

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	1
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

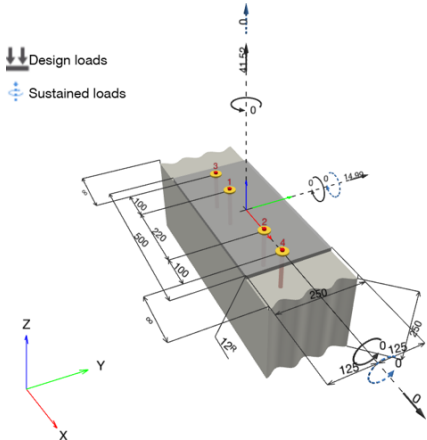
Specifier's comments:

1 Input data

Anchor type and size:	HIT-HY 200-R V3 + HAS 5.8 M12	
Return period (service life in years):	50	
Item number:	2390202 HAS 5.8 M12x160 (insert) / 2262134 HIT-HY 200-R V3 (mortar)	
Hilti Filling Set or any suitable annular gap filling solution		
Specification text:	Hilti HAS-U 5.8 threaded rod with HIT-HY 200-R V3 injection mortar with 110 mm embedment hef, M12, Steel galvanized, Hammer drilling installation per ETA 19/0601, with annular gaps filled with Hilti Filling Set or any suitable gap solutions	
Effective embedment depth:	$h_{ef,act} = 110.0 \text{ mm}$ ($h_{ef,limit} = - \text{mm}$)	
Material:	5.8	
Approval No.:	ETA 19/0601	
Issued Valid:	29/1/2024 -	
Proof:	SOFA based on EN 1992-4, Chemical	
Stand-off installation:	$e_b = 0.0 \text{ mm}$ (no stand-off); $t = 12.0 \text{ mm}$	
Baseplate ^R :	$l_x \times l_y \times t = 500.0 \text{ mm} \times 250.0 \text{ mm} \times 12.0 \text{ mm}$; (Recommended plate thickness: not calculated)	
Profile:	no profile	
Base material:	cracked concrete, 32MPa, $f_{c,cyl} = 32.00 \text{ N/mm}^2$; $h = 250.0 \text{ mm}$, Temp. short/long: 0/0 °C, User-defined partial material safety factor $\gamma_c = 1.500$	
Installation:	Hammer drilled hole, Installation condition: Dry	
Reinforcement:	No reinforcement or Reinforcement spacing $\geq 150 \text{ mm}$ (any $\emptyset$) or $\geq 100 \text{ mm}$ ($\emptyset \leq 10 \text{ mm}$) no longitudinal edge reinforcement Reinforcement to control splitting acc. to EN 1992-4, 7.2.1.7 (2) b) 2) present	

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

Geometry [mm] & Loading [kN, kNm]



www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	2
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

1.1 Load combination

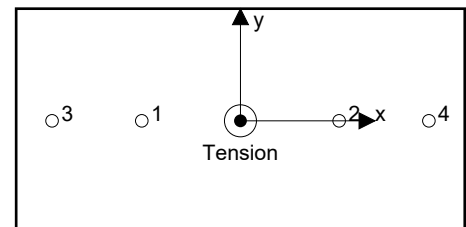
Case	Description	Forces [kN] / Moments [kNm]	Seismic	Fire	Max. Util. Anchor [%]
1	Combination 1	$N = 41.520$; $V_x = 0.000$; $V_y = 14.990$; $M_x = 0.000$; $M_y = 0.000$; $M_z = 0.000$; $N_{sus} = 0.000$; $M_{x,sus} = 0.000$; $M_{y,sus} = 0.000$;	no	no	112

2 Load case/Resulting anchor forces

Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	10.380	3.748	0.000	3.748
2	10.380	3.748	0.000	3.748
3	10.380	3.748	0.000	3.748
4	10.380	3.748	0.000	3.748



Max. concrete compressive strain: - [%]
 Max. concrete compressive stress: - [N/mm²]
 Resulting tension force in (x/y)=(0.0/0.0): 41.520 [kN]
 Resulting compression force in (x/y)=(-/-): 0.000 [kN]

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

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	3
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

3 Tension load EN 1992-4, Section 7.2.1

	Load [kN]	Capacity [kN]	Utilization β_N [%]	Status
Steel failure*	10.380	28.100	37	OK
Combined pullout-concrete cone failure**	41.520	47.859	87	OK
Concrete Breakout failure**	41.520	53.487	78	OK
Splitting failure**	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (anchors in tension)

3.1 Steel failure

$$N_{Ed} \leq N_{Rd,s} = \frac{N_{Rk,s}}{\gamma_{Ms}} \quad \text{EN 1992-4, Table 7.1}$$

$N_{Rk,s}$ [kN]	γ_{Ms}	$N_{Rd,s}$ [kN]	N_{Ed} [kN]
42.150	1.500	28.100	10.380

www.hilti.com.au

Company: Laycomm Pty Ltd
 Address: Level 2, 157 Grenfell Street Adelaide, SA 5000
 Phone / Fax: 0426967800 |
 Design: Copy - Concrete - 22 Oct 2024
 Fastening Point:

Page: 4
 Specifier: Steven Zheng
 E-Mail: steven.zheng@laycomm.com.au
 Date: 22/10/2024

3.2 Combined pullout-concrete cone failure

$$N_{Ed} \leq N_{Rd,p} = \frac{N_{Rk,p}}{\gamma_{Mp}} \quad \text{EN 1992-4, Table 7.1}$$

$$N_{Rk,p} = N_{Rk,p}^0 \cdot \frac{A_{p,N}}{A_{p,N}^0} \cdot \psi_{g,Np} \cdot \psi_{s,Np} \cdot \psi_{re,Np} \cdot \psi_{ec1,Np} \cdot \psi_{ec2,Np} \quad \text{EN 1992-4, Eq. (7.13)}$$

$$N_{Rk,p}^0 = \psi_{sus} \cdot \tau_{Rk} \cdot \pi \cdot d \cdot h_{ef} \quad \text{EN 1992-4, Eq. (7.14)}$$

$$\psi_{sus} = 1 \quad \text{EN 1992-4, Eq. (7.14a)}$$

$$s_{cr,Np} = 7.3 \cdot d \cdot \sqrt{\psi_{sus} \cdot \tau_{Rk}} \leq 3 \cdot h_{ef} \quad \text{EN 1992-4, Eq. (7.15)}$$

$$\psi_{g,Np} = \psi_{g,Np}^0 \cdot \left(\frac{s}{s_{cr,Np}} \right)^{0.5} \cdot (\psi_{g,Np}^0 - 1) \geq 1.00 \quad \text{EN 1992-4, Eq. (7.17)}$$

$$\psi_{g,Np}^0 = \sqrt{n} - (\sqrt{n} - 1) \cdot \left(\frac{\tau_{Rk}}{\tau_{Rk,c}} \right)^{1.5} \geq 1.00 \quad \text{EN 1992-4, Eq. (7.18)}$$

$$\tau_{Rk,c} = \frac{k_3}{\pi \cdot d} \cdot \sqrt{h_{ef} \cdot f_{ck}} \quad \text{EN 1992-4, Eq. (7.19)}$$

$$\psi_{s,Np} = 0.7 + 0.3 \cdot \frac{c}{c_{cr,Np}} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.20)}$$

$$\psi_{ec1,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c1,N}}{s_{cr,Np}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.21)}$$

$$\psi_{ec2,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c2,N}}{s_{cr,Np}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.21)}$$

