

工程指示 / 要求簡箋(E.I.)

工程指示編號：EI / 2998 / 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(M16)  
 收件人：林哥 發件人：Ant Yeung 日期：25/01/2021

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 |

內容：

請按 BM 訂購 M16 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 M16，已出信 MC 39941

謝謝

請在 2021.02.05 前完成上列要求。

附：1 頁 BM，2 頁圖，16 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 ( ) 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：

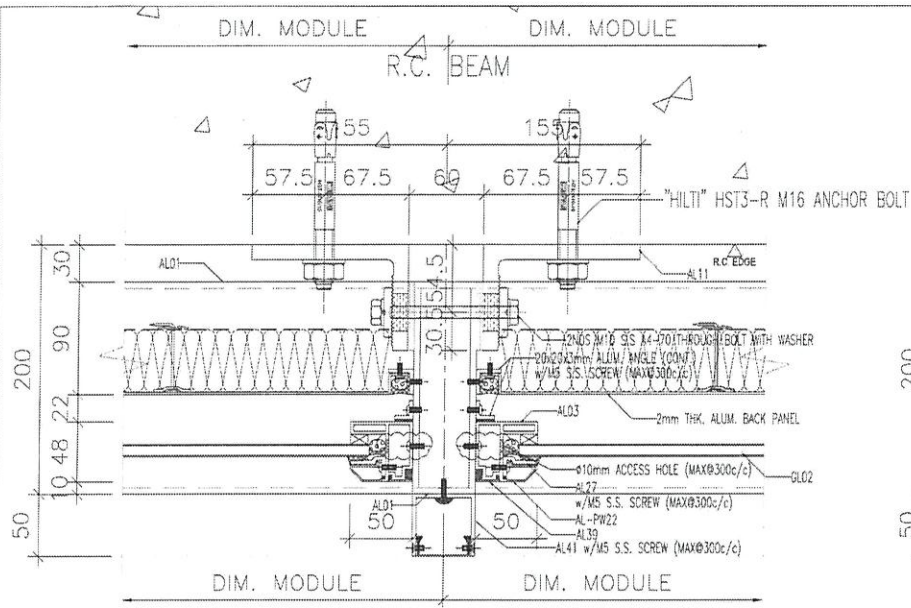
HK 121

發件人簽署：

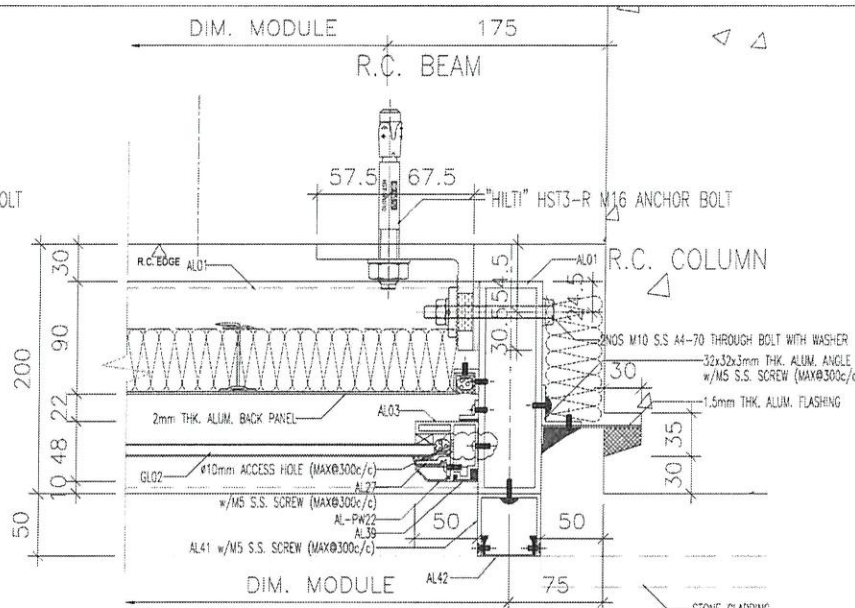
項目經理簽署：

 美特鋁質有限公司 MIDI Aluminium Fabricator Ltd.	工程號: J852	計算:	CJM	日期:	2020.08.12	送呈:	胡哥
	地盤名稱: 亞皆老街	核對:	wsh	日期:	2020.08.15	副本:	
幕牆地盤用配件B.M.表	項目類別: 幕牆 (1F~23F)	批准:		日期:		此BM依據施工圖 來計算	
BM編號:	A/C Code:						

