www.hilti.es

Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Immingham. Dolphin Removable Handrail	Date:	18/11/2025
Fastening Point:			

Specifier's comments:

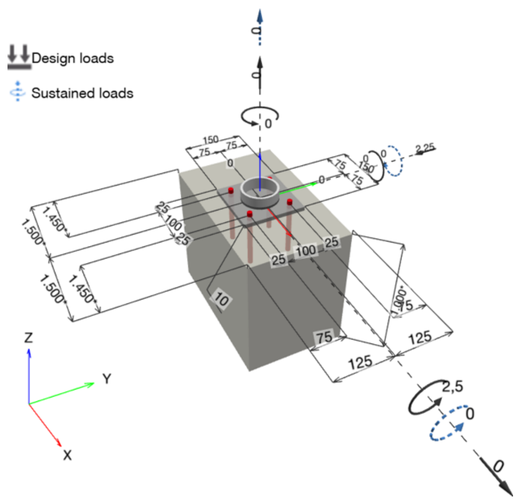
1 Anchor Design

1.1 Input data

Anchor type and size:	**HIT-HY 200-A V3 + HIS-N + 8.8 M12**
Return period (service life in years):	50
Item number:	258017 HIS-N M12x125 (insert) / 2378171 HIT-HY 200-A V3 (mortar)
Specification text:	Hilti HIS-N 8.8 varilla de anclaje with HIT-HY 200-A V3 resina de inyección with 125 mm embedment hef, M12, Acero Galvanizado, Hammer drill bit installation per ETA 19/0601
Effective embedment depth:	$h_{ef,act}$ = 125.0 mm, h_{nom} = 125.0 mm
Material:	8.8
Approval No.:	ETA 19/0601
Issued I Valid:	29/1/2024 | -
Proof:	Design Method EN 1992-4, Chemical
Stand-off installation:	e_b = 0.0 mm (no stand-off); t = 10.0 mm
Baseplate[CBFEM] :	l_x x l_y x t = 150.0 mm x 150.0 mm x 10.0 mm;
Profile:	Pipe, 88,9 x 5,6; (L x W x T) = 88.9 mm x 88.9 mm x 5.6 mm
Base material:	cracked concrete, C40/50, $f_{c,cyl}$ = 40.00 N/mm^2; h =1,000.0 mm, Temp. short/long: 0/0 °C, partial material safety factor γ_c = 1.500; $\gamma_{c,seismic}$ = 1.500
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 >= 12.0 [mm] Reinforcement to control splitting acc. to EN 1992-4, 7.2.1.7 (2) b) 2) present

[CBFEM] - The anchor calculation is based on a component-based Finite Element Method (CBFEM)

Geometry [mm] & Loading [kN, kNm]



1.1.1 Load combination

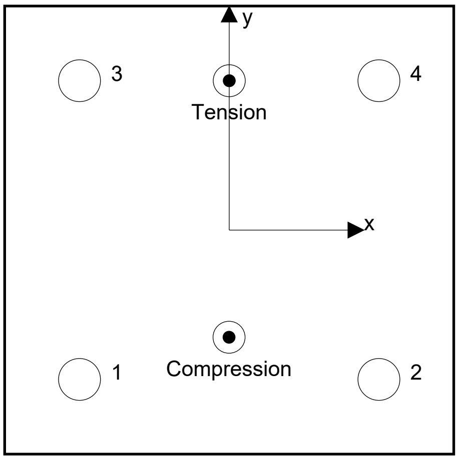
Case	Description	Forces [kN] / Moments [kNm]	Seismic	Fire	Max. Util. Anchor [%]
1	Combinación 1	$N = 0.000$; $V_x = 0.000$; $V_y = -2.250$; $M_x = 2.500$; $M_y = 0.000$; $M_z = 0.000$; $N_{sus} = 0.000$; $M_{x,sus} = 0.000$; $M_{y,sus} = 0.000$;	no	no	95

1.2 Load case/Resulting anchor forces

Anchor reactions [kN]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	-0.001	0.552	-0.042	-0.550
2	-0.001	0.552	0.042	-0.551
3	13.545	0.583	0.099	-0.575
4	13.552	0.583	-0.099	-0.574

Resulting tension force in (x/y)=(0.0/50.0): 27.094 [kN]
Resulting compression force in (x/y)=(-0.1/-35.9): 27.987 [kN]



Anchor forces are calculated based on a component-based Finite Element Method (CBFEM)

1.3 Tension load (EN 1992-4, Section 7.2.1)

	Load [kN]	Capacity [kN]	Utilization β_N [%]	Status
Steel Strength*	13.552	44.667	31	OK
Combined pullout-concrete cone failure**	27.097	28.795	95	OK
Concrete Breakout failure**	27.097	31.416	87	OK
Splitting failure**	N/A	N/A	N/A	N/A