$A_{p,N}$ [mm ²]	$A_{p,N}^0$ [mm ²]	$\tau_{Rk,ucr,20}$ [N/mm ²]	$s_{cr,Np}$ [mm]	$c_{cr,Np}$ [mm]	c_{min} [mm]	$f_{c,cyl}$ [N/mm ²]
187,500	108,900	18.00	330.0	165.0	125.0	32.00
ψ_c	$\tau_{Rk,cr}$ [N/mm ²]	k_3	$\tau_{Rk,c}$ [N/mm ²]	$\psi_{g,Np}^0$	$\psi_{g,Np}$	
1.048	9.96	7.700	12.12	1.255	1.089	
$e_{c1,N}$ [mm]	$\psi_{ec1,Np}$	$e_{c2,N}$ [mm]	$\psi_{ec2,Np}$	$\psi_{s,Np}$	$\psi_{re,Np}$	
0.0	1.000	0.0	1.000	0.927	1.000	
ψ_{sus}^0	α_{sus}	ψ_{sus}				
0.800	0.000	1.000				
$N_{Rk,p}^0$ [kN]	$N_{Rk,p}$ [kN]	γ_{Mp}	$N_{Rd,p}$ [kN]	N_{Ed} [kN]		
41.291	71.789	1.500	47.859	41.520		

Group anchor ID

1-4

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	5
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

3.3 Concrete Breakout failure

$$N_{Ed} \leq N_{Rd,c} = \frac{N_{Rk,c}}{\gamma_{Mc}} \quad \text{EN 1992-4, Table 7.1}$$

$$N_{Rk,c} = N_{Rk,c}^0 \cdot \frac{A_{c,N}}{A_{c,N}^0} \cdot \psi_{s,N} \cdot \psi_{re,N} \cdot \psi_{ec1,N} \cdot \psi_{ec2,N} \cdot \psi_{M,N} \quad \text{EN 1992-4, Eq. (7.1)}$$

$$N_{Rk,c}^0 = k_1 \cdot \sqrt{f_{ck}} \cdot h_{ef}^{1.5} \quad \text{EN 1992-4, Eq. (7.2)}$$

$$A_{c,N}^0 = s_{cr,N} \cdot s_{cr,N} \quad \text{EN 1992-4, Eq. (7.3)}$$

$$\psi_{s,N} = 0.7 + 0.3 \cdot \frac{c}{c_{cr,N}} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.4)}$$

$$\psi_{ec1,N} = \frac{1}{1 + \left(\frac{2 \cdot e_{N,1}}{s_{cr,N}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.6)}$$

$$\psi_{ec2,N} = \frac{1}{1 + \left(\frac{2 \cdot e_{N,2}}{s_{cr,N}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.6)}$$

$$\psi_{M,N} = 1 \quad \text{EN 1992-4, Eq. (7.7)}$$

$A_{c,N} [\text{mm}^2]$	$A_{c,N}^0 [\text{mm}^2]$	$c_{cr,N} [\text{mm}]$	$s_{cr,N} [\text{mm}]$	$f_{c,cyl} [\text{N/mm}^2]$		
187,500	108,900	165.0	330.0	32.00		
$e_{c1,N} [\text{mm}]$	$\psi_{ec1,N}$	$e_{c2,N} [\text{mm}]$	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$	$z [\text{mm}]$
0.0	1.000	0.0	1.000	0.927	1.000	0.0
$\psi_{M,N}$	k_1	$N_{Rk,c}^0 [\text{kN}]$	γ_{Mc}	$N_{Rd,c} [\text{kN}]$	$N_{Ed} [\text{kN}]$	
1.000	7.700	50.252	1.500	53.487	41.520	

Group anchor ID

1-4

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	6
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

4 Shear load EN 1992-4, Section 7.2.2

	Load [kN]	Capacity [kN]	Utilization β_v [%]	Status
Steel failure (without lever arm)*	3.748	20.232	19	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	14.990	95.718	16	OK
Concrete edge failure in direction y+**	14.990	32.183	47	OK

* highest loaded anchor **anchor group (relevant anchors)

4.1 Steel failure (without lever arm)

$$V_{Ed} \leq V_{Rd,s} = \frac{V_{Rk,s}}{\gamma_{Ms}} \quad \text{EN 1992-4, Table 7.2}$$

$$V_{Rk,s} = k_7 \cdot V_{Rk,s}^0 \quad \text{EN 1992-4, Eq. (7.35)}$$

$V_{Rk,s}^0$ [kN]	k_7	$V_{Rk,s}$ [kN]	γ_{Ms}	$V_{Rd,s}$ [kN]	V_{Ed} [kN]
25.290	1.000	25.290	1.250	20.232	3.748

www.hilti.com.au

Company: Laycomm Pty Ltd
 Address: Level 2, 157 Grenfell Street Adelaide, SA 5000
 Phone | Fax: 0426967800 |
 Design: Copy - Concrete - 22 Oct 2024
 Fastening Point:

Page: 7
 Specifier: Steven Zheng
 E-Mail: steven.zheng@laycomm.com.au
 Date: 22/10/2024

