Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Piece#8-top anchored- Oct 3, 2025	Date:	10/8/2025
Fastening point:			

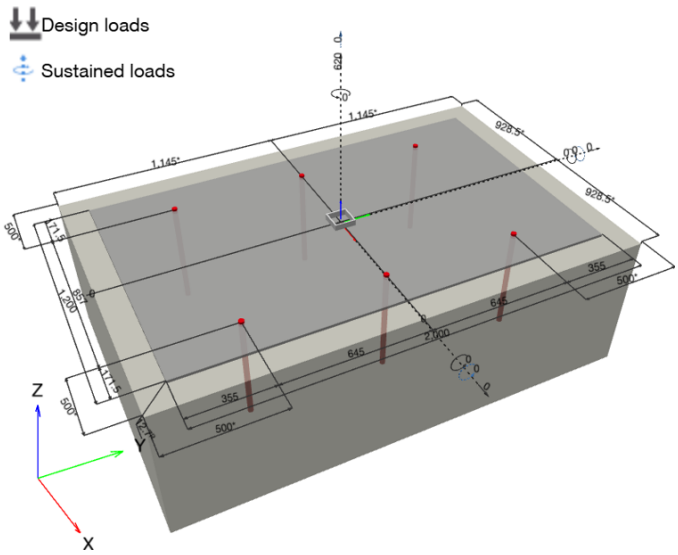
Specifier's comments:

1 Input data

Anchor type and diameter:	**HIT-RE 500 V3 + HAS-B-105 (ASTM F1554 Gr.105) 1**
Item number:	not available (element) / 2123401 HIT-RE 500 V3 (adhesive)
Specification text:	Hilti ∅ 1 in HIT-RE 500 V3 + HAS-B-105 (ASTM F1554 Gr.105) with 500 mm nominal embedment depth per ICC-ES ESR-3814 , SAFEset - automatic cleaning installation per MPII,
Effective embedment depth:	$h_{ef,act}$ = 500.0 mm ($h_{ef,limit}$ = - mm)
Material:	ASTM F1554 Grade 105
Evaluation Service Report:	ESR-3814
Issued I Valid:	- | -
Proof:	Design Method CSA A23.3-14 / Chem.
Shear edge breakout verification:	Row closest to edge (Case 3 only from CSA A23.3-14 Fig. D.13)
Stand-off installation:	e_b = 0.0 mm (no stand-off); t = 12.7 mm
Anchor plate[R]:	l_x x l_y x t = 1,200.0 mm x 2,000.0 mm x 12.7 mm; (Recommended plate thickness: not calculated)
Profile:	Square HSS (AISC), HSS4X4X.25; (L x W x T) = 101.6 mm x 101.6 mm x 6.3 mm
Base material:	cracked concrete, f_c' = 34.47 N/mm^2; h = 3,000.0 mm, Temp. short/long: 20/20 °C
Installation:	**automatic cleaned drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < 15M bar

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

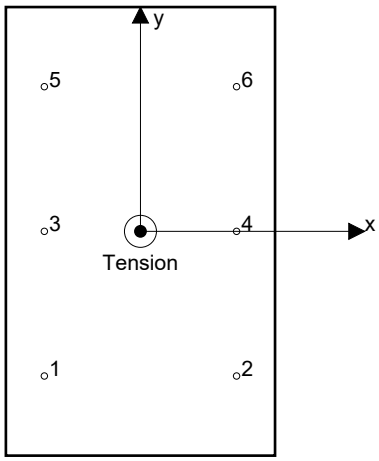
Geometry [mm] & Loading [kN, kNm]



1.1 Design results

Case	Description	Forces [kN] / Moments [kNm]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 620.000; V_x = 0.000; V_y = 0.000; 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	89

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	103.333	0.000	0.000	0.000
2	103.333	0.000	0.000	0.000
3	103.333	0.000	0.000	0.000
4	103.333	0.000	0.000	0.000
5	103.333	0.000	0.000	0.000
6	103.333	0.000	0.000	0.000

Max. concrete compressive strain: - [‰]
Max. concrete compressive stress: - [N/mm^2]
Resulting tension force in (x/y)=(0.0/0.0): 620.000 [kN]
Resulting compression force in (x/y)=(-/-): 0.000 [kN]

