139 - 147 Argyle Street,
Kowloon, Hong Kong

By Email & Hand

Attn.: Mr. Dick Yuen / Ms. Penny Chau

Dear Sir,

Re : Design, Supply & Installation of Aluminium Window & Cladding, Curtain Wall, Glass Wall, Lourves and Glass Balustrade Nominated Sub-Contract at K.I.L. 6038RP, K.I.L.6037RP, K.I.L. 6036RP, K.I.L. 6035RP & K.I.L. 6005, Nos. 139-147 Argyle Street, Kowloon.
Submission of Drawing and Calculation for Remedial case for Curtain Wall (Alternative) (TS069)

Regarding the captioned project, we would like to submit the drawing and calculation for remedial case for Curtain Wall (alternative) for your review and comment.

Thank you for your kind attention.

Yours faithfully,
MIDI ALUMINIUM FABRICATOR LTD.

P.P.

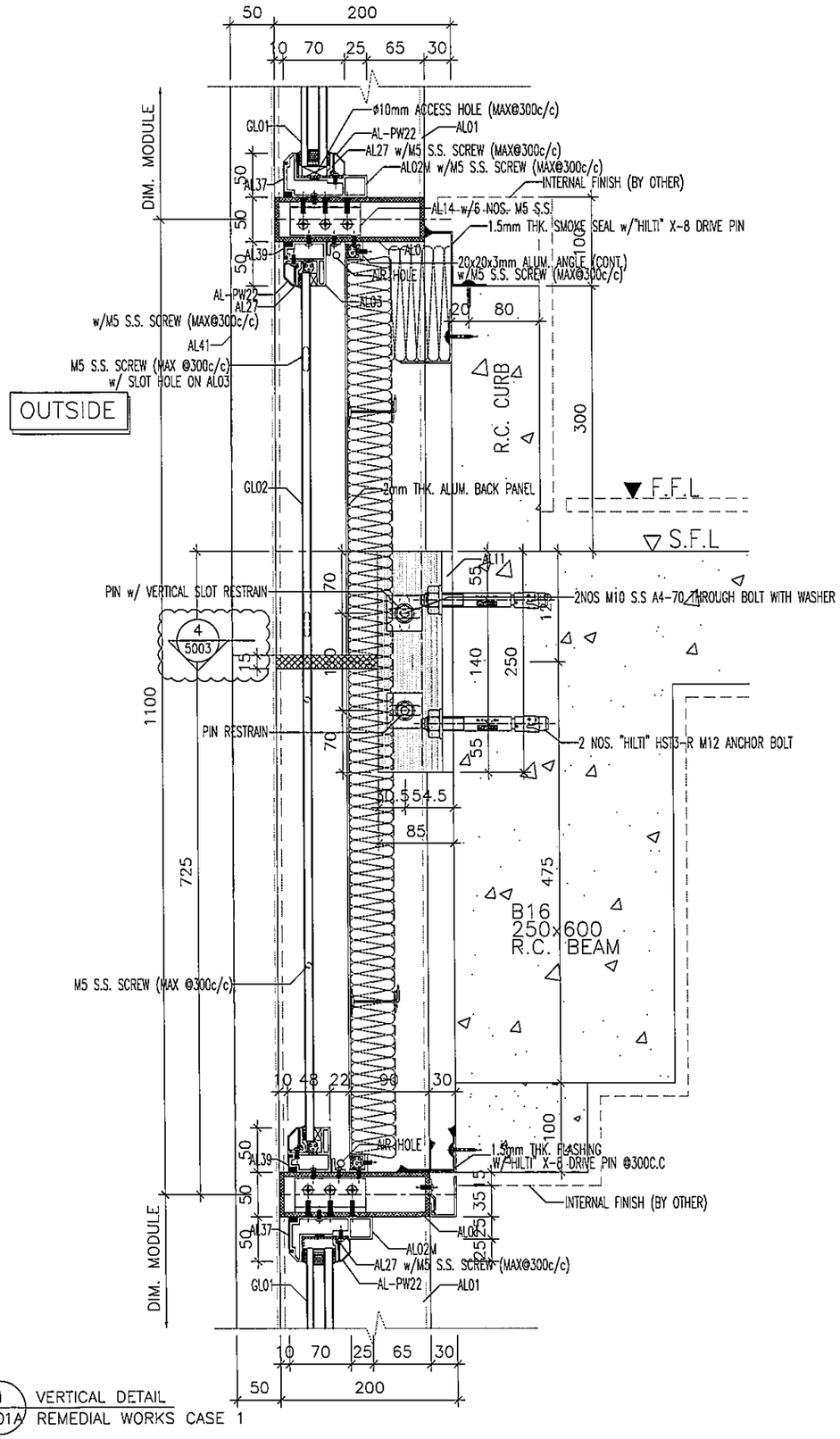
Marco Tam
Director

Encl

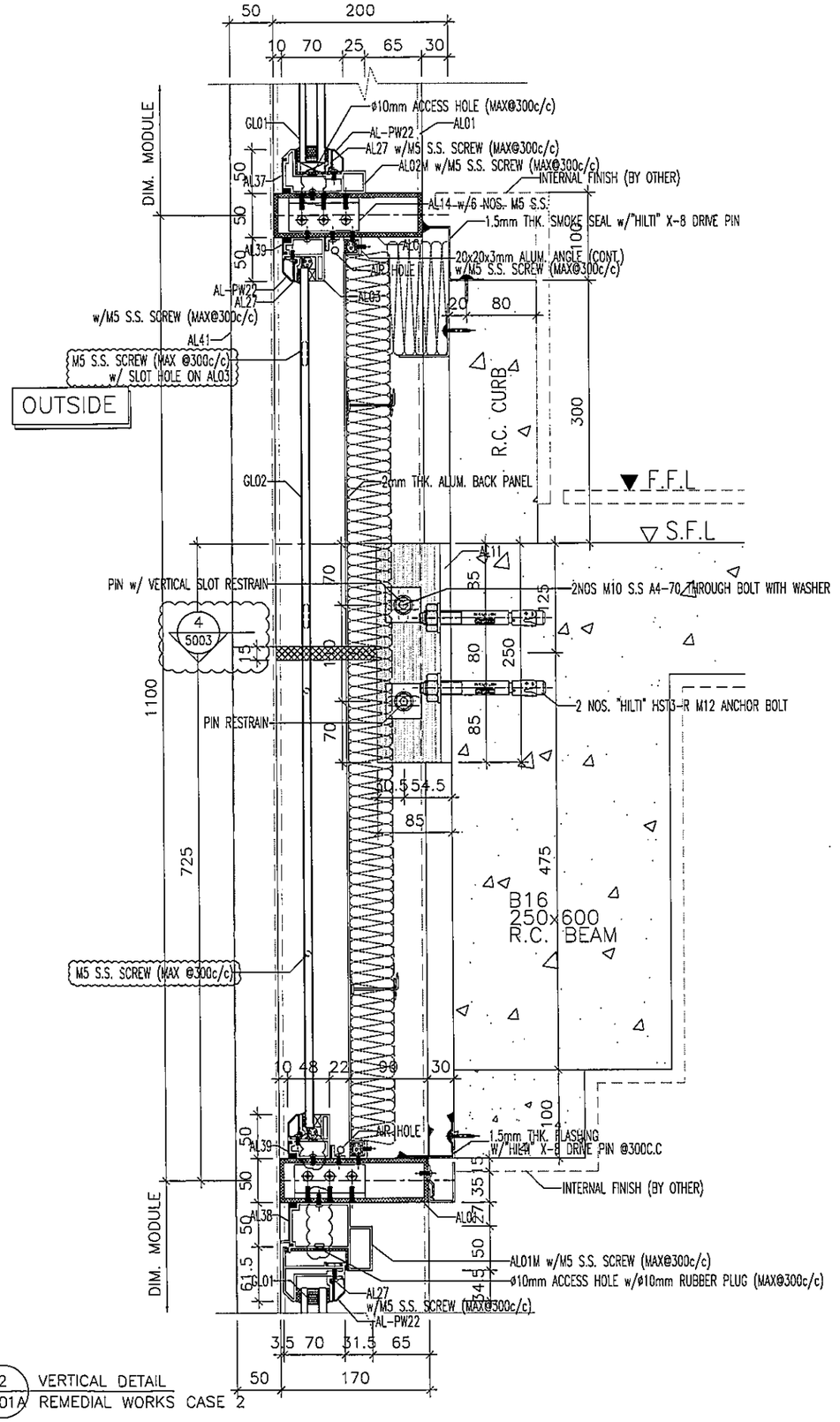
cc.	Gammon	- Mr. Chris Kwok / Ms. Myra Li /	(w/e)
		- Ms. Esther Chung / Ms. Angel Man /	
		- Mr. Jackson Mok / Mr. Sam Tang	
	Sino	- Mr. Billy Tang / Mr. Jimmy Cheung /	(w/e) (Email Only)
		- Mr. Terry Wan / Mr. Jaja Wong	
	AGC	- Mr. Raymond Ho / Mr. Eliot Chan	(w/e) (Email Only)
	MFT	- Mr. Brian Leung / Mr. Nigel Lo	(w/e)
		- Ms. Yoanna Chan / Ms. Cosimo Wong	
		- Mr. Neo Wong	