4.2 Pryout failure (bond relevant)

$$V_{Ed} \leq V_{Rd,cp} = \frac{V_{Rk,cp}}{\gamma_{Mc,p}} \quad \text{EN 1992-4, Table 7.2}$$

$$V_{Rk,cp} = k_8 \cdot \min \{N_{Rk,c}; N_{Rk,p}\} \quad \text{EN 1992-4, Eq. (7.39c)}$$

$$N_{Rk,p} = N_{Rk,p}^0 \cdot \frac{A_{p,N}}{A_{p,N}^0} \cdot \psi_{g,Np} \cdot \psi_{s,Np} \cdot \psi_{re,Np} \cdot \psi_{ec1,Np} \cdot \psi_{ec2,Np} \quad \text{EN 1992-4, Eq. (7.13)}$$

$$N_{Rk,p}^0 = \psi_{sus} \cdot \tau_{Rk} \cdot \pi \cdot d \cdot h_{ef} \quad \text{EN 1992-4, Eq. (7.14)}$$

$$\psi_{sus} = 1 \quad \text{EN 1992-4, Eq. (7.14a)}$$

$$s_{cr,Np} = 7.3 \cdot d \cdot \sqrt{\psi_{sus} \cdot \tau_{Rk}} \leq 3 \cdot h_{ef} \quad \text{EN 1992-4, Eq. (7.15)}$$

$$\psi_{g,Np} = \psi_{g,Np}^0 - \left(\frac{s}{s_{cr,Np}} \right)^{0.5} \cdot (\psi_{g,Np}^0 - 1) \geq 1.00 \quad \text{EN 1992-4, Eq. (7.17)}$$

$$\psi_{g,Np}^0 = \sqrt{n} - (\sqrt{n} - 1) \cdot \left(\frac{\tau_{Rk}}{\tau_{Rk,c}} \right)^{1.5} \geq 1.00 \quad \text{EN 1992-4, Eq. (7.18)}$$

$$\tau_{Rk,c} = \frac{k_3}{\pi \cdot d} \cdot \sqrt{h_{ef} \cdot f_{ck}} \quad \text{EN 1992-4, Eq. (7.19)}$$

$$\psi_{s,Np} = 0.7 + 0.3 \cdot \frac{c}{c_{cr,Np}} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.20)}$$

$$\psi_{ec1,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c1,N}}{s_{cr,Np}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.21)}$$

$$\psi_{ec2,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c2,N}}{s_{cr,Np}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.21)}$$

$A_{p,N} [\text{mm}^2]$	$A_{p,N}^0 [\text{mm}^2]$	$\tau_{Rk,ucr,20} [\text{N/mm}^2]$	$s_{cr,Np} [\text{mm}]$	$c_{cr,Np} [\text{mm}]$	$c_{min} [\text{mm}]$	$f_{c,cyl} [\text{N/mm}^2]$
187,500	108,900	18.00	330.0	165.0	125.0	32.00
ψ_c	$\tau_{Rk,cr} [\text{N/mm}^2]$	k_3	$\tau_{Rk,c} [\text{N/mm}^2]$	k_8	$\psi_{g,Np}^0$	
1.048	9.96	7.700	12.12	2.000	1.255	
$\psi_{g,Np}$	$e_{c1,V} [\text{mm}]$	$\psi_{ec1,Np}$	$e_{c2,V} [\text{mm}]$	$\psi_{ec2,Np}$	$\psi_{s,Np}$	
1.089	0.0	1.000	0.0	1.000	0.927	
$\psi_{re,Np}$	ψ_{sus}^0	α_{sus}	ψ_{sus}			
1.000	0.800	0.000	1.000			
$N_{Rk,p}^0 [\text{kN}]$	$N_{Rk,p} [\text{kN}]$	$\gamma_{Mc,p}$	$V_{Rd,cp} [\text{kN}]$	$V_{Ed} [\text{kN}]$		
41.291	71.789	1.500	95.718	14.990		

Group anchor ID

1-4

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	8
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

4.3 Concrete edge failure in direction y+

$$V_{Ed} \leq V_{Rd,c} = \frac{V_{Rk,c}}{\gamma_{Mc}} \quad \text{EN 1992-4, Table 7.2}$$

$$V_{Rk,c} = k_T \cdot V_{Rk,c}^0 \cdot \frac{A_{c,V}}{A_{c,V}^0} \cdot \psi_{s,V} \cdot \psi_{h,V} \cdot \psi_{\alpha,V} \cdot \psi_{ec,V} \cdot \psi_{re,V} \quad \text{EN 1992-4, Eq. (7.40)}$$

$$V_{Rk,c}^0 = k_9 \cdot d_{nom}^\alpha \cdot l_f^\beta \cdot \sqrt{f_{ck}} \cdot c_1^{1.5} \quad \text{EN 1992-4, Eq. (7.41)}$$

$$\alpha = 0.1 \cdot \left(\frac{l_f}{c_1} \right)^{0.5} \quad \text{EN 1992-4, Eq. (7.42)}$$

$$\beta = 0.1 \cdot \left(\frac{d_{nom}}{c_1} \right)^{0.2} \quad \text{EN 1992-4, Eq. (7.43)}$$

$$A_{c,V}^0 = 4.5 \cdot c_1^2 \quad \text{EN 1992-4, Eq. (7.44)}$$

$$\psi_{s,V} = 0.7 + 0.3 \cdot \frac{c_2}{1.5 \cdot c_1} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.45)}$$

$$\psi_{h,V} = \left(\frac{1.5 \cdot c_1}{h} \right)^{0.5} \geq 1.00 \quad \text{EN 1992-4, Eq. (7.46)}$$

$$\psi_{ec,V} = \frac{1}{1 + \left(\frac{2 \cdot e_V}{3 \cdot c_1} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.47)}$$

$$\psi_{\alpha,V} = \sqrt{\frac{1}{(\cos \alpha_V)^2 + (0.5 \cdot \sin \alpha_V)^2}} \geq 1.00 \quad \text{EN 1992-4, Eq. (7.48)}$$

l_f [mm]	d_{nom} [mm]	k_9	α	β	$f_{c,cyl}$ [N/mm ²]		
110.0	12.00	1.700	0.094	0.063	32.00		
c_1 [mm]	$A_{c,V}$ [mm ²]	$A_{c,V}^0$ [mm ²]					
125.0	149,062	70,312					
$\psi_{s,V}$	$\psi_{h,V}$	α_V [°]	$\psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$	
1.000	1.000	0.00	1.000	0.0	1.000	1.000	
$V_{Rk,c}^0$ [kN]	k_T	γ_{Mc}	$V_{Rd,c}$ [kN]	V_{Ed} [kN]			
22.771	1.0	1.500	32.183	14.990			

Group anchor ID

1-4

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	9
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

5 Combined tension and shear loads (EN 1992-4, Section 7.2.3)

Steel failure

β_N	β_V	α	Utilization $\beta_{N,V}$ [%]	Status
0.369	0.185	2.000	18	OK

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

Concrete failure

β_N	β_V	α	Utilization $\beta_{N,V}$ [%]	Status
0.868	0.466	1.000	112	not recommended

$$(\beta_N + \beta_V) / 1.2 \leq 1.0$$

6 Displacements (highest loaded anchor)

Short term loading:

N_{Sk}	=	7.689 [kN]	δ_N	=	0.1298 [mm]
V_{Sk}	=	2.776 [kN]	δ_V	=	0.1388 [mm]
			δ_{NV}	=	0.1900 [mm]

Long term loading:

N_{Sk}	=	7.689 [kN]	δ_N	=	0.2967 [mm]
V_{Sk}	=	2.776 [kN]	δ_V	=	0.2221 [mm]
			δ_{NV}	=	0.3706 [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!