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

3 Tension load

	Load N_f [kN]	Capacity N_r [kN]	Utilization $\beta_N = N_f/N_r$	Status
Steel Strength*	103.333	229.022	46	OK
Bond Strength**	620.000	1,351.259	46	OK
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	620.000	701.264	89	OK

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

Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Piece#8-top anchored- Oct 3, 2025	Date:	10/8/2025
Fastening point:			

3.1 Steel Strength

$N_{s,uta} = A_{se} f_{uta}$ = ESR value		refer to ICC-ES ESR-3814
N_{sar}	$= A_{se} \phi_s f_{uta} R$	CSA A23.3-14 Eq. D.2
N_{sar}	$\geq N_{fa}$	CSA A23.3-14 Table D.1

Variables

n	$A_{se,N}$ [mm²]	f_{uta} [N/mm²]
1	391	861.84

Calculations

$N_{s,uta}$ [kN]
336.797

Results

$N_{s,uta}$ [kN]	ϕ_s	R	N_{sar} [kN]	N_{fa} [kN]
336.797	0.850	0.800	229.022	103.333

3.2 Bond Strength

N_{agr}	$= \left(\frac{A_{Na}}{A_{Na0}}\right) \psi_{ec1,Na} \psi_{ec2,Na} \psi_{ed,Na} \psi_{cp,Na} N_{bar}$	CSA A23.3-14 Eq. D.21
N_{agr}	$\geq N_{fa,g}$	CSA A23.3-14 Table D.1
A_{Na}	= see CSA A23.3-14, Part D.6.5.1, Fig. D.11	
A_{Na0}	$= (2 c_{Na})^2$	CSA A23.3-14 Eq. D.22
c_{Na}	$= 10 d_a \sqrt{\frac{\tau_{uncr}}{7.60}}$	CSA A23.3-14 Eq. D.23
$\psi_{ec,Na}$	$= \left(\frac{1}{1 + \frac{e'_N}{c_{Na}}}\right) \leq 1.0$	CSA A23.3-14 Eq. D.25
$\psi_{ed,Na}$	$= 0.7 + 0.3 \left(\frac{c_{a,min}}{c_{Na}}\right) \leq 1.0$	CSA A23.3-14 Eq. D.27
$\psi_{cp,Na}$	$= MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}}\right) \leq 1.0$	CSA A23.3-14 Eq. D.29
N_{bar}	$= \lambda_a \phi_c \tau_r \pi d_a h_{ef} R$	CSA A23.3-14 Eq. D.24

Variables

τ_{uncr} [N/mm²]	d_a [mm]	h_{ef} [mm]	$c_{a,min}$ [mm]	$\alpha_{overhead}$	τ_{cr} [N/mm²]
16.07	25.4	500.0	500.0	1.000	9.49

$e'_{1,N}$ [mm]	$e'_{2,N}$ [mm]	c_{ac} [mm]	λ_a
0.0	0.0	925.3	1.000

Calculations

c_{Na} [mm]	A_{Na} [mm²]	A_{Na0} [mm²]	$\psi_{ed,Na}$
369.4	2,997,249	545,691	1.000

$\psi_{ec1,Na}$	$\psi_{ec2,Na}$	$\psi_{cp,Na}$
1.000	1.000	1.000

Results

ϕ_c	R	N_{bar} [kN]	N_{agr} [kN]	$N_{fa,g}$ [kN]
0.650	1.000	246.015	1,351.259	620.000

Company:		Page:	4
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Piece#8-top anchored- Oct 3, 2025	Date:	10/8/2025
Fastening point:			

3.3 Concrete Breakout Failure

$N_{cbgr} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_{br}$ CSA A23.3-14 Eq. D.4

$N_{cbgr} \geq N_{fa,g}$ CSA A23.3-14 Table D.1

A_{Nc} see CSA A23.3-14, Part D.6.2.1, Fig. D.7

$A_{Nc0} = 9 h_{ef}^2$ CSA A23.3-14 Eq. D.5

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 e'_N}{3 h_{ef}}}\right) \leq 1.0$ CSA A23.3-14 Eq. D.8

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}}\right) \leq 1.0$ CSA A23.3-14 Eq. D.11

$\psi_{cp,N} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}}\right) \leq 1.0$ CSA A23.3-14 Eq. D.13

$N_{br} = k_c \phi_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} R$ CSA A23.3-14 Eq. D.6