(KM/MT/DW/AY/BL/KL/wk

九龍茶果嶺道610號生利工業中心1樓6-8號
Units 6-8, 1st Floor, Sunray Industrial Centre, 610 Cha Kwo Ling Road, Kln.
TEL. (電話) : 2348 9211 FAX. (傳真) : 2772 7666 E-mail Address (電郵) : midi@midiltd.com.hk.



1 6001A VERTICAL DETAIL REMEDIAL WORKS CASE 1



2 6001A VERTICAL DETAIL REMEDIAL WORKS CASE 2

B.D. REF :

CLIENT :

ARCHITECT :
AGC DESIGN LTD

MAIN CONTRACTOR :
Gammon

STRUCTURAL ENGINEER :
ARUP

FACADE CONSULTANT:
MEINHARDT

NOTE :
1. ALL DIMENSIONS ARE IN mm.
2. ALL ELEVATIONS ARE VIEWED FROM OUTSIDE.
3. ALL DIMENSIONS TO BE VERIFIED ON SITE BEFORE FABRICATION.

LEGEND :
- X1 / X001 — DETAIL MARK NO. / REFER SHEET NO.
1. F.F.L. --FINISHED FLOOR LEVEL
2. S.F.L. --STRUCTURAL FLOOR LEVEL
3. (/R) --REVERSED DETAIL
4. GLASS LEGEND
   - AL01 ALUM EXTRUSION MARK: REFER TO DRAWING: 1101&1102
   - GL01 GL01 (VISION GLASS): 8mm HEAT STRENGTHENED+12mm AIR GAP +10mm THK. CLEAR TEMPERED I.G.U.
   - GL02 GL02 (SPANDREL GLASS): 10mm THK. HEAT STRENGTHENED GLASS
   - GL04 GL04 (PROTECTIVE BARRIER): 10mm THK. TEMPERED GLASS

NO.	DATE	REVISED	BY

JOB NO. : J-852

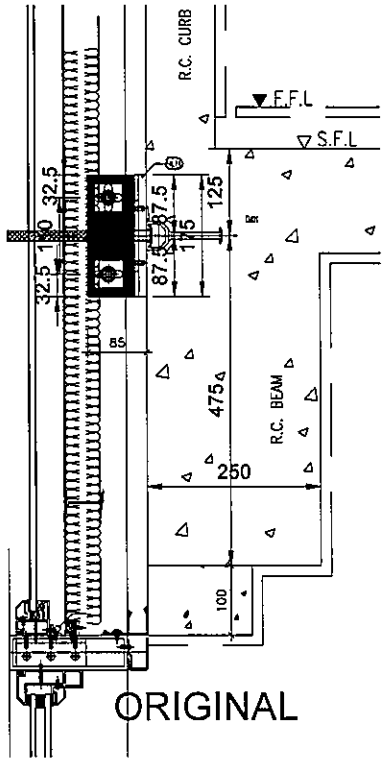
PROJECT :
PROPOSED RESIDENTIAL DEVELOPMENT AT 139 - 147 ARGYLE STREET, NKIL 6005, 6035 R.P., 6036 R.P., 6037 R.P. & 6038 R.P.

TITLE :
TYPICAL DETAILS FOR CURTAIN WALL

DATE : 17-DEC-19	SCALE : 1:6
DRAWN BY : MN	CHECKED BY : DW

美特鋁製有限公司
MIDI ALUMINIUM FABRICATOR LTD.
Units 6-8, Sunray Industrial Centre, 1/F
610 Cha Kwo Ling Road, Kowloon
Tel:23489211-4 Fax:(852)27727666

DWG NO. : J852-SD-CW-6001A | REV. : -



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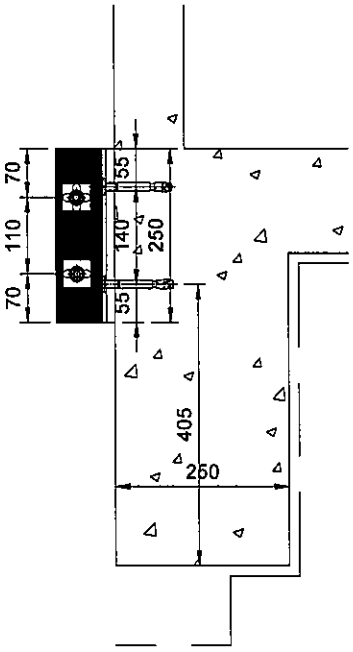
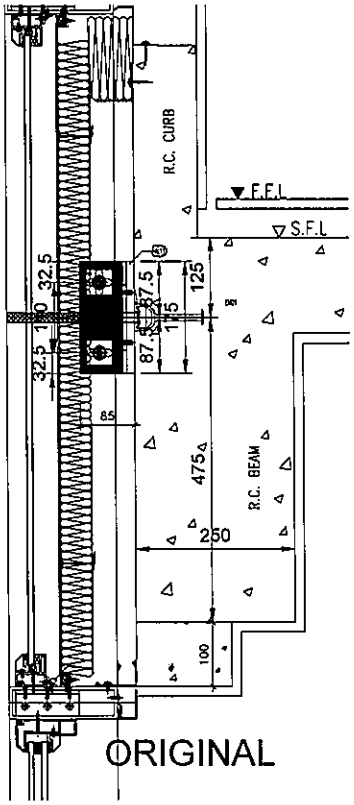
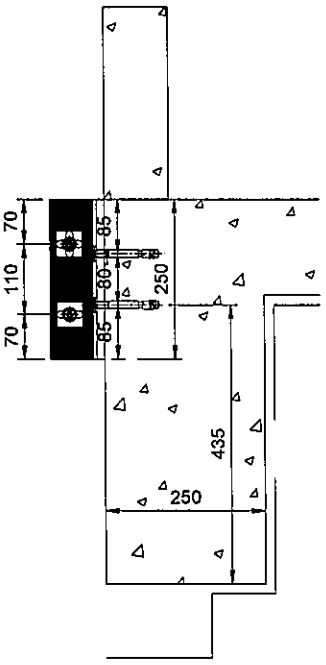