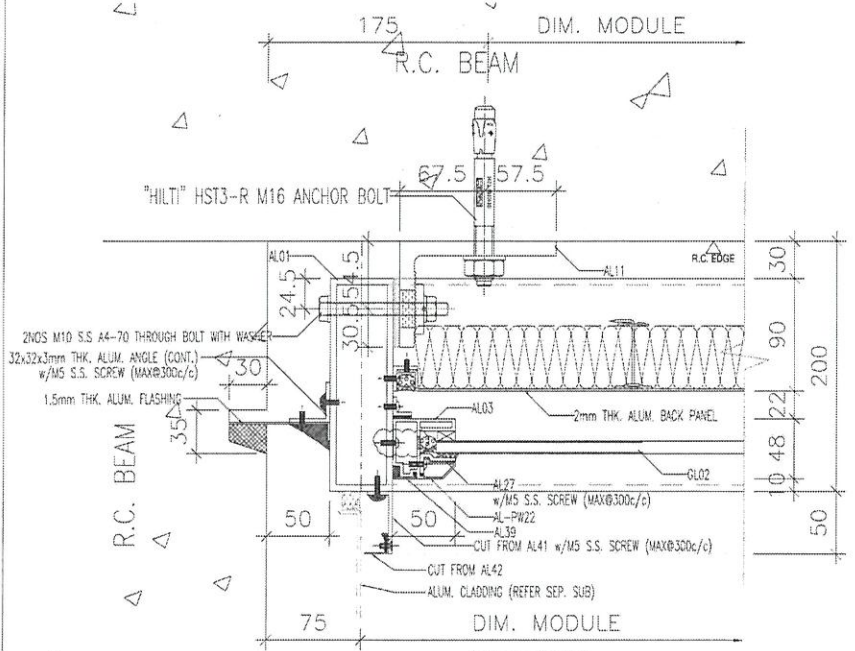
序號	修改標示	配件圖號	物料編號	配件名稱	顏色	實用	後備	總數	單位	備注
1			HILTI HST3-R	M16x135mm拉爆	A4-70	20		20	粒	幕牆修補方案用



1 HORIZONTAL DETAIL  
5003A



2 HORIZONTAL DETAIL  
5003A



3 HORIZONTAL DETAIL  
5003A

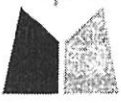
B.D. REF :			
CLIENT :			
ARCHITECT :			
MAIN CONTRACTOR :			
STRUCTURAL ENGINEER :			
FACADE CONSULTANT :			
NOTE :			
1. ALL DIMENSIONS ARE IN mm.			
2. ALL ELEVATIONS ARE VIEWED FROM OUTSIDE.			
3. ALL DIMENSIONS TO BE VERIFIED ON SITE BEFORE FABRICATION.			
LEGEND :			
DETAIL MARK NO. REFER SHEET NO.			
1. F.F.L. -- FINISHED FLOOR LEVEL			
2. S.F.L. -- STRUCTURAL FLOOR LEVEL			
3.  -- REVERSED DETAIL			
4. GLASS LEGEND			
ALUM EXTRUSION MARK: REFER TO DRAWING: 1101&1102			
GL01 (VISION GLASS): 8mm HEAT STRENGTHENED+12mm AIR GAP +10mm THK CLEAR TEMPERED I.G.U.			
GL02 (SPANDREL GLASS): 10mm THK HEAT STRENGTHENED GLASS			
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 : 1:4	
DRAWN BY : MN		CHECKED BY : DW	
英特鋁質有限公司 MIDI ALUMINIUM FABRICATOR LTD. Units 6-8, Sunny Industrial Centre, 1/F 810 Che Kwo Ling Road, Kowloon Tel: 23489211-4 Fax: (852) 2727866			
DWG NO. : J852-SD-CW-5003A		REV. : -	





## 5 SUMMARY OF EMBED LOADING FOR CW

EMBED TYPE	Unfactored Reaction force	
	WL	DL
	<p>Rx (kN) 0</p> <p>Ry (kN) 0</p> <p>Rz (kN) ±14</p> <p>Mx(kNm) 0</p> <p>My (kNm) 0</p> <p>Mz (kNm) 0</p>	<p>Rx (kN) 0</p> <p>Ry (kN) +4</p> <p>Rz (kN) 0</p> <p>Mx(kNm) 0</p> <p>My (kNm) 0</p> <p>Mz (kNm) 0</p>
EM01-For Central Mullion (Page		
	<p>Rx (kN) 0</p> <p>Ry (kN) ±7</p> <p>Rz (kN) 0</p> <p>Mx(kNm) ±1.4</p> <p>My (kNm) 0</p> <p>Mz (kNm) ±0.18</p>	<p>Rx (kN) 0</p> <p>Ry (kN) 0</p> <p>Rz (kN) 0</p> <p>Mx(kNm) 0</p> <p>My (kNm) 0</p> <p>Mz (kNm) 0</p>
EM03For Central Mullion		
	<p>Rx (kN) 0</p> <p>Ry (kN) ±3.5</p> <p>Rz (kN) 0</p> <p>Mx(kNm) ±0.7</p> <p>My (kNm) 0</p> <p>Mz (kNm) ±0.35</p>	<p>Rx (kN) 0</p> <p>Ry (kN) 0</p> <p>Rz (kN) 0</p> <p>Mx(kNm) 0</p> <p>My (kNm) 0</p> <p>Mz (kNm) 0</p>
EM03- For Edge Mullion		

 美特铝质有限公司 MIDI ALUMINIUM FABRICATOR LTD.	PROJECT:	PROPOSED RESIDENTIAL DEVELOPMENT AT 139 - 147 ARGYLE STREET.		
	REPORT DATE:	02/07/2020	REPORT NO:	J852-CW-BD-02