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	10
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

7 Warnings

- The anchor design methods in PROFIS Engineering require rigid baseplates per current regulations (AS 5216:2021, 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 Engineering calculates the minimum required baseplate thickness with CBFEM 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 Engineering. 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 EN 1992-4, Annex A!
- The design is only valid if the clearance hole in the fixture is not larger than the value given in Table 6.1 of EN 1992-4! For larger diameters of the clearance hole see section 6.2.2 of EN 1992-4!
- 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.
- For the determination of the $\psi_{re,v}$ (concrete edge failure) the minimum concrete cover defined in the design settings is used as the concrete cover of the edge reinforcement.
- Drilled hole cleaning must be performed according to instructions for use (blow twice with oil-free compressed air (min. 6 bar), brush twice, blow twice with oil-free compressed air (min. 6 bar)).
- Characteristic bond resistances depend on short- and long-term temperatures.
- Edge reinforcement is not required to avoid splitting failure
- Design is only valid if hole is filled to remove clearance, clearance as per EN 1992-4 Table 6.1
- Load transfer from supplementary reinforcement to the structural member shall be verified by the responsible structural engineer.
- With supplementary reinforcement and post-installed anchors, please ensure that in the jobsite the rebars are not drilled through.
- The characteristic bond resistances depend on the return period (service life in years): 50

Fastening does not meet the design criteria!

Company: Laycomm Pty Ltd
 Address: Level 2, 157 Grenfell Street Adelaide, SA 5000
 Phone | Fax: 0426967800 |
 Design: Copy - Concrete - 22 Oct 2024
 Fastening Point:

Page: 11
 Specifier: Steven Zheng
 E-Mail: steven.zheng@laycomm.com.au
 Date: 22/10/2024

8 Installation data

Baseplate, steel: Grade 300; $E = 200,000.00 \text{ N/mm}^2$; $f_{yk} = 310.00 \text{ N/mm}^2$
 Profile: no profile

Hole diameter in the fixture: $d_f = 14.0 \text{ mm}$

Plate thickness (input): 12.0 mm

Recommended plate thickness: not calculated

Drilling method: Hammer drilled

Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

Anchor type and size: HIT-HY 200-R V3 + HAS 5.8 M12

Item number: 2390202 HAS 5.8 M12x160 (insert) /
 2262134 HIT-HY 200-R V3 (mortar)

Maximum installation torque: 40 Nm

Hole diameter in the base material: 14.0 mm

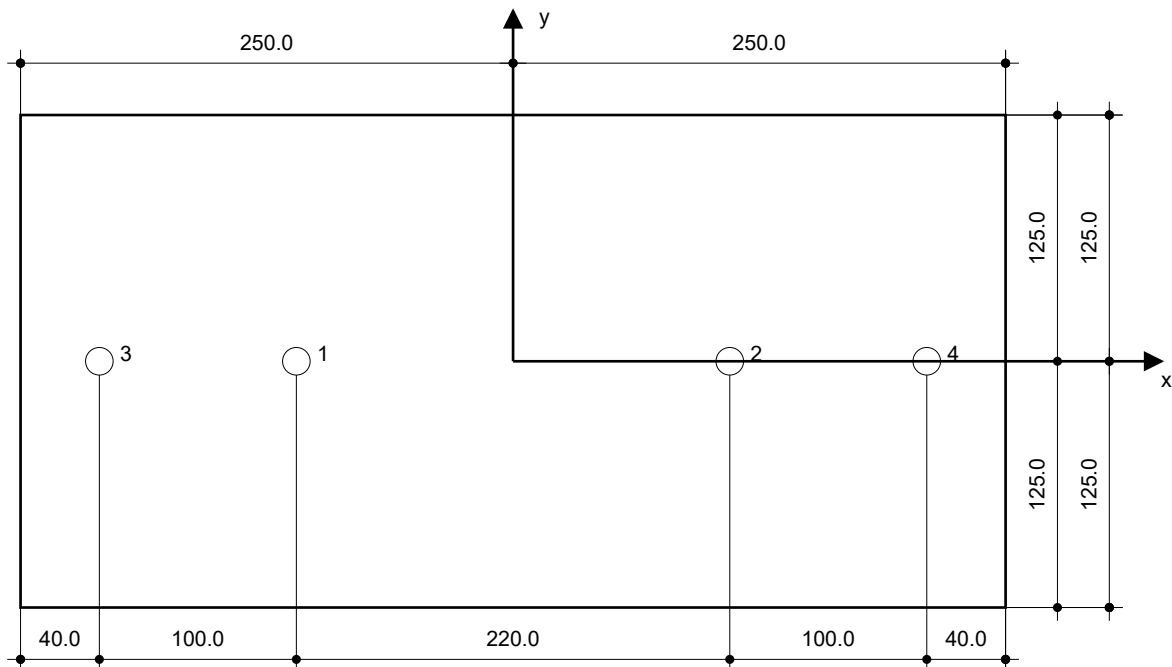
Hole depth in the base material: 110.0 mm

Minimum thickness of the base material: 140.0 mm

Hilti HAS-U 5.8 threaded rod with HIT-HY 200-R V3 injection mortar with 110 mm embedment hef, M12, Steel galvanized, Hammer drilling installation per ETA 19/0601, with annular gaps filled with Hilti Filling Set or any suitable gap solutions

8.1 Recommended accessories

Drilling	Cleaning	Setting
- Suitable Rotary Hammer - Properly sized drill bit	- Compressed air with required accessories to blow from the bottom of the hole - Proper diameter wire brush	- Dispenser including cassette and mixer - For deep installations, a piston plug is necessary - Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	c _{-x}	c _{+x}	c _{-y}	c _{+y}
1	-110.0	0.0	-	-	125.0	125.0
2	110.0	0.0	-	-	125.0	125.0
3	-210.0	0.0	-	-	125.0	125.0
4	210.0	0.0	-	-	125.0	125.0



www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	12
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

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.