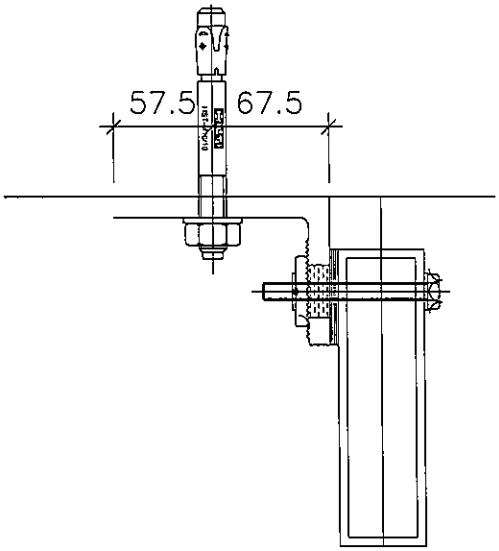
REVISED
CASE 1



ORIGINAL



REVISED
CASE 2



LOADS

1) LOADING ANALYSIS

Span between supports $L := 3500mm$

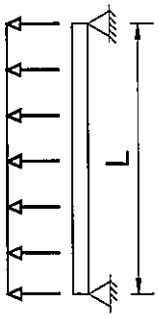
Wind load along X-axis

Design wind pressure $W_d := 1.4 \times 2.82kPa$ $W_d = 3.95 \cdot kPa$

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

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

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



2) Dead Load Dead load of a unit include the followings:-

1. Weight of glass

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

Width of glass $B = 515 \cdot mm$

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

Thickness of spandrel glass $t_s := 8mm$ Thickness of vision glass $t_v := 8mm + 10mm$

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

2. Self weight of frame

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

Section area of transoms $A_t := 4000mm^2$ (say)

Section area of mullion $A_m := 5000mm^2$ (say)

Width of frame $B = 515 \cdot mm$

Height of frame $H := 3230mm$

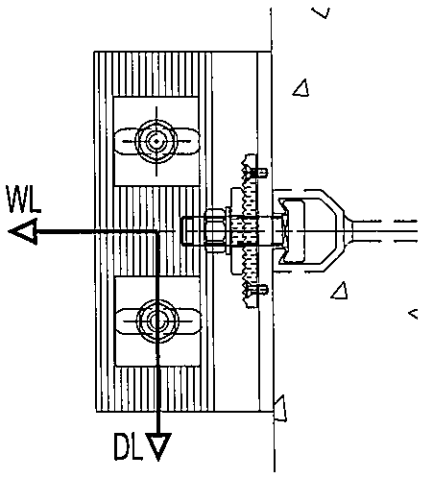
Self weight of frame $W_f := \left(4\rho_a \cdot A_t \cdot B + \rho_a \cdot A_m \cdot H\right)$

$W_f = 663.41 \cdot N$

$DL := 1.25\left(W_g + W_f\right)$

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

$DL := 2.1kN$ (say)



Eccentricity $e := 200mm$

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

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

$DL = 2.1 \cdot kN$

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Phone I Fax:	|	Date:	2021/3/8
E-Mail:			

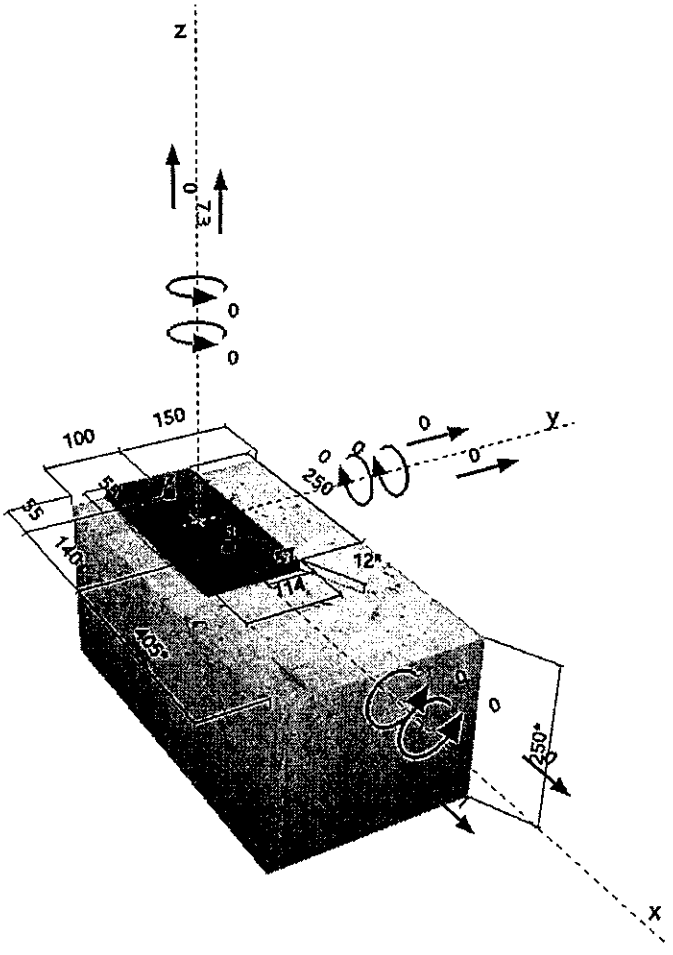
Specifier's comments:

1 Input data

Anchor type and size:	**HST3-R M12 hef2**
Return period (service life in years):	50
Effective embedment depth:	h_{ef} = 70 mm, h_{nom} = 80 mm
Material:	A4
Approval No.:	ETA-98/0001
Issued I Valid:	02/10/2019 I -
Proof:	Design method ETAG (No. 001 Annex C/2010)
Stand-off installation:	e_b = 0 mm (no stand-off); t = 12 mm
Baseplate:	l_x x l_y x t = 250 mm x 114 mm x 12 mm; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, C35/45, $f_{c,cube}$ = 45.00 N/mm²; h = 250 mm
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 + close mesh (stirrups, hangers) s <= 100

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

Geometry [mm] & Loading [kN, kNm]



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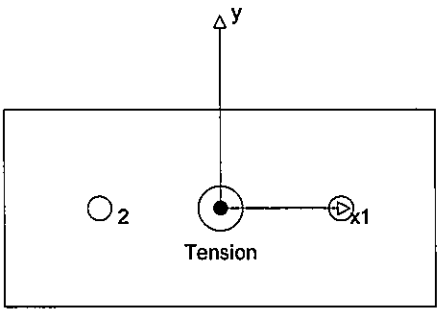
2 Load case/Resulting anchor forces

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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [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	$N^0_{Rk,c}$ [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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,sp}$ [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

$N^0_{Rk,c}$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]
28.287	1.500	33.179	14.600

Group anchor ID
1, 2

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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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [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
$N^0_{Rk,c}$ [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]	$A_{c,V}$ [mm²]	$A^0_{c,V}$ [mm²]		
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
$V^0_{Rk,c}$ [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:

N_{Sk}	=	3.650 [kN]	δ_N	=	0.307 [mm]
V_{Sk}	=	2.100 [kN]	δ_V	=	0.330 [mm]
			δ_{NV}	=	0.451 [mm]

Long term loading:

N_{Sk}	=	3.650 [kN]	δ_N	=	0.615 [mm]
V_{Sk}	=	2.100 [kN]	δ_V	=	0.490 [mm]
			δ_{NV}	=	0.786 [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!