### 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

$$w = W_d \cdot B$$

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

Shear force

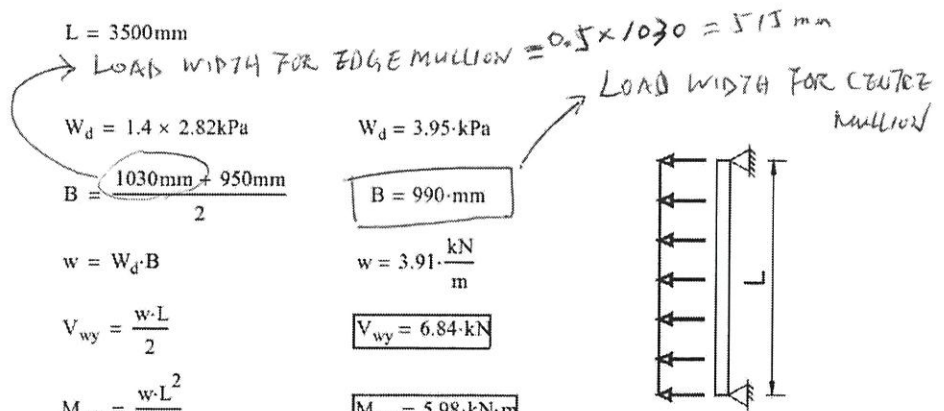
$$V_{wy} = \frac{w \cdot L}{2}$$

$$V_{wy} = 6.84\text{ kN}$$

Max Bending Moment

$$M_{wx} = \frac{w \cdot L^2}{8}$$

$$M_{wx} = 5.98\text{ kN}\cdot\text{m}$$



### 2) CHECK BENDING ABOUT X-X AXIS (MAJOR AXIS)

Moment along major axis

$$M_x = M_{wx} = 5.98\text{ kN}\cdot\text{m}$$

Check Local Buckling

$$p_0 = 160\text{ MPa}$$

Limiting bending stress for 6063-T6 alloy to Table 2.1

$$\epsilon = \sqrt{\frac{250\text{MPa}}{p_0}}$$

$$\epsilon = 1.25$$

#### Slenderness limits to Table 4.3

For external elements (unweld)

$$\beta_1 = 6 \cdot \epsilon = 7.5$$

For internal elements (unweld)

$$\beta_{1i} = 18 \cdot \epsilon = 22.5$$

$$\beta_0 = 7 \cdot \epsilon = 8.75$$

$$\beta_{0i} = 22 \cdot \epsilon = 27.5$$

#### Check flange (under -ve Pressure) to Cl. 4.3.2.2 & 4.3.3.4

For element 1 (internal element),

Thickness of element

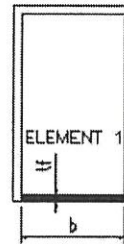
$$t_f = 5\text{ mm}$$

Width of element

$$b = 50\text{mm} - 2 \cdot t_f = 40\text{ mm}$$

$$\beta = \frac{b}{t_f} = 8 < \beta_{1i} = 22.5$$

FlangeClass = "Fully Compact"



#### Check web (under stress gradient) to Cl. 4.3.2.2 & 4.3.3.4

For element 2 (internal element),

Thickness of element

$$t = 5\text{ mm}$$

Distance from neutral axis to more heavily compressed edge

$$y_c = 82\text{ mm}$$

Distance from neutral axis to other edge

$$y_o = -82\text{ mm}$$

Stress gradient coefficient

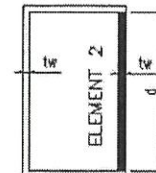
$$\frac{y_o}{y_c} = -1$$

Refer to Fig. 4.2,

$$g = 0.4$$

$$\beta = \frac{g \cdot (y_c - y_o)}{t} = 13.12 < \beta_{1i} = 22.5$$

WebClass = "Fully Compact"





www.hilti.com.hk


 Company:  
 Specifier:  
 Address:  
 Phone | Fax:  
 E-Mail:

 Page:  
 Project:  
 Fastening Point:  
 Date:

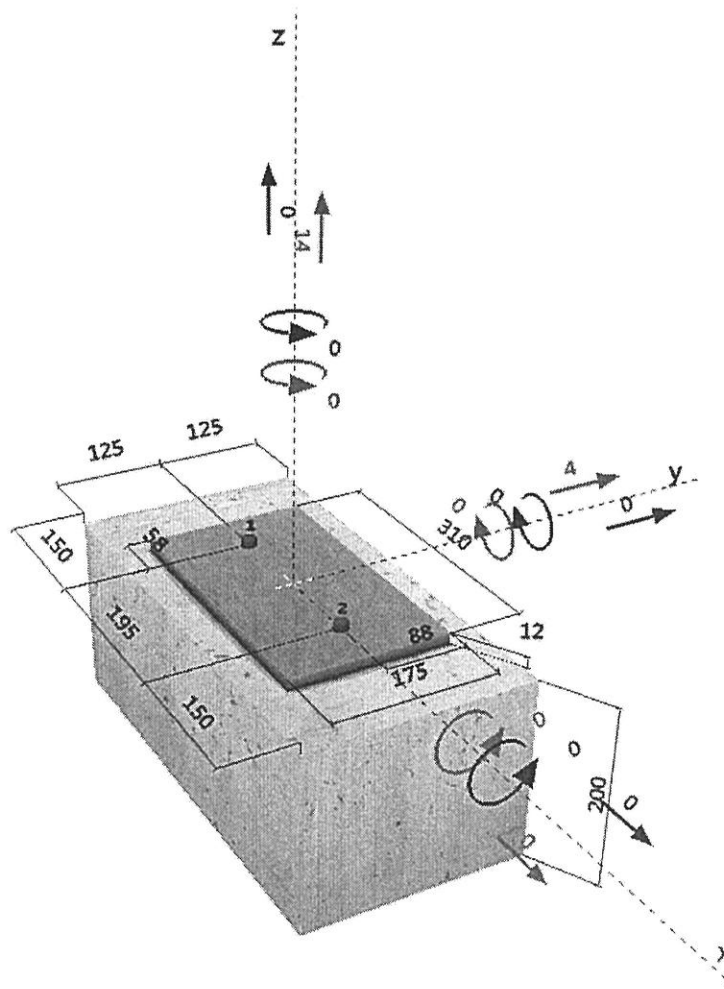
 1  
  
  
 2021/1/20

**Specifier's comments:**

## 1 Input data

<b>Anchor type and size:</b>	HST3-R M16 hef2	
Effective embedment depth:	$h_{ef} = 85 \text{ mm}$ , $h_{nom} = 98 \text{ mm}$	
Material:	A4	
Approval No.:	ETA-98/0001	
Issued   Valid:	2015/11/6   -	
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:	S 235 (St 37); $E = 210000.00 \text{ N/mm}^2$ ; $f_{yk} = 235.00 \text{ N/mm}^2$ ; $\gamma_{Ms} = 1.100$ $l_x \times l_y \times t = 310 \text{ mm} \times 175 \text{ mm} \times 12 \text{ mm}$ ; (Recommended plate thickness: calculated (12 mm))	
Profile:	no profile	
Base material:	cracked concrete, C35/45, $f_{cc} = 45.00 \text{ N/mm}^2$ ; $h = 200 \text{ mm}$	
<b>Installation:</b>	<b>hammer drilled hole, Installation condition: Dry</b>	
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) $s \leq$	

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



Company:  
 Specifier:  
 Address:  
 Phone | Fax:  
 E-Mail:

Page: 2  
 Project:  
 Fastening Point:  
 Date: 2021/1/20

## 2 Load case/Resulting anchor forces

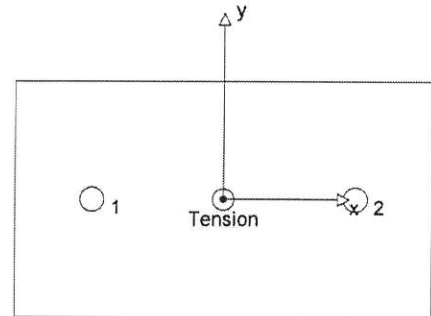
Load case 1 (2.00·permanent load + 2.00·variable load)  
 Load case 2 (1.0·permanent load + 2.00·variable load)  
 Load case 3 (2.00·permanent load)

### Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	14.000	4.000	0.000	4.000
2	14.000	4.000	0.000	4.000

max. concrete compressive strain: - [‰]  
 max. concrete compressive stress: - [N/mm<sup>2</sup>]  
 resulting tension force in (x/y)=(0/0): 28.000 [kN]  
 resulting compression force in (x/y)=(0/0): 0.000 [kN]



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

	Load [kN]	Capacity [kN]	Utilisation $\beta_N$ [%]	Status
Steel failure*	14.000	49.571	29	OK
Pull-out failure*	N/A	N/A	N/A	N/A
Concrete cone failure**	28.000	43.400	65	OK
Splitting failure**	28.000	50.361	56	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]
69.400	1.400	49.571	14.000

### 3.2 Concrete cone failure

$A_{c,N}$ [mm <sup>2</sup> ]	$A_{c,N}^0$ [mm <sup>2</sup> ]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]		
112500	65025	128	255		
$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.994	1.000
$k_1$	$N_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	$N_{Sd}$ [kN]	
7.200	37.850	1.500	43.400	28.000	

### 3.3 Splitting failure

$A_{c,N}$ [mm <sup>2</sup> ]	$A_{c,N}^0$ [mm <sup>2</sup> ]	$c_{cr,sp}$ [mm]	$s_{cr,sp}$ [mm]	$\psi_{h,sp}$		
112500	65025	128	255	1.160		
$e_{c1,N}$ [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	0.994	1.000	7.200
$N_{Rk,c}^0$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	$N_{Sd}$ [kN]			
37.850	1.500	50.361	28.000			

Company:  
 Specifier:  
 Address:  
 Phone | Fax:  
 E-Mail:

Page: 3  
 Project:  
 Fastening Point:  
 Date: 2021/1/20

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

	Load [kN]	Capacity [kN]	Utilisation $\beta_v$ [%]	Status
Steel failure (without lever arm)*	4.000	50.880	8	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	8.000	147.993	6	OK
Concrete edge failure in direction y+**	8.000	31.142	26	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]
63.600	1.250	50.880	4.000

##### 4.2 Pryout failure

$A_{c,N}$ [mm <sup>2</sup> ]	$A_{c,N}^0$ [mm <sup>2</sup> ]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k-factor	
112500	65025	128	255	3.410	
$e_{c1,V}$ [mm]	$\psi_{ec1,N}$	$e_{c2,V}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.994	1.000
$N_{Rk,c}^0$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	$V_{Sd}$ [kN]		
37.850	1.500	147.993	8.000		

##### 4.3 Concrete edge failure in direction y+

$l_f$ [mm]	$d_{nom}$ [mm]	$k_1$	$\alpha$	$\beta$	
85	16.0	1.700	0.082	0.066	
$c_1$ [mm]	$A_{c,V}$ [mm <sup>2</sup> ]	$A_{c,V}^0$ [mm <sup>2</sup> ]			
125	92813	70313			
$\psi_{s,V}$	$\psi_{h,V}$	$\psi_{a,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$
0.940	1.000	1.000	0	1.000	1.400
$V_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	$V_{Sd}$ [kN]		
26.891	1.500	31.142	8.000		

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

Steel failure

$\beta_N$	$\beta_V$	$\alpha$	Utilisation $\beta_{N,V}$ [%]	Status
0.645	0.257	1.500	65	OK

$$\beta_N^2 + \beta_V^2 \leq 1$$

#### 6 Displacements (highest loaded anchor)

Short term loading:

$N_{Sk}$ = 7.000 [kN]	$\delta_N$ = 0.940 [mm]
$V_{Sk}$ = 2.000 [kN]	$\delta_V$ = 0.314 [mm]
	$\delta_{NV}$ = 0.991 [mm]

Long term loading:

$N_{Sk}$ = 7.000 [kN]	$\delta_N$ = 0.888 [mm]
$V_{Sk}$ = 2.000 [kN]	$\delta_V$ = 0.468 [mm]
	$\delta_{NV}$ = 1.004 [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!