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	1
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone I Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

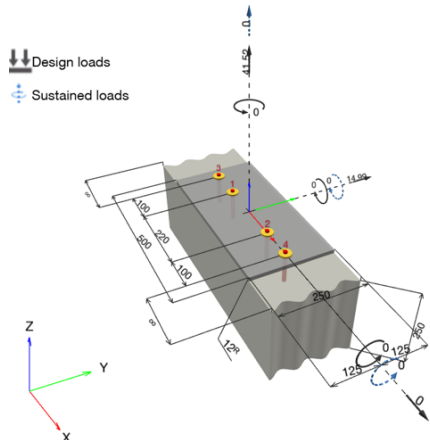
Specifier's comments:

1 Input data

Anchor type and size:	HIT-HY 200-R V3 + HAS 5.8 M12	
Return period (service life in years):	50	
Item number:	2390126 HAS 5.8 M12x120 (insert) / 2262134 HIT-HY 200-R V3 (mortar)	
Hilti Filling Set or any suitable annular gap filling solution		
Specification text:	Hilti HAS-U 5.8 threaded rod with HIT-HY 200-R V3 injection mortar with 79 mm embedment hef, M12, Steel galvanized, Hammer drilling installation per ETA 19/0601, with annular gaps filled with Hilti Filling Set or any suitable gap solutions	
Effective embedment depth:	$h_{ef,opti} = 79.0 \text{ mm}$ ($h_{ef,limit} = 220.0 \text{ mm}$)	
Material:	5.8	
Approval No.:	ETA 19/0601	
Issued I Valid:	29/1/2024 -	
Proof:	SOFA based on EN 1992-4, Chemical	
Stand-off installation:	$e_b = 0.0 \text{ mm}$ (no stand-off); $t = 12.0 \text{ mm}$	
Baseplate ^R :	$l_x \times l_y \times t = 500.0 \text{ mm} \times 250.0 \text{ mm} \times 12.0 \text{ mm}$; (Recommended plate thickness: not calculated)	
Profile:	no profile	
Base material:	cracked concrete, 32MPa, $f_{c,cyl} = 32.00 \text{ N/mm}^2$; $h = 250.0 \text{ mm}$, Temp. short/long: 0/0 °C, User-defined partial material safety factor $\gamma_c = 1.500$	
Installation:	Hammer drilled hole, Installation condition: Dry	
Reinforcement:	No reinforcement or Reinforcement spacing $\geq 150 \text{ mm}$ (any $\emptyset$) or $\geq 100 \text{ mm}$ ($\emptyset \leq 10 \text{ mm}$) no longitudinal edge reinforcement Reinforcement to control splitting acc. to EN 1992-4, 7.2.1.7 (2) b) 2) present	

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

Geometry [mm] & Loading [kN, kNm]



www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	2
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

1.1 Load combination

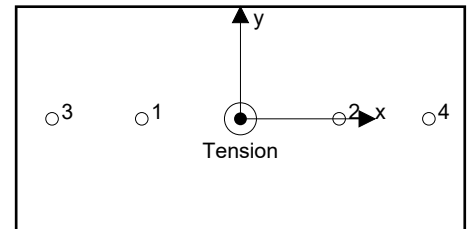
Case	Description	Forces [kN] / Moments [kNm]	Seismic	Fire	Max. Util. Anchor [%]
1	Combination 1	$N = 41.520$; $V_x = 0.000$; $V_y = 14.990$; $M_x = 0.000$; $M_y = 0.000$; $M_z = 0.000$; $N_{sus} = 0.000$; $M_{x,sus} = 0.000$; $M_{y,sus} = 0.000$;	no	no	100

2 Load case/Resulting anchor forces

Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	10.380	3.748	0.000	3.748
2	10.380	3.748	0.000	3.748
3	10.380	3.748	0.000	3.748
4	10.380	3.748	0.000	3.748



Max. concrete compressive strain: - [%]
 Max. concrete compressive stress: - [N/mm²]
 Resulting tension force in (x/y)=(0.0/0.0): 41.520 [kN]
 Resulting compression force in (x/y)=(-/-): 0.000 [kN]

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



www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	3
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

3 Tension load EN 1992-4, Section 7.2.1

	Load [kN]	Capacity [kN]	Utilization β_N [%]	Status
Steel failure*	10.380	28.100	37	OK
Combined pullout-concrete cone failure**	41.520	55.379	75	OK
Concrete Breakout failure**	41.520	56.524	74	OK
Splitting failure**	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (anchors in tension)

3.1 Steel failure

$$N_{Ed} \leq N_{Rd,s} = \frac{N_{Rk,s}}{\gamma_{Ms}} \quad \text{EN 1992-4, Table 7.1}$$

$N_{Rk,s}$ [kN]	γ_{Ms}	$N_{Rd,s}$ [kN]	N_{Ed} [kN]
42.150	1.500	28.100	10.380

www.hilti.com.au

Company: Laycomm Pty Ltd
Address: Level 2, 157 Grenfell Street Adelaide, SA 5000
Phone | Fax: 0426967800 |
Design: Copy - Concrete - 22 Oct 2024
Fastening Point:

Page: 4
Specifier: Steven Zheng
E-Mail: steven.zheng@laycomm.com.au
Date: 22/10/2024

3.2 Combined pullout-concrete cone failure

$$N_{Ed} \leq N_{Rd,p} = \frac{N_{Rk,p}}{\gamma_{Mp}} \quad \text{EN 1992-4, Table 7.1}$$

$$N_{Rk,p} = N_{Rk,p}^0 \cdot \frac{A_{p,N}}{A_{p,N}^0} \cdot \psi_{g,Np} \cdot \psi_{s,Np} \cdot \psi_{re,Np} \cdot \psi_{ec1,Np} \cdot \psi_{ec2,Np} \quad \text{EN 1992-4, Eq. (7.13)}$$

$$N_{Rk,p}^0 = \psi_{sus} \cdot \tau_{Rk} \cdot \pi \cdot d \cdot h_{ef} \quad \text{EN 1992-4, Eq. (7.14)}$$

$$\psi_{sus} = 1 \quad \text{EN 1992-4, Eq. (7.14a)}$$

$$s_{cr,Np} = 7.3 \cdot d \cdot \sqrt{\psi_{sus} \cdot \tau_{Rk}} \leq 3 \cdot h_{ef} \quad \text{EN 1992-4, Eq. (7.15)}$$

$$\psi_{g,Np} = \psi_{g,Np}^0 \cdot \left(\frac{s}{s_{cr,Np}} \right)^{0.5} \cdot (\psi_{g,Np}^0 - 1) \geq 1.00 \quad \text{EN 1992-4, Eq. (7.17)}$$

$$\psi_{g,Np}^0 = \sqrt{n} - (\sqrt{n} - 1) \cdot \left(\frac{\tau_{Rk}}{\tau_{Rk,c}} \right)^{1.5} \geq 1.00 \quad \text{EN 1992-4, Eq. (7.18)}$$

$$\tau_{Rk,c} = \frac{k_3}{\pi \cdot d} \cdot \sqrt{h_{ef} \cdot f_{ck}} \quad \text{EN 1992-4, Eq. (7.19)}$$

$$\psi_{s,Np} = 0.7 + 0.3 \cdot \frac{c}{c_{cr,Np}} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.20)}$$

$$\psi_{ec1,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c1,N}}{s_{cr,Np}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.21)}$$

$$\psi_{ec2,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c2,N}}{s_{cr,Np}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.21)}$$