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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E-Mail:

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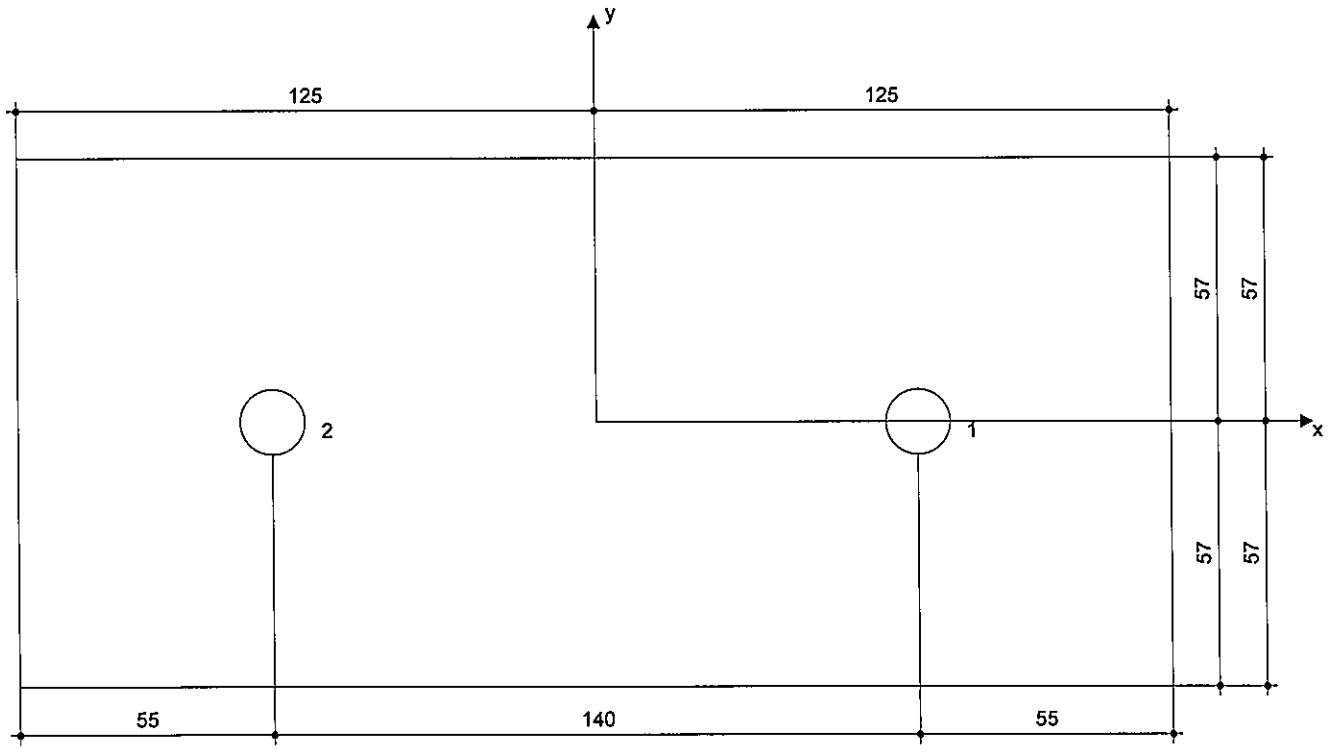
8 Installation data

Baseplate, steel: -
Profile: no profile
Hole diameter in the fixture: d_f = 14 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
• Suitable Rotary Hammer	• Manual blow-out pump	• Hilti SIW 6AT-A22 + SI AT-A22
• Properly sized drill bit		• Torque wrench
		• Hammer



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	70	0	195	405	100	150
2	-70	0	55	545	100	150

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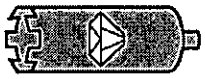
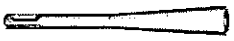
E-Mail:			

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 (α_{gap}=1)

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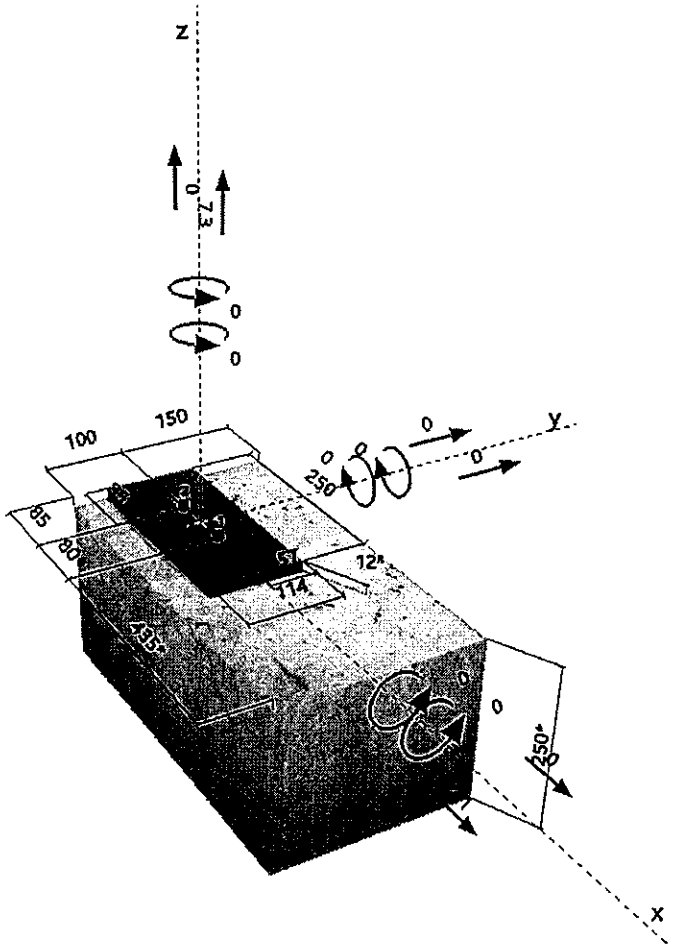
Specifier's comments:

1 Input data

Anchor type and size:	**HST3-R M12 hef2**
Return period (service life in years):	50
Effective embedment depth:	h_{ef} = 70 mm, h_{nom} = 80 mm
Material:	A4
Approval No.:	ETA-98/0001
Issued I Valid:	02/10/2019 | -
Proof:	Design method ETAG (No. 001 Annex C/2010)
Stand-off installation:	e_b = 0 mm (no stand-off); t = 12 mm
Baseplate:	l_x x l_y x t = 250 mm x 114 mm x 12 mm; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, C35/45, $f_{c,cube}$ = 45.00 N/mm²; h = 250 mm
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 + close mesh (stirrups, hangers) s <= 100

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

Geometry [mm] & Loading [kN, kNm]



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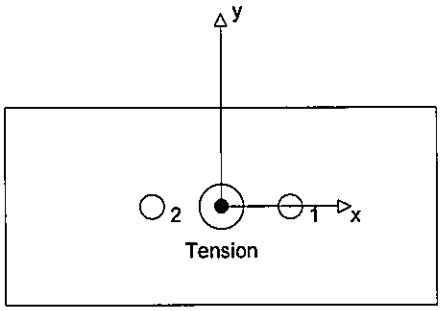
2 Load case/Resulting anchor forces

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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [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	$N^0_{Rk,c}$ [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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,sp}$ [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

$N^0_{Rk,c}$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]
28.287	1.500	32.847	14.600

Group anchor ID
1, 2

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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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [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
$N^0_{Rk,c}$ [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]	$A_{c,V}$ [mm²]	$A^0_{c,V}$ [mm²]		
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
$V^0_{Rk,c}$ [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:

N_{Sk}	=	3.650 [kN]	δ_N	=	0.307 [mm]
V_{Sk}	=	2.100 [kN]	δ_V	=	0.330 [mm]
			δ_{NV}	=	0.451 [mm]

Long term loading:

N_{Sk}	=	3.650 [kN]	δ_N	=	0.615 [mm]
V_{Sk}	=	2.100 [kN]	δ_V	=	0.490 [mm]
			δ_{NV}	=	0.786 [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!