---

Company:		Page:	4
Specifier:		Project:	
Address:		Fastening Point:	
Phone   Fax:		Date:	2021/1/20
E-Mail:			

---

## 7 Warnings

- Load re-distributions on the anchors due to elastic deformations of the anchor plate are not considered. The anchor plate is assumed to be 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.

**Fastening meets the design criteria!**

[www.hilti.com.hk](http://www.hilti.com.hk)

 Company:  
 Specifier:  
 Address:  
 Phone | Fax:  
 E-Mail:

 Page: 5  
 Project:  
 Fastening Point:  
 Date: 2021/1/20

## 8 Installation data

Baseplate, steel: S 235 (St 37);  $E = 210000.00 \text{ N/mm}^2$ ;  $f_{yk} = 235.00 \text{ N/mm}^2$   
 Profile: no profile  
 Hole diameter in the fixture:  $d_f = 18 \text{ mm}$   
 Plate thickness (input): 12 mm  
 Recommended plate thickness: calculated (12 mm)  
 Drilling method: Hammer drilled  
 Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Anchor type and size: HST3-R M16 hef2  
 Installation torque: 0.110 kNm  
 Hole diameter in the base material: 16 mm  
 Hole depth in the base material: 108 mm  
 Minimum thickness of the base material: 160 mm

### 8.1 Recommended accessories

#### Drilling

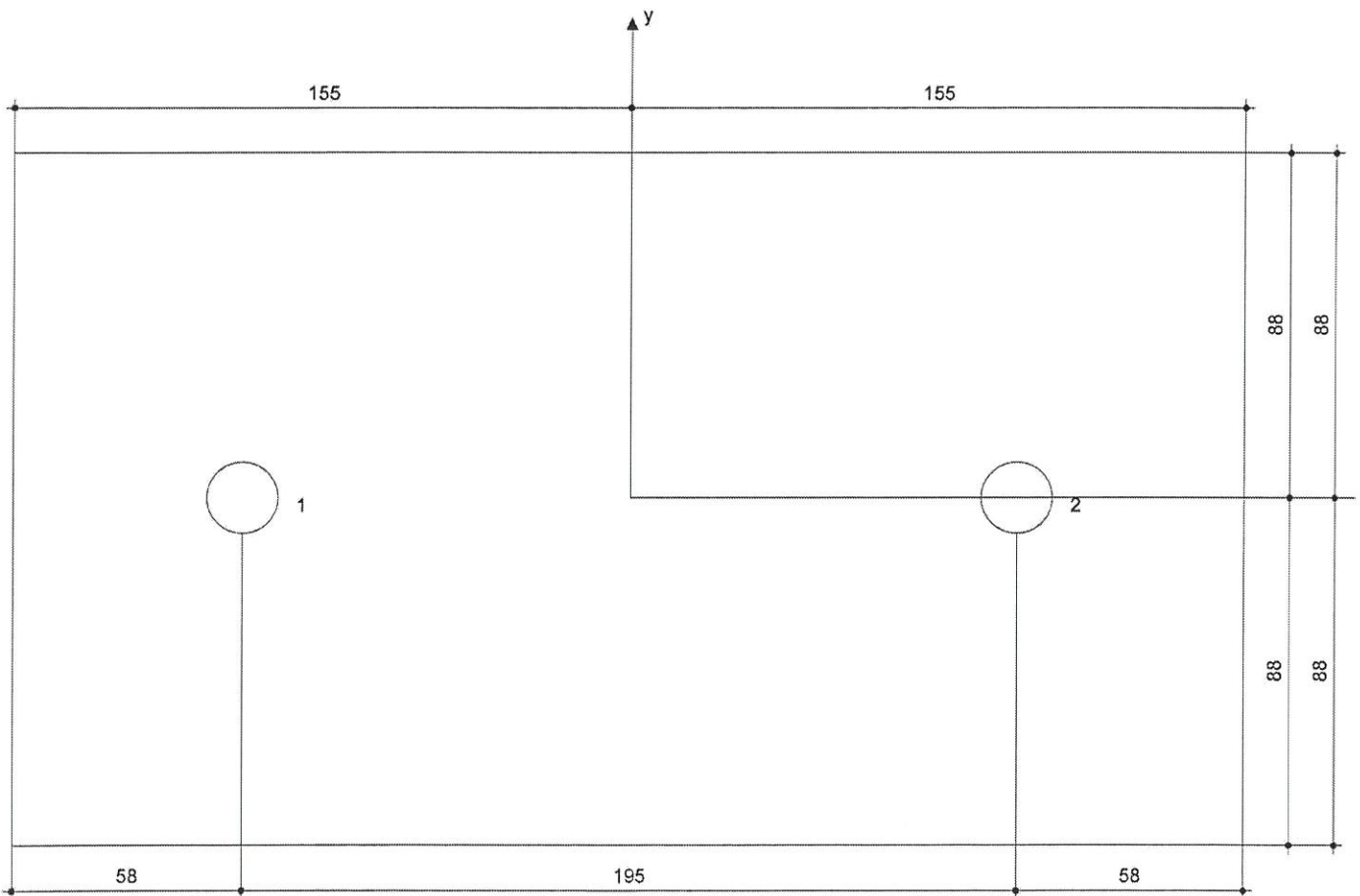
- Suitable Rotary Hammer
- Properly sized drill bit