$A_{p,N} [\text{mm}^2]$	$A_{p,N}^0 [\text{mm}^2]$	$\tau_{Rk,ucr,20} [\text{N/mm}^2]$	$s_{cr,Np} [\text{mm}]$	$c_{cr,Np} [\text{mm}]$	$c_{min} [\text{mm}]$	$f_{c,cyl} [\text{N/mm}^2]$
155,709	56,169	18.00	237.0	118.5	125.0	32.00
ψ_c	$\tau_{Rk,cr} [\text{N/mm}^2]$	k_3	$\tau_{Rk,c} [\text{N/mm}^2]$	$\psi_{g,Np}^0$	$\psi_{g,Np}$	
1.048	9.96	7.700	10.27	1.045	1.010	
$e_{c1,N} [\text{mm}]$	$\psi_{ec1,Np}$	$e_{c2,N} [\text{mm}]$	$\psi_{ec2,Np}$	$\psi_{s,Np}$	$\psi_{re,Np}$	
0.0	1.000	0.0	1.000	1.000	1.000	
ψ_{sus}^0	α_{sus}	ψ_{sus}				
0.800	0.000	1.000				
$N_{Rk,p}^0 [\text{kN}]$	$N_{Rk,p} [\text{kN}]$	γ_{Mp}	$N_{Rd,p} [\text{kN}]$	$N_{Ed} [\text{kN}]$		
29.655	83.069	1.500	55.379	41.520		

Group anchor ID

1-4

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	5
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

3.3 Concrete Breakout failure

$$N_{Ed} \leq N_{Rd,c} = \frac{N_{Rk,c}}{\gamma_{Mc}} \quad \text{EN 1992-4, Table 7.1}$$

$$N_{Rk,c} = N_{Rk,c}^0 \cdot \frac{A_{c,N}}{A_{c,N}^0} \cdot \psi_{s,N} \cdot \psi_{re,N} \cdot \psi_{ec1,N} \cdot \psi_{ec2,N} \cdot \psi_{M,N} \quad \text{EN 1992-4, Eq. (7.1)}$$

$$N_{Rk,c}^0 = k_1 \cdot \sqrt{f_{ck}} \cdot h_{ef}^{1.5} \quad \text{EN 1992-4, Eq. (7.2)}$$

$$A_{c,N}^0 = s_{cr,N} \cdot s_{cr,N} \quad \text{EN 1992-4, Eq. (7.3)}$$

$$\psi_{s,N} = 0.7 + 0.3 \cdot \frac{c}{c_{cr,N}} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.4)}$$

$$\psi_{ec1,N} = \frac{1}{1 + \left(\frac{2 \cdot e_{N,1}}{s_{cr,N}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.6)}$$

$$\psi_{ec2,N} = \frac{1}{1 + \left(\frac{2 \cdot e_{N,2}}{s_{cr,N}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.6)}$$

$$\psi_{M,N} = 1 \quad \text{EN 1992-4, Eq. (7.7)}$$

$A_{c,N} [\text{mm}^2]$	$A_{c,N}^0 [\text{mm}^2]$	$c_{cr,N} [\text{mm}]$	$s_{cr,N} [\text{mm}]$	$f_{c,cyl} [\text{N/mm}^2]$		
155,709	56,169	118.5	237.0	32.00		
$e_{c1,N} [\text{mm}]$	$\psi_{ec1,N}$	$e_{c2,N} [\text{mm}]$	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$	$z [\text{mm}]$
0.0	1.000	0.0	1.000	1.000	1.000	0.0
$\psi_{M,N}$	k_1	$N_{Rk,c}^0 [\text{kN}]$	γ_{Mc}	$N_{Rd,c} [\text{kN}]$	$N_{Ed} [\text{kN}]$	
1.000	7.700	30.585	1.500	56.524	41.520	

Group anchor ID

1-4

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	6
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

4 Shear load EN 1992-4, Section 7.2.2

	Load [kN]	Capacity [kN]	Utilization β_v [%]	Status
Steel failure (without lever arm)*	3.748	20.232	19	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	14.990	110.758	14	OK
Concrete edge failure in direction y+**	14.990	30.422	50	OK

* highest loaded anchor **anchor group (relevant anchors)

4.1 Steel failure (without lever arm)

$$V_{Ed} \leq V_{Rd,s} = \frac{V_{Rk,s}}{\gamma_{Ms}} \quad \text{EN 1992-4, Table 7.2}$$

$$V_{Rk,s} = k_7 \cdot V_{Rk,s}^0 \quad \text{EN 1992-4, Eq. (7.35)}$$

$V_{Rk,s}^0$ [kN]	k_7	$V_{Rk,s}$ [kN]	γ_{Ms}	$V_{Rd,s}$ [kN]	V_{Ed} [kN]
25.290	1.000	25.290	1.250	20.232	3.748

www.hilti.com.au

Company: Laycomm Pty Ltd
 Address: Level 2, 157 Grenfell Street Adelaide, SA 5000
 Phone | Fax: 0426967800 |
 Design: Copy - Concrete - 22 Oct 2024
 Fastening Point:

Page: 7
 Specifier: Steven Zheng
 E-Mail: steven.zheng@laycomm.com.au
 Date: 22/10/2024