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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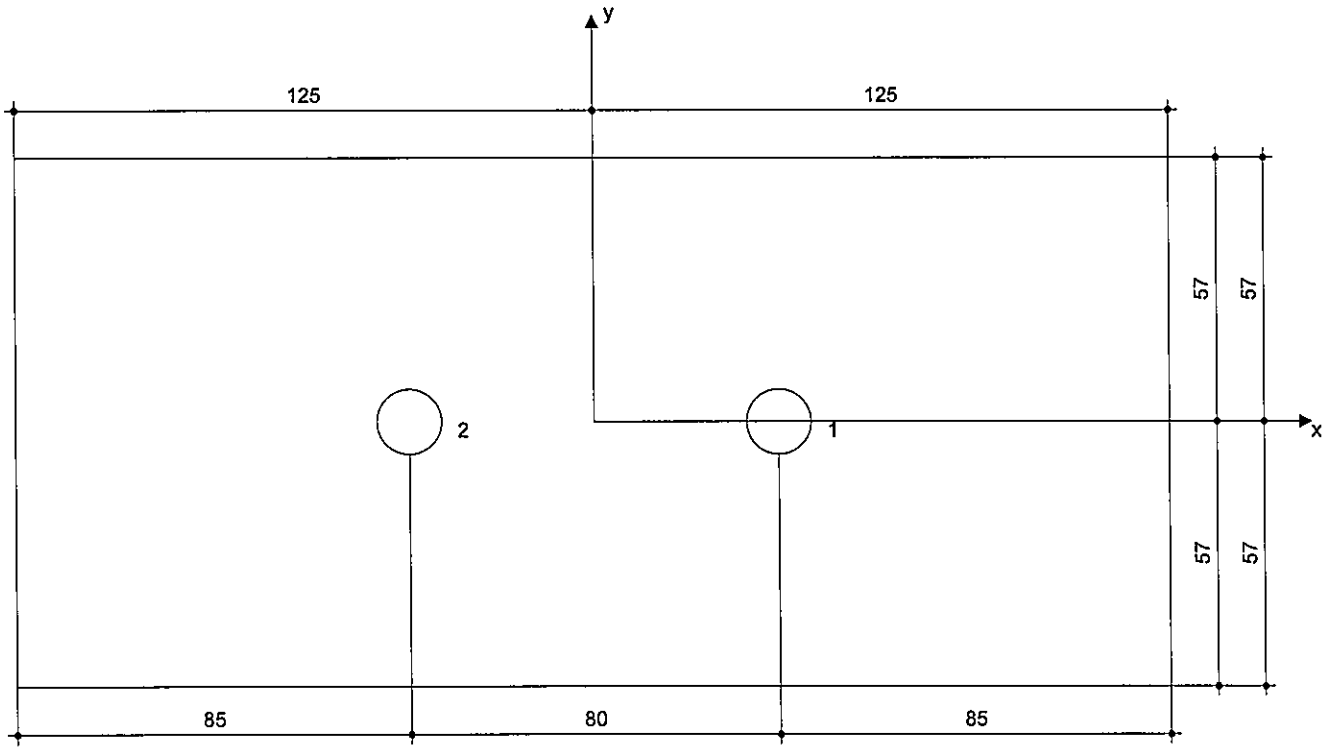
8 Installation data

Baseplate, steel: -
Profile: no profile
Hole diameter in the fixture: d_f = 14 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
• Suitable Rotary Hammer	• Manual blow-out pump	• Hilti SIW 6AT-A22 + SI AT-A22
• Properly sized drill bit		• 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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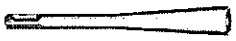
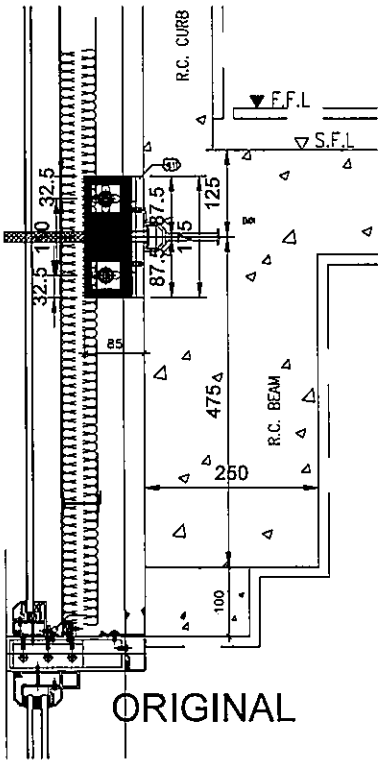
HST3 (-R) subject to:

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 (αgap=1)



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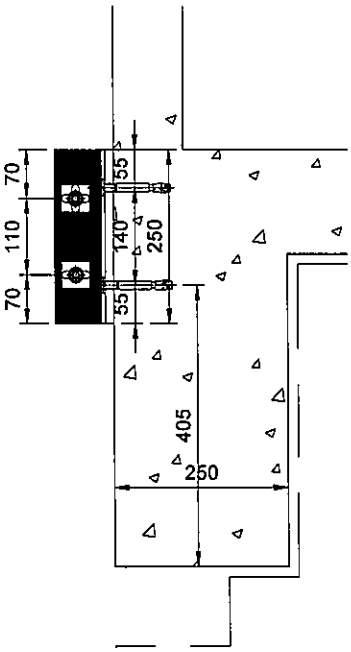
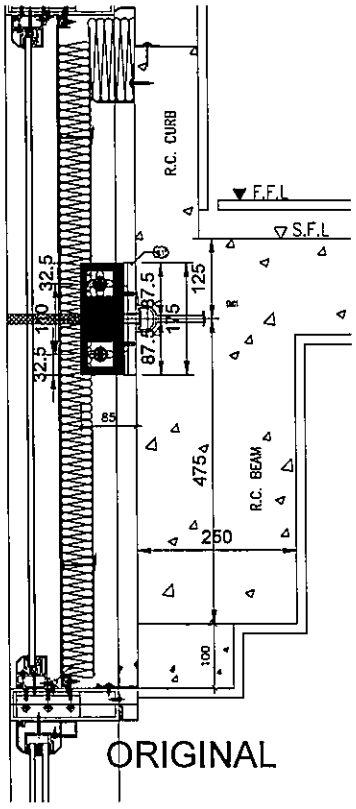


REVISED
CASE 1



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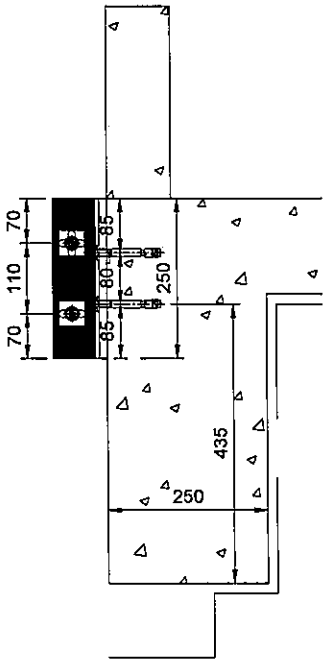

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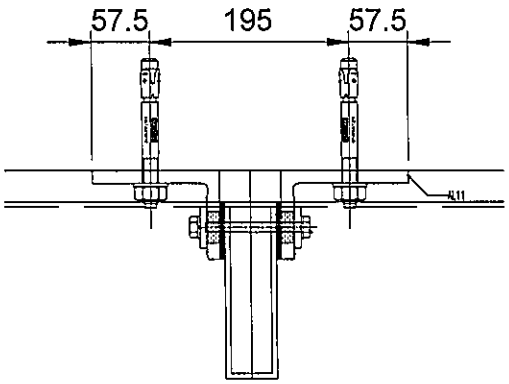
CASE 2