#### Cleaning

- Manual blow-out pump

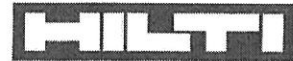
#### Setting

- Torque wrench
- Hammer



#### Coordinates Anchor [mm]

Anchor	x	y	$c_x$	$c_{+x}$	$c_y$	$c_{+y}$
1	-98	0	150	345	125	125
2	98	0	345	150	125	125



www.hilti.com.hk

Profis Anchor 2.6.6






Company:  
Specifier:  
Address:  
Phone | Fax:  
E-Mail:

Page: 6  
Project:  
Fastening Point:  
Date: 2021/1/20

## 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)					-

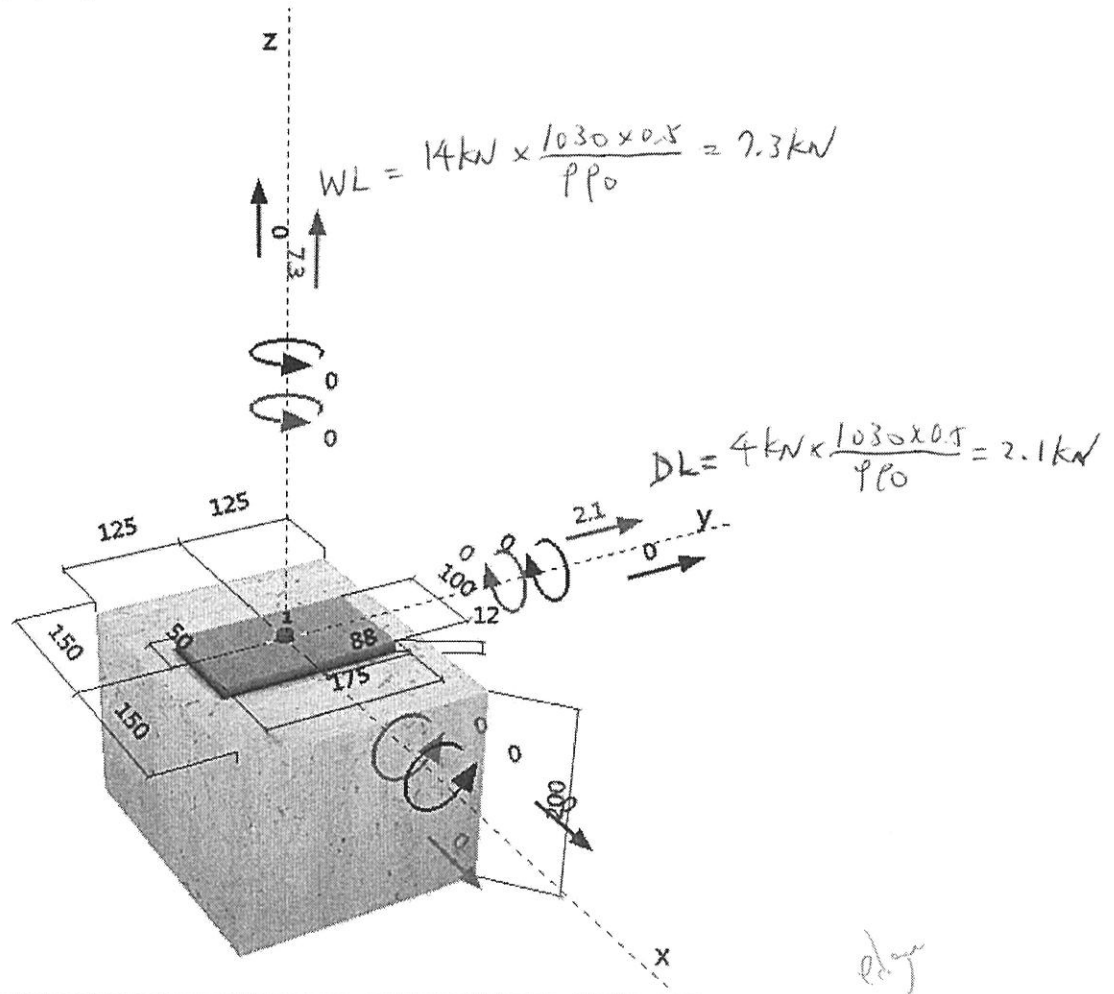
**\*Installation methods provided in ETA-98/0001**