4.2 Pryout failure (bond relevant)

$$V_{Ed} \leq V_{Rd,cp} = \frac{V_{Rk,cp}}{\gamma_{Mc,p}} \quad \text{EN 1992-4, Table 7.2}$$

$$V_{Rk,cp} = k_8 \cdot \min \{N_{Rk,c}; N_{Rk,p}\} \quad \text{EN 1992-4, Eq. (7.39c)}$$

$$N_{Rk,p} = N_{Rk,p}^0 \cdot \frac{A_{p,N}}{A_{p,N}^0} \cdot \psi_{g,Np} \cdot \psi_{s,Np} \cdot \psi_{re,Np} \cdot \psi_{ec1,Np} \cdot \psi_{ec2,Np} \quad \text{EN 1992-4, Eq. (7.13)}$$

$$N_{Rk,p}^0 = \psi_{sus} \cdot \tau_{Rk} \cdot \pi \cdot d \cdot h_{ef} \quad \text{EN 1992-4, Eq. (7.14)}$$

$$\psi_{sus} = 1 \quad \text{EN 1992-4, Eq. (7.14a)}$$

$$s_{cr,Np} = 7.3 \cdot d \cdot \sqrt{\psi_{sus} \cdot \tau_{Rk}} \leq 3 \cdot h_{ef} \quad \text{EN 1992-4, Eq. (7.15)}$$

$$\psi_{g,Np} = \psi_{g,Np}^0 - \left(\frac{s}{s_{cr,Np}} \right)^{0.5} \cdot (\psi_{g,Np}^0 - 1) \geq 1.00 \quad \text{EN 1992-4, Eq. (7.17)}$$

$$\psi_{g,Np}^0 = \sqrt{n} - (\sqrt{n} - 1) \cdot \left(\frac{\tau_{Rk}}{\tau_{Rk,c}} \right)^{1.5} \geq 1.00 \quad \text{EN 1992-4, Eq. (7.18)}$$

$$\tau_{Rk,c} = \frac{k_3}{\pi \cdot d} \cdot \sqrt{h_{ef} \cdot f_{ck}} \quad \text{EN 1992-4, Eq. (7.19)}$$

$$\psi_{s,Np} = 0.7 + 0.3 \cdot \frac{c}{c_{cr,Np}} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.20)}$$

$$\psi_{ec1,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c1,N}}{s_{cr,Np}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.21)}$$

$$\psi_{ec2,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c2,N}}{s_{cr,Np}} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.21)}$$

$A_{p,N} [\text{mm}^2]$	$A_{p,N}^0 [\text{mm}^2]$	$\tau_{Rk,ucr,20} [\text{N/mm}^2]$	$s_{cr,Np} [\text{mm}]$	$c_{cr,Np} [\text{mm}]$	$c_{min} [\text{mm}]$	$f_{c,cyl} [\text{N/mm}^2]$
155,709	56,169	18.00	237.0	118.5	125.0	32.00
ψ_c	$\tau_{Rk,cr} [\text{N/mm}^2]$	k_3	$\tau_{Rk,c} [\text{N/mm}^2]$	k_8	$\psi_{g,Np}^0$	
1.048	9.96	7.700	10.27	2.000	1.045	
$\psi_{g,Np}$	$e_{c1,V} [\text{mm}]$	$\psi_{ec1,Np}$	$e_{c2,V} [\text{mm}]$	$\psi_{ec2,Np}$	$\psi_{s,Np}$	
1.010	0.0	1.000	0.0	1.000	1.000	
$\psi_{re,Np}$	ψ_{sus}^0	α_{sus}	ψ_{sus}			
1.000	0.800	0.000	1.000			
$N_{Rk,p}^0 [\text{kN}]$	$N_{Rk,p} [\text{kN}]$	$\gamma_{Mc,p}$	$V_{Rd,cp} [\text{kN}]$	$V_{Ed} [\text{kN}]$		
29.655	83.069	1.500	110.758	14.990		

Group anchor ID

1-4

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	8
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

4.3 Concrete edge failure in direction y+

$$V_{Ed} \leq V_{Rd,c} = \frac{V_{Rk,c}}{\gamma_{Mc}} \quad \text{EN 1992-4, Table 7.2}$$

$$V_{Rk,c} = k_T \cdot V_{Rk,c}^0 \cdot \frac{A_{c,V}}{A_{c,V}^0} \cdot \psi_{s,V} \cdot \psi_{h,V} \cdot \psi_{\alpha,V} \cdot \psi_{ec,V} \cdot \psi_{re,V} \quad \text{EN 1992-4, Eq. (7.40)}$$

$$V_{Rk,c}^0 = k_9 \cdot d_{nom}^\alpha \cdot l_f^\beta \cdot \sqrt{f_{ck}} \cdot c_1^{1.5} \quad \text{EN 1992-4, Eq. (7.41)}$$

$$\alpha = 0.1 \cdot \left(\frac{l_f}{c_1} \right)^{0.5} \quad \text{EN 1992-4, Eq. (7.42)}$$

$$\beta = 0.1 \cdot \left(\frac{d_{nom}}{c_1} \right)^{0.2} \quad \text{EN 1992-4, Eq. (7.43)}$$

$$A_{c,V}^0 = 4.5 \cdot c_1^2 \quad \text{EN 1992-4, Eq. (7.44)}$$

$$\psi_{s,V} = 0.7 + 0.3 \cdot \frac{c_2}{1.5 \cdot c_1} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.45)}$$

$$\psi_{h,V} = \left(\frac{1.5 \cdot c_1}{h} \right)^{0.5} \geq 1.00 \quad \text{EN 1992-4, Eq. (7.46)}$$

$$\psi_{ec,V} = \frac{1}{1 + \left(\frac{2 \cdot e_V}{3 \cdot c_1} \right)} \leq 1.00 \quad \text{EN 1992-4, Eq. (7.47)}$$

$$\psi_{\alpha,V} = \sqrt{\frac{1}{(\cos \alpha_V)^2 + (0.5 \cdot \sin \alpha_V)^2}} \geq 1.00 \quad \text{EN 1992-4, Eq. (7.48)}$$

l_f [mm]	d_{nom} [mm]	k_9	α	β	$f_{c,cyl}$ [N/mm ²]	
79.0	12.00	1.700	0.079	0.063	32.00	
c_1 [mm]	$A_{c,V}$ [mm ²]	$A_{c,V}^0$ [mm ²]				
125.0	149,062	70,312				
$\psi_{s,V}$	$\psi_{h,V}$	α_V [°]	$\psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$
1.000	1.000	0.00	1.000	0.0	1.000	1.000
$V_{Rk,c}^0$ [kN]	k_T	γ_{Mc}	$V_{Rd,c}$ [kN]	V_{Ed} [kN]		
21.525	1.0	1.500	30.422	14.990		

Group anchor ID

1-4

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	9
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

5 Combined tension and shear loads (EN 1992-4, Section 7.2.3)

Steel failure

β_N	β_V	α	Utilization $\beta_{N,V}$ [%]	Status
0.369	0.185	2.000	18	OK

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

Concrete failure

β_N	β_V	α	Utilization $\beta_{N,V}$ [%]	Status
0.750	0.493	1.500	100	OK

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

6 Displacements (highest loaded anchor)

Short term loading:

N_{Sk}	=	7.689 [kN]	δ_N	=	0.1807 [mm]
V_{Sk}	=	2.776 [kN]	δ_V	=	0.1388 [mm]
			δ_{NV}	=	0.2279 [mm]

Long term loading:

N_{Sk}	=	7.689 [kN]	δ_N	=	0.4131 [mm]
V_{Sk}	=	2.776 [kN]	δ_V	=	0.2221 [mm]
			δ_{NV}	=	0.4690 [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!