LOADS

1) LOADING ANALYSIS

Span between supports $L := 3500mm$

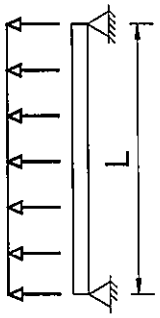
Wind load along X-axis

Design wind pressure $W_d := 1.4 \times 2.82kPa$ $W_d = 3.95 \cdot kPa$

Load width $B := \frac{1030mm + 950mm}{2}$ $B = 990 \cdot mm$

UDL along x axis $w := W_d \cdot B$ $w = 3.91 \cdot \frac{kN}{m}$

WL per fixing $WL_H := w \cdot L$ $\boxed{WL_H = 13.68 \cdot kN}$



2) Dead Load Dead load of a unit include the followings:-

1. Weight of glass

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

Width of glass $B = 990 \cdot mm$

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

Thickness of spandrel glass $t_s := 8mm$ Thickness of vision glass $t_v := 8mm + 10mm$

Weight of glass $W_g := \left(H_s \cdot t_s + H_v \cdot t_v\right) \cdot \rho_g \cdot B$ $\boxed{W_g = 1.34 \times 10^3 \cdot N}$

2. Self weight of frame

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

Section area of transoms $A_t := 4000mm^2$ (say)

Section area of mullion $A_m := 5000mm^2$ (say)

Width of frame $B = 990 \cdot mm$

Height of frame $H := 3230mm$

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

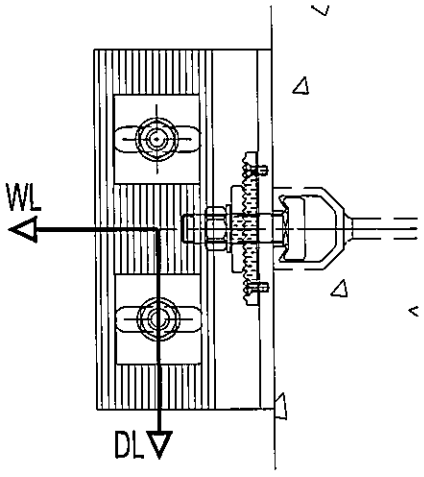
$W_f = 870.13 \cdot N$

$DL := 1.25\left(W_g + W_f\right)$

Max.support reaction (unfactored)

$DL = 2.76 \times 10^3 \cdot N$

$DL := 4kN$ (say)



Eccentricity $e := 200mm$

Eccentric moment $M_e := DL \cdot e$ $M_e = 0.8 \cdot kN \cdot m$

Reaction force per fixing $WL := WL_H + \frac{M_e}{3500mm} = 13.91 \cdot kN$ $WL := 14kN$

$DL = 4 \cdot kN$

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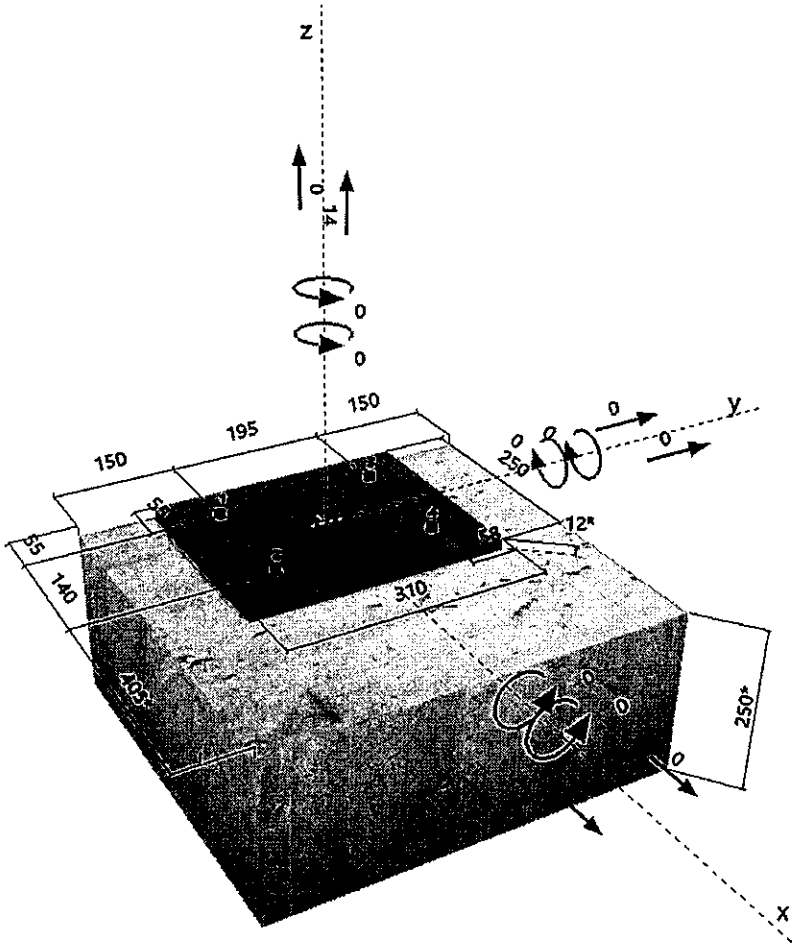
Specifier's comments:

1 Input data

Anchor type and size:	**HST3-R M12 hef2**
Return period (service life in years):	50
Effective embedment depth:	h_{ef} = 70 mm, h_{nom} = 80 mm
Material:	A4
Approval No.:	ETA-98/0001
Issued I Valid:	02/10/2019 | -
Proof:	Design method ETAG (No. 001 Annex C/2010)
Stand-off installation:	e_b = 0 mm (no stand-off); t = 12 mm
Baseplate:	l_x x l_y x t = 250 mm x 310 mm x 12 mm; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, C35/45, $f_{c,cube}$ = 45.00 N/mm²; h = 250 mm
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 + close mesh (stirrups, hangers) s <= 100

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

Geometry [mm] & Loading [kN, kNm]



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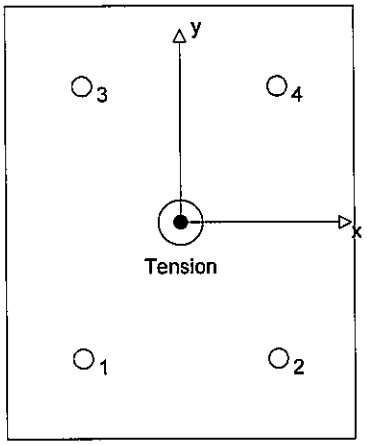
2 Load case/Resulting anchor forces



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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [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	$N^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]
7.200	28.287	1.500	44.533	28.000

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3.4 Splitting failure

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,sp}$ [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

$N^0_{Rk,c}$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]
28.287	1.500	65.548	28.000

Group anchor ID
1-4

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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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [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
$N^0_{Rk,c}$ [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]	$A_{c,V}$ [mm²]	$A^0_{c,V}$ [mm²]		
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
$V^0_{Rk,c}$ [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:

N_{Sk}	=	3.500 [kN]	δ_N	=	0.295 [mm]
V_{Sk}	=	2.000 [kN]	δ_V	=	0.314 [mm]
			δ_{NV}	=	0.431 [mm]

Long term loading:

N_{Sk}	=	3.500 [kN]	δ_N	=	0.589 [mm]
V_{Sk}	=	2.000 [kN]	δ_V	=	0.467 [mm]
			δ_{NV}	=	0.752 [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!