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


**Specifier's comments:**

### 1 Input data

<b>Anchor type and size:</b>	HST3-R M16 hef2	
<b>Effective embedment depth:</b>	$h_{ef} = 85 \text{ mm}$ , $h_{nom} = 98 \text{ mm}$	
<b>Material:</b>	A4	
<b>Approval No.:</b>	ETA-98/0001	
<b>Issued   Valid:</b>	2015/11/6   -	
<b>Proof:</b>	Design method ETAG (No. 001 Annex C/2010)	
<b>Stand-off installation:</b>	$e_b = 0 \text{ mm}$ (no stand-off); $t = 12 \text{ mm}$	
<b>Baseplate:</b>	S 235 (St 37); $E = 210000.00 \text{ N/mm}^2$ ; $f_{yk} = 235.00 \text{ N/mm}^2$ ; $\gamma_{Ms} = 1.100$ $l_x \times l_y \times t = 100 \text{ mm} \times 175 \text{ mm} \times 12 \text{ mm}$ ; (Recommended plate thickness: calculated (12 mm))	
<b>Profile:</b>	no profile	
<b>Base material:</b>	cracked concrete, C35/45, $f_{cc} = 45.00 \text{ N/mm}^2$ ; $h = 200 \text{ mm}$	
<b>Installation:</b>	<b>hammer drilled hole, Installation condition: Dry</b>	
<b>Reinforcement:</b>	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) $s \leq$	

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


## 2 Load case/Resulting anchor forces

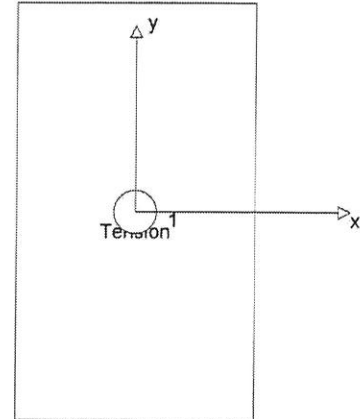
Load case 1 (2.00-permanent load + 2.00-variable load)  
 Load case 2 (1.0-permanent load + 2.00-variable load)  
 Load case 3 (2.00-permanent load)

### Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	14.600	4.200	0.000	4.200

max. concrete compressive strain: - [‰]  
 max. concrete compressive stress: - [N/mm<sup>2</sup>]  
 resulting tension force in (x/y)=(0/0): 14.600 [kN]  
 resulting compression force in (x/y)=(0/0): 0.000 [kN]



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

	Load [kN]	Capacity [kN]	Utilisation $\beta_N$ [%]	Status
Steel failure*	14.600	49.571	30	OK
Pull-out failure*	N/A	N/A	N/A	N/A
Concrete cone failure**	14.600	24.593	60	OK
Splitting failure**	14.600	28.538	52	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]
69.400	1.400	49.571	14.600

### 3.2 Concrete cone failure

$A_{c,N}$ [mm <sup>2</sup> ]	$A_{c,N}^0$ [mm <sup>2</sup> ]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]		
63750	65025	128	255		
$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.994	1.000
$k_1$	$N_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	$N_{Sd}$ [kN]	
7.200	37.850	1.500	24.593	14.600	

### 3.3 Splitting failure

$A_{c,N}$ [mm <sup>2</sup> ]	$A_{c,N}^0$ [mm <sup>2</sup> ]	$c_{cr,sp}$ [mm]	$s_{cr,sp}$ [mm]	$\psi_{h,sp}$		
63750	65025	128	255	1.160		
$e_{c1,N}$ [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	0.994	1.000	7.200
$N_{Rk,c}^0$ [kN]	$\gamma_{M,sp}$	$N_{Rd,sp}$ [kN]	$N_{Sd}$ [kN]			
37.850	1.500	28.538	14.600			

Company:  
 Specifier:  
 Address:  
 Phone | Fax:  
 E-Mail:

Page: 3  
 Project:  
 Fastening Point:  
 Date: 2021/1/20

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

	Load [kN]	Capacity [kN]	Utilisation $\beta_v$ [%]	Status
Steel failure (without lever arm)*	4.200	50.880	9	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	4.200	83.863	6	OK
Concrete edge failure in direction y+**	4.200	18.874	23	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]
63.600	1.250	50.880	4.200

##### 4.2 Pryout failure

$A_{c,N}$ [mm <sup>2</sup> ]	$A_{c,N}^0$ [mm <sup>2</sup> ]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k-factor	
63750	65025	128	255	3.410	
$e_{c1,v}$ [mm]	$\psi_{ec1,N}$	$e_{c2,v}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1.000	0	1.000	0.994	1.000
$N_{Rk,c}^0$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	$V_{Sd}$ [kN]		
37.850	1.500	83.863	4.200		

##### 4.3 Concrete edge failure in direction y+

$l_f$ [mm]	$d_{nom}$ [mm]	$k_1$	$\alpha$	$\beta$	
85	16.0	1.700	0.082	0.066	
$c_1$ [mm]	$A_{c,v}$ [mm <sup>2</sup> ]	$A_{c,v}^0$ [mm <sup>2</sup> ]			
125	56250	70313			
$\psi_{s,v}$	$\psi_{h,v}$	$\psi_{r,v}$	$e_{c,v}$ [mm]	$\psi_{ec,v}$	$\psi_{re,v}$
0.940	1.000	1.000	0	1.000	1.400
$V_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	$V_{Sd}$ [kN]		
26.891	1.500	18.874	4.200		

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

Steel failure

$\beta_N$	$\beta_V$	$\alpha$	Utilisation $\beta_{N,V}$ [%]	Status
0.594	0.223	1.500	57	OK

$$\beta_N^2 + \beta_V^2 \leq 1$$

#### 6 Displacements (highest loaded anchor)

Short term loading:

$N_{Sk}$ = 7.300 [kN]	$\delta_N$ = 0.981 [mm]
$V_{Sk}$ = 2.100 [kN]	$\delta_V$ = 0.330 [mm]
	$\delta_{NV}$ = 1.035 [mm]

Long term loading:

$N_{Sk}$ = 7.300 [kN]	$\delta_N$ = 0.926 [mm]
$V_{Sk}$ = 2.100 [kN]	$\delta_V$ = 0.492 [mm]
	$\delta_{NV}$ = 1.049 [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!