Hilti PROFIS Engineering 3.1.4

www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	10
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

7 Warnings

- The anchor design methods in PROFIS Engineering require rigid baseplates per current regulations (AS 5216:2021, 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 Engineering calculates the minimum required baseplate thickness with CBFEM 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 Engineering. 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 EN 1992-4, Annex A!
- The design is only valid if the clearance hole in the fixture is not larger than the value given in Table 6.1 of EN 1992-4! For larger diameters of the clearance hole see section 6.2.2 of EN 1992-4!
- 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.
- For the determination of the $\psi_{re,v}$ (concrete edge failure) the minimum concrete cover defined in the design settings is used as the concrete cover of the edge reinforcement.
- Drilled hole cleaning must be performed according to instructions for use (blow twice with oil-free compressed air (min. 6 bar), brush twice, blow twice with oil-free compressed air (min. 6 bar)).
- Characteristic bond resistances depend on short- and long-term temperatures.
- Edge reinforcement is not required to avoid splitting failure
- Design is only valid if hole is filled to remove clearance, clearance as per EN 1992-4 Table 6.1
- Load transfer from supplementary reinforcement to the structural member shall be verified by the responsible structural engineer.
- With supplementary reinforcement and post-installed anchors, please ensure that in the jobsite the rebars are not drilled through.
- The characteristic bond resistances depend on the return period (service life in years): 50

Fastening meets the design criteria!

Company: Laycomm Pty Ltd
 Address: Level 2, 157 Grenfell Street Adelaide, SA 5000
 Phone | Fax: 0426967800 |
 Design: Copy - Concrete - 22 Oct 2024
 Fastening Point:

Page: 11
 Specifier: Steven Zheng
 E-Mail: steven.zheng@laycomm.com.au
 Date: 22/10/2024

8 Installation data

Baseplate, steel: Grade 300; $E = 200,000.00 \text{ N/mm}^2$; $f_{yk} = 310.00 \text{ N/mm}^2$
 Profile: no profile

Hole diameter in the fixture: $d_f = 14.0 \text{ mm}$

Plate thickness (input): 12.0 mm

Recommended plate thickness: not calculated

Drilling method: Hammer drilled

Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

Anchor type and size: HIT-HY 200-R V3 + HAS 5.8 M12

Item number: 2390126 HAS 5.8 M12x120 (insert) /

2262134 HIT-HY 200-R V3 (mortar)

Maximum installation torque: 40 Nm

Hole diameter in the base material: 14.0 mm

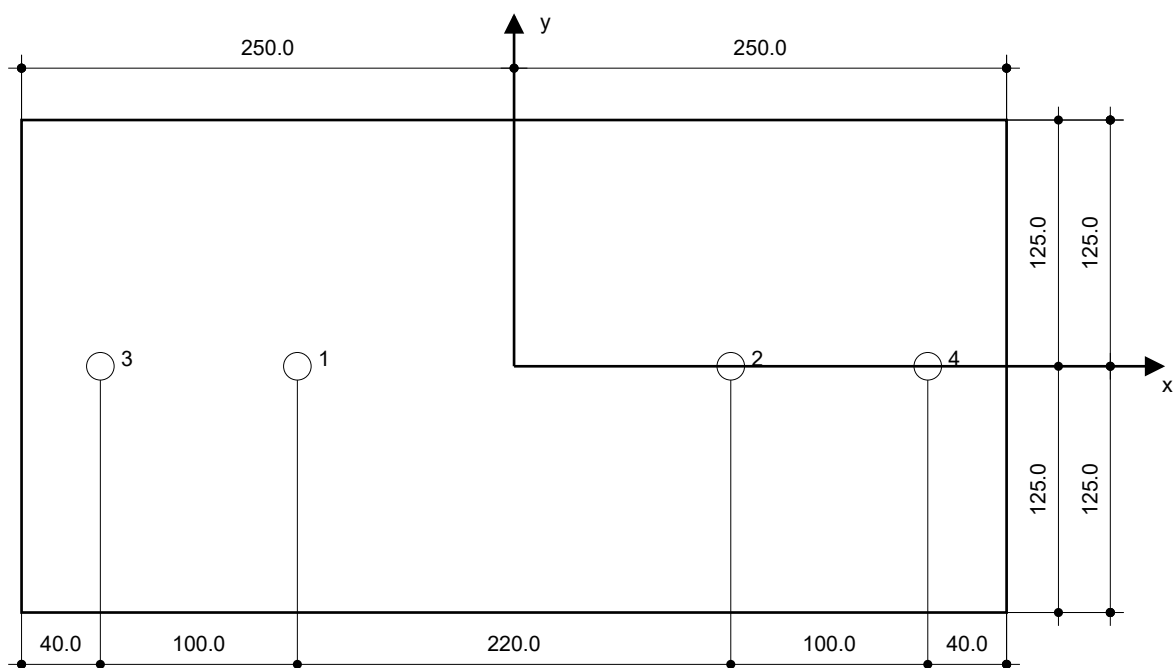
Hole depth in the base material: 79.0 mm

Minimum thickness of the base material: 109.0 mm

Hilti HAS-U 5.8 threaded rod with HIT-HY 200-R V3 injection mortar with 79 mm embedment hef, M12, Steel galvanized, Hammer drilling installation per ETA 19/0601, with annular gaps filled with Hilti Filling Set or any suitable gap solutions

8.1 Recommended accessories

Drilling	Cleaning	Setting
- Suitable Rotary Hammer - Properly sized drill bit	- Compressed air with required accessories to blow from the bottom of the hole - Proper diameter wire brush	- Dispenser including cassette and mixer - For deep installations, a piston plug is necessary - Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	c _{-x}	c _{+x}	c _{-y}	c _{+y}
1	-110.0	0.0	-	-	125.0	125.0
2	110.0	0.0	-	-	125.0	125.0
3	-210.0	0.0	-	-	125.0	125.0
4	210.0	0.0	-	-	125.0	125.0



www.hilti.com.au

Company:	Laycomm Pty Ltd	Page:	12
Address:	Level 2, 157 Grenfell Street Adelaide, SA 5000	Specifier:	Steven Zheng
Phone Fax:	0426967800	E-Mail:	steven.zheng@laycomm.com.au
Design:	Copy - Concrete - 22 Oct 2024	Date:	22/10/2024
Fastening Point:			

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.