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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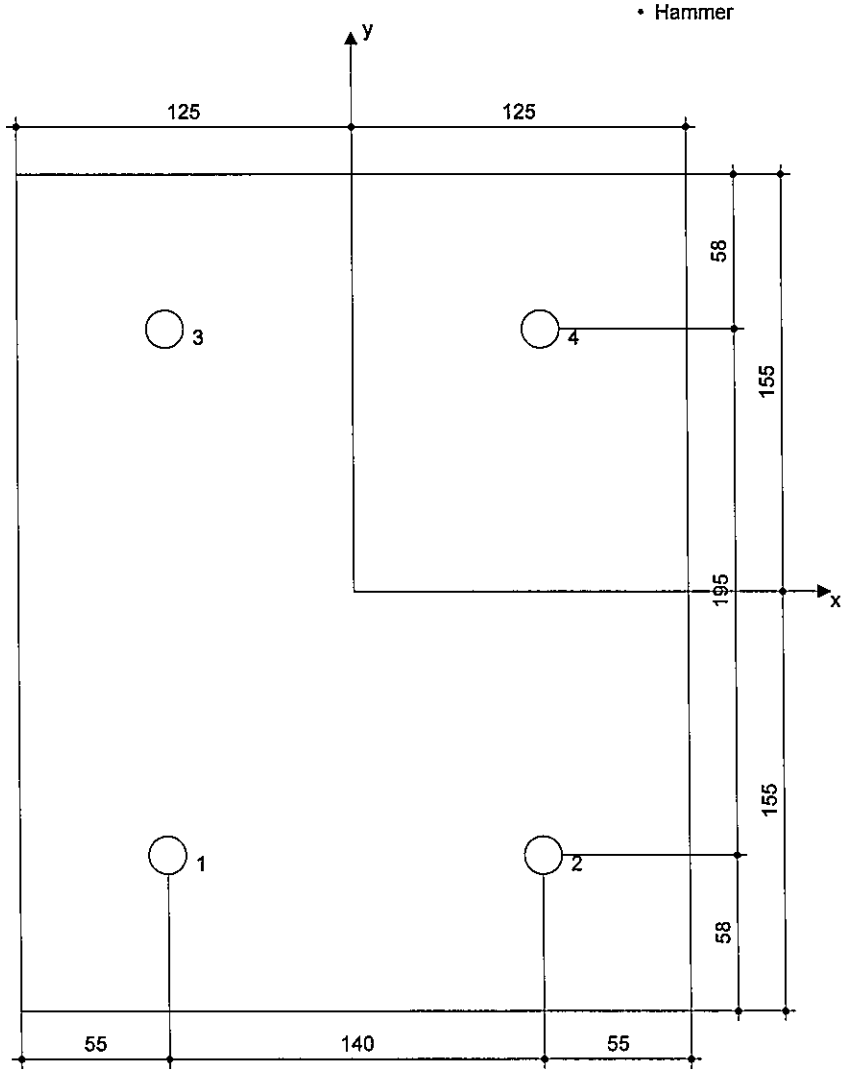
8 Installation data

Baseplate, steel: -
Profile: no profile
Hole diameter in the fixture: d_f = 14 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
• Suitable Rotary Hammer	• Manual blow-out pump	• Hilti SIW 6AT-A22 + SI AT-A22
• Properly sized drill bit		• 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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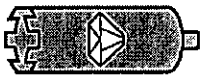
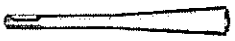
9 Remarks; Your Cooperation Duties

- 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 (α_{gap}=1)

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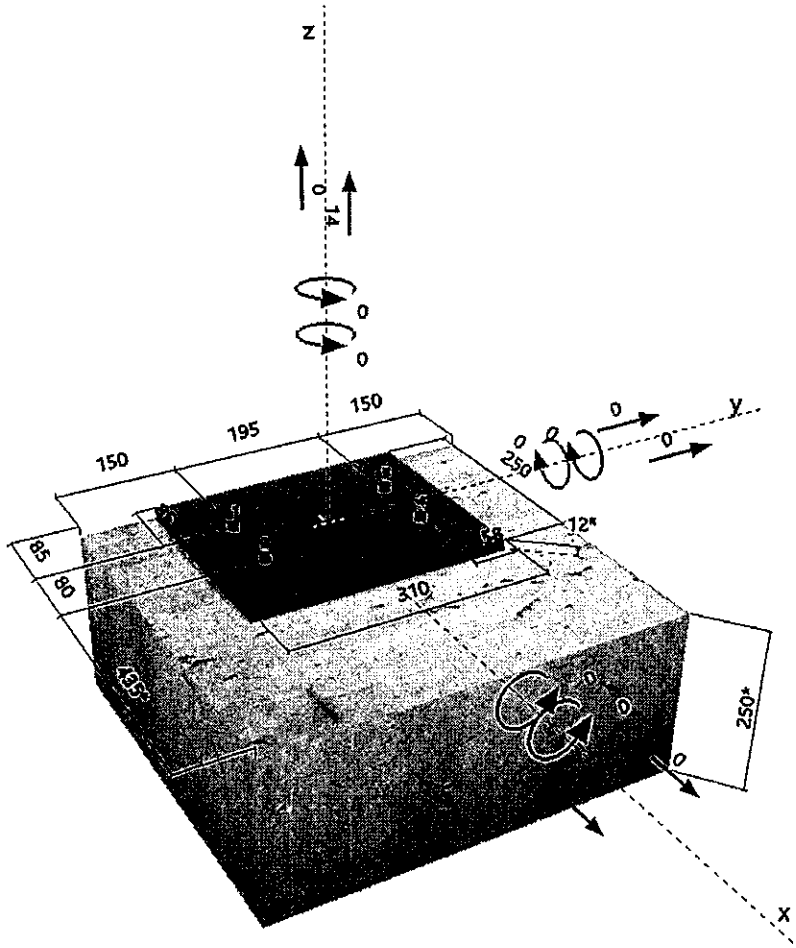
Specifier's comments:

1 Input data

Anchor type and size:	**HST3-R M12 hef2**
Return period (service life in years):	50
Effective embedment depth:	h_{ef} = 70 mm, h_{nom} = 80 mm
Material:	A4
Approval No.:	ETA-98/0001
Issued I Valid:	02/10/2019 | -
Proof:	Design method ETAG (No. 001 Annex C/2010)
Stand-off installation:	e_b = 0 mm (no stand-off); t = 12 mm
Baseplate:	l_x x l_y x t = 250 mm x 310 mm x 12 mm; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, C35/45, $f_{c,cube}$ = 45.00 N/mm²; h = 250 mm
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 + close mesh (stirrups, hangers) s <= 100

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

Geometry [mm] & Loading [kN, kNm]



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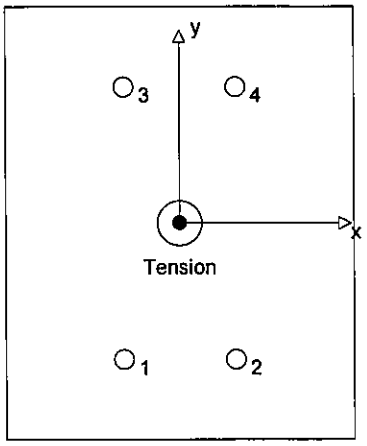
2 Load case/Resulting anchor forces



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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [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	$N^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]
7.200	28.287	1.500	44.088	28.000

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3.4 Splitting failure

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,sp}$ [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

$N^0_{Rk,c}$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	N_{Sd} [kN]
28.287	1.500	64.893	28.000

Group anchor ID
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Phone I Fax: |
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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

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [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
$N^0_{Rk,c}$ [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]	$A_{c,V}$ [mm²]	$A^0_{c,V}$ [mm²]		
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
$V^0_{Rk,c}$ [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:

N_{Sk}	=	3.500 [kN]	δ_N	=	0.295 [mm]
V_{Sk}	=	2.000 [kN]	δ_V	=	0.314 [mm]
			δ_{NV}	=	0.431 [mm]

Long term loading:

N_{Sk}	=	3.500 [kN]	δ_N	=	0.589 [mm]
V_{Sk}	=	2.000 [kN]	δ_V	=	0.467 [mm]
			δ_{NV}	=	0.752 [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!