Variables

h_{ef} [mm]	$e'_{1,N}$ [mm]	$e'_{2,N}$ [mm]	$c_{a,min}$ [mm]	$\psi_{c,N}$
333.3	0.0	0.0	500.0	1.000

c_{ac} [mm]	k_c	λ_a	f'_c [N/mm^2]
925.3	7.1	1.000	34.47

Calculations

A_{Nc} [mm^2]	A_{Nc0} [mm^2]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$
4,252,530	1,000,000	1.000	1.000	1.000	1.000

Results

ϕ_c	R	N_{br} [kN]	N_{cbgr} [kN]	$N_{fa,g}$ [kN]
0.650	1.000	164.905	701.264	620.000

Company:		Page:	5
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Piece#8-top anchored- Oct 3, 2025	Date:	10/8/2025
Fastening point:			

4 Shear load

	Load V_f [kN]	Capacity V_r [kN]	Utilization $\beta_V = V_f/V_r$	Status
Steel Strength*	N/A	N/A	N/A	N/A
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Bond Strength controls)*	N/A	N/A	N/A	N/A
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

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

5 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (EN1992-4, AS5216, etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with FEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate 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!
- The equations presented in this report are based on metric units. When inputs are displayed in imperial units, the user should be aware that the equations remain in their metric format.
- Condition A applies when supplementary reinforcement is used. The R factor is increased for non-steel Design Strengths except Pullout Strength and Pryout strength. Condition B applies when supplementary reinforcement is not used and for Pullout Strength and Pryout Strength. Refer to your local standard.
- Checking the transfer of loads into the base material is required in accordance with CSA A23.3!
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. CSA A23.3-14 Annex D, Clause D.10.1

Fastening meets the design criteria!

6 Installation data

Profile: Square HSS (AISC), HSS4X4X.25; (L x W x T) = 101.6 mm x 101.6 mm x 6.3 mm

Hole diameter in the fixture: d_f = 28.6 mm

Plate thickness (input): 12.7 mm

Recommended plate thickness: not calculated

Drilling method: SafeSet - automatic cleaning

Cleaning: Automatically performed while drilling

Anchor type and diameter: HIT-RE 500 V3 + HAS-B-105 (ASTM F1554 Gr.105) 1

Item number: not available (element) / 2123401 HIT-RE 500 V3 (adhesive)

Maximum installation torque: 203 Nm

Hole diameter in the base material: 28.6 mm

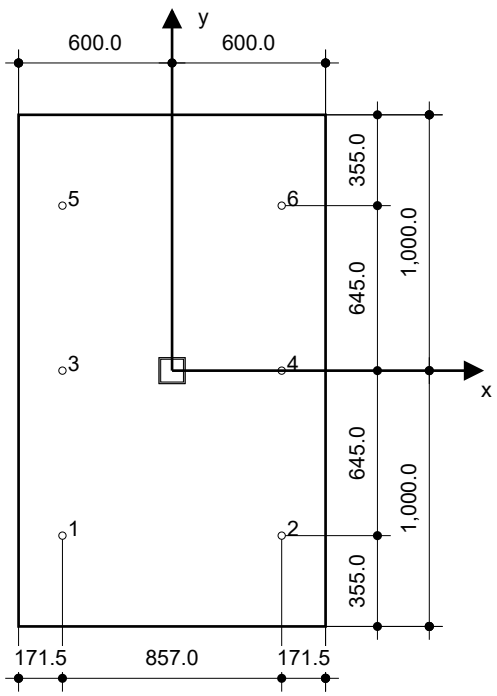
Hole depth in the base material: 500.0 mm

Minimum thickness of the base material: 557.1 mm

Hilti ∅ 1 in HIT-RE 500 V3 + HAS-B-105 (ASTM F1554 Gr.105) with 500 mm nominal embedment depth per ICC-ES ESR-3814 , SAFEset - automatic cleaning installation per MPII

6.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit for SAFEset - automatic cleaning (TE-CD / TE-YD) • Vacuum cleaner	• No accessory required	• Dispenser including cassette and mixer • Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-428.5	-645.0	500.0	1,357.0	500.0	1,790.0
2	428.5	-645.0	1,357.0	500.0	500.0	1,790.0
3	-428.5	0.0	500.0	1,357.0	1,145.0	1,145.0
4	428.5	0.0	1,357.0	500.0	1,145.0	1,145.0
5	-428.5	645.0	500.0	1,357.0	1,790.0	500.0
6	428.5	645.0	1,357.0	500.0	1,790.0	500.0

7 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.