Company:  
Specifier:  
Address:  
Phone | Fax:  
E-Mail:

Page: 4  
Project:  
Fastening Point:  
Date: 2021/1/20

## 7 Warnings

- Load re-distributions on the anchors due to elastic deformations of the anchor plate are not considered. The anchor plate is assumed to be 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.

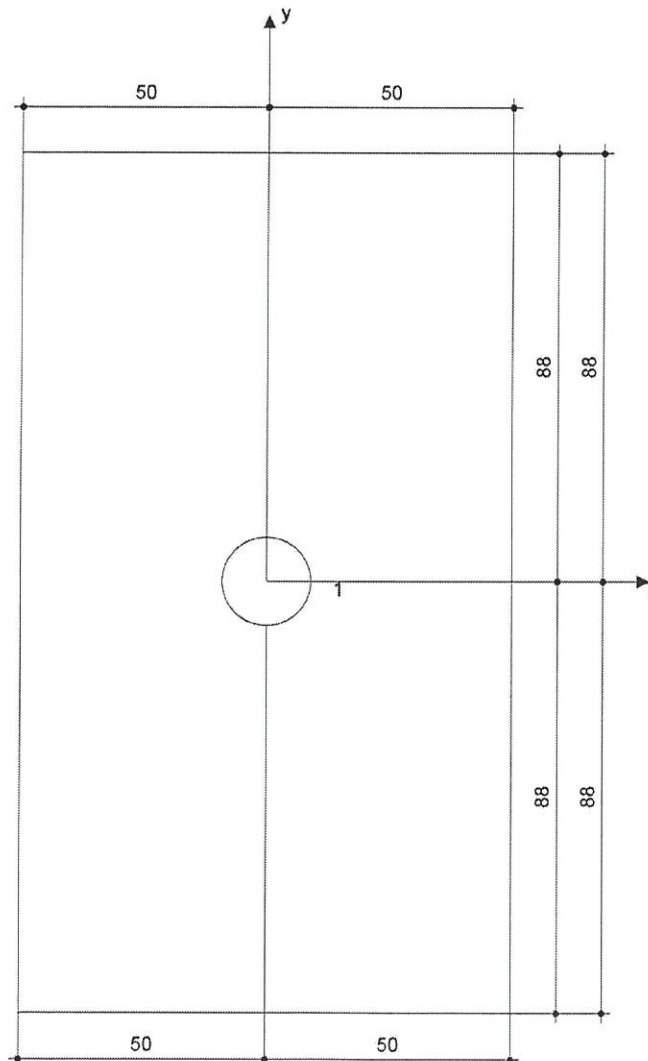
**Fastening meets the design criteria!**

## 8 Installation data

Baseplate, steel: S 235 (St 37);  $E = 210000.00 \text{ N/mm}^2$ ;  $f_{yk} = 235.00 \text{ N/mm}^2$     Anchor type and size: HST3-R M16 hef2  
 Profile: no profile    Installation torque: 0.110 kNm  
 Hole diameter in the fixture:  $d_f = 18 \text{ mm}$     Hole diameter in the base material: 16 mm  
 Plate thickness (input): 12 mm    Hole depth in the base material: 108 mm  
 Recommended plate thickness: calculated (12 mm)    Minimum thickness of the base material: 160 mm  
 Drilling method: Hammer drilled  
 Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

### 8.1 Recommended accessories

Drilling	Cleaning	Setting
<ul style="list-style-type: none"> <li>Suitable Rotary Hammer</li> <li>Properly sized drill bit</li> </ul>	<ul style="list-style-type: none"> <li>Manual blow-out pump</li> </ul>	<ul style="list-style-type: none"> <li>Torque wrench</li> <li>Hammer</li> </ul>



#### Coordinates Anchor [mm]

Anchor	x	y	c <sub>x</sub>	c <sub>+x</sub>	c <sub>y</sub>	c <sub>+y</sub>
1	0	0	150	150	125	125



www.hilti.com.hk

Profis Anchor 2.6.6





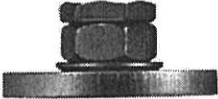
Company:  
Specifier:  
Address:  
Phone | Fax:  
E-Mail:

Page: 6  
Project:  
Fastening Point:  
Date: 2021/1/20

## 9 Remarks; Your Cooperation Duties

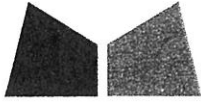
- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied 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 (agap=1)



美特鋁質有限公司  
MIDI ALUMINIUM FABRICATOR LTD.

E-Mail  
13:11  
25 JAN 2021

Our ref. MC/39941/852

25<sup>th</sup> January 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, Louvers 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 (M16) for Curtain Wall(TS056)**

Regarding the captioned project, we would like to submit the drawing and calculation for remedial case (M16) for Curtain Wall for your review and comment.

Thank you for your kind attention.

Yours faithfully,  
MIDI ALUMINIUM FABRICATOR LTD.

Francis Mau  
Managing Director

Encl

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

FM/MT/DW/AY/BL/KL/wk