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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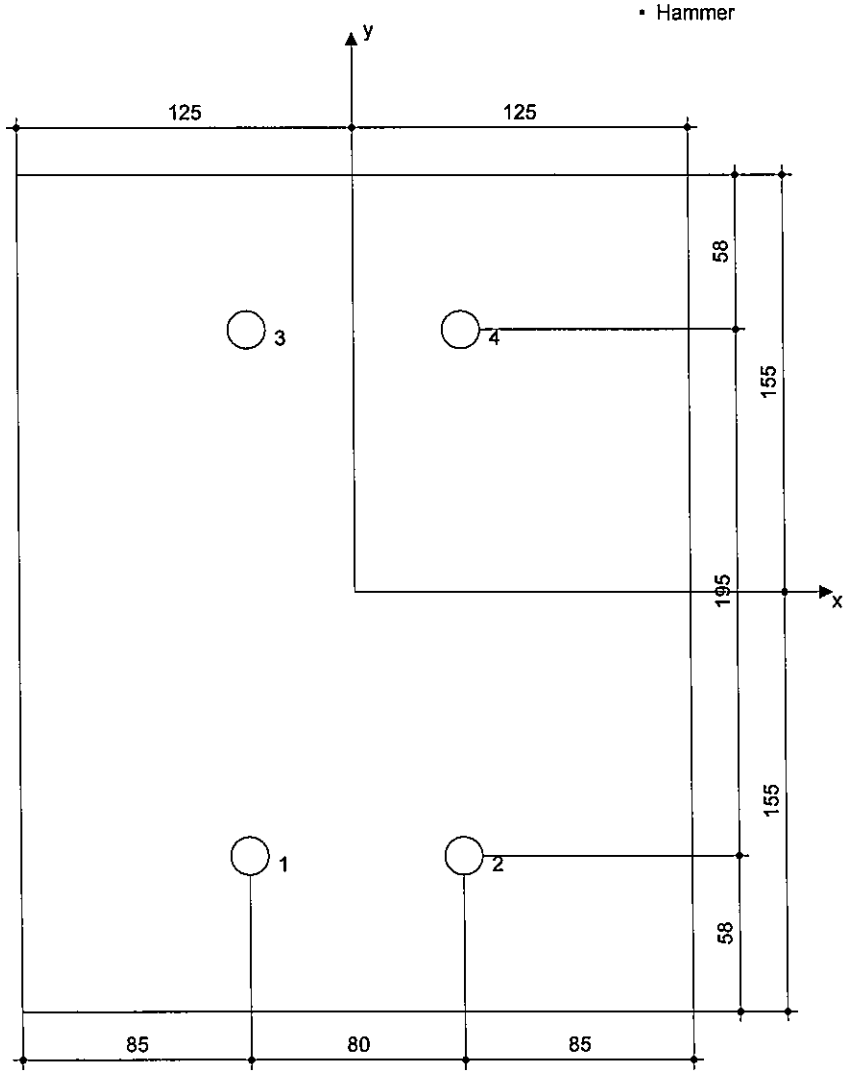
8 Installation data

Baseplate, steel: -
Profile: no profile
Hole diameter in the fixture: d_f = 14 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
• Suitable Rotary Hammer	• Manual blow-out pump	• Hilti SIW 6AT-A22 + SI AT-A22
• Properly sized drill bit		• 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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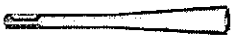
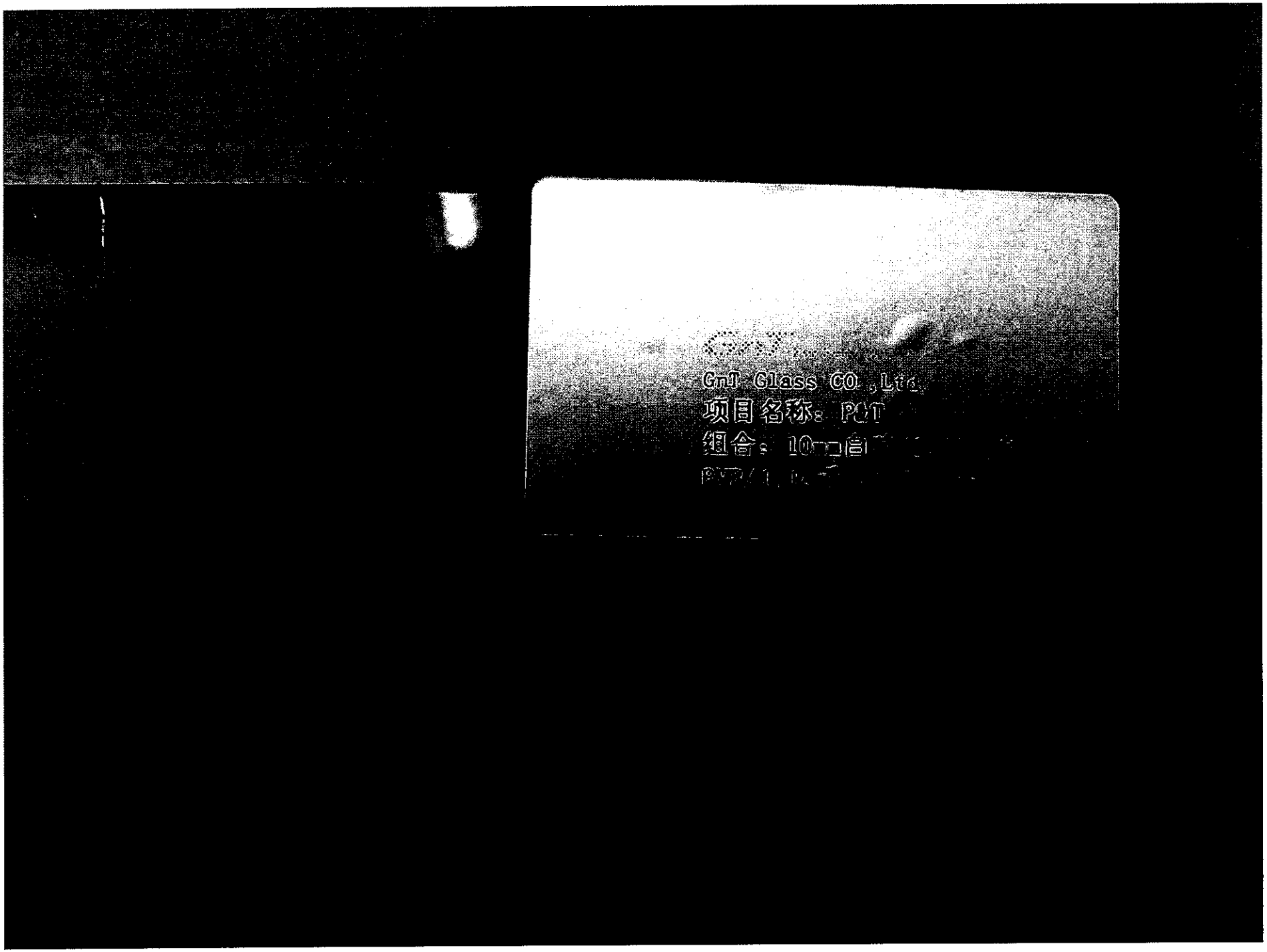
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate 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 (αgap=1)


CnT Glass CO.,Ltd
项目名称：PET