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

1.3.1 Steel Strength

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

$N_{Rk,s}$ [kN]	γ_{Ms}	$N_{Rd,s}$ [kN]	N_{Ed} [kN]
67.000	1.500	44.667	13.552

1.3.2 Combined pullout-concrete cone failure

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

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

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

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

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

$\psi_{g,Np} = \psi^0_{g,Np} - \left(\frac{s}{s_{cr,Np}}\right)^{0,5} \cdot \left(\psi^0_{g,Np} - 1\right) \geq 1.00$ — EN 1992-4, Eq. (7.17)

$\psi^0_{g,Np} = \sqrt{n} - (\sqrt{n} - 1) \cdot \left(\frac{\tau_{Rk}}{\tau_{Rk,c}}\right)^{1,5} \geq 1.00$ — EN 1992-4, Eq. (7.18)

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

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

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

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

$A_{p,N}$ [mm²]	$A^0_{p,N}$ [mm²]	$\tau_{Rk,ucr,20}$ [N/mm²]	$s_{cr,Np}$ [mm]	$c_{cr,Np}$ [mm]	c_{min} [mm]	$f_{c,cyl}$ [N/mm²]
118,750	140,625	13.00	375.0	187.5	75.0	40.00

ψ_c	$\tau_{Rk,cr}$ [N/mm²]	k_3	$\tau_{Rk,c}$ [N/mm²]	$\psi^0_{g,Np}$	$\psi_{g,Np}$
1.072	7.50	7.700	8.45	1.068	1.033

$e_{c1,N}$ [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	0.820	1.000

ψ^0_{sus}	α_{sus}	ψ_{sus}
0.800	0.000	1.000

$N^0_{Rk,p}$ [kN]	$N_{Rk,p}$ [kN]	γ_{Mp}	$N_{Rd,p}$ [kN]	N_{Ed} [kN]
60.397	43.193	1.500	28.795	27.097

Group anchor ID
3, 4

1.3.3 Concrete Breakout failure

$N_{Ed} \leq N_{Rd,c} = \frac{N_{Rk,c}}{\gamma_{Mc}}$		EN 1992-4, Table 7.1
$N_{Rk,c}$	$= N^0_{Rk,c} \cdot \frac{A_{c,N}}{A^0_{c,N}} \cdot \psi_{s,N} \cdot \psi_{re,N} \cdot \psi_{ec1,N} \cdot \psi_{ec2,N} \cdot \psi_{M,N}$	EN 1992-4, Eq. (7.1)
$N^0_{Rk,c}$	$= k_1 \cdot \sqrt{f_{ck}} \cdot h_{ef}^{1,5}$	EN 1992-4, Eq. (7.2)
$A^0_{c,N}$	$= s_{cr,N} \cdot s_{cr,N}$	EN 1992-4, Eq. (7.3)
$\psi_{s,N}$	$= 0.7 + 0.3 \cdot \frac{c}{c_{cr,N}} \leq 1.00$	EN 1992-4, Eq. (7.4)
$\psi_{ec1,N}$	$= \frac{1}{1 + \left(\frac{2 \cdot e_{N,1}}{s_{cr,N}}\right)} \leq 1.00$	EN 1992-4, Eq. (7.6)
$\psi_{ec2,N}$	$= \frac{1}{1 + \left(\frac{2 \cdot e_{N,2}}{s_{cr,N}}\right)} \leq 1.00$	EN 1992-4, Eq. (7.6)
$\psi_{M,N}$	$= 1$	EN 1992-4, Eq. (7.7)

$A_{c,N}$ [mm^2]	$A^0_{c,N}$ [mm^2]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	$f_{c,cyl}$ [N/mm^2]
118,750	140,625	187.5	375.0	40.00

$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$	z [mm]
0.0	1.000	0.0	1.000	0.820	1.000	85.9

$\psi_{M,N}$	k_1	$N^0_{Rk,c}$ [kN]	γ_{Mc}	$N_{Rd,c}$ [kN]	N_{Ed} [kN]
1.000	7.700	68.059	1.500	31.416	27.097

Group anchor ID
3, 4

1.4 Shear load (EN 1992-4, Section 7.2.2)

	Load [kN]	Capacity [kN]	Utilization β_V [%]	Status
Steel Strength (without lever arm)*	0.583	27.200	3	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure**	2.250	60.185	4	OK
Concrete edge failure in direction y-**	2.252	14.422	16	OK

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

1.4.1 Steel Strength (without lever arm)

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

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

$V^0_{Rk,s}$ [kN]	k_7	$V_{Rk,s}$ [kN]	γ_{Ms}	$V_{Rd,s}$ [kN]	V_{Ed} [kN]
34.000	1.000	34.000	1.250	27.200	0.583

1.4.2 Pryout Strength (Bond Strength controls)

$V_{Ed} \leq V_{Rd,cp} = \frac{V_{Rk,cp}}{\gamma_{Mc,p}}$	EN 1992-4, Table 7.2
$V_{Rk,cp} = k_8 \cdot \min\{N_{Rk,c}; N_{Rk,p}\}$	EN 1992-4, Eq. (7.39c)
$N_{Rk,p} = N^0_{Rk,p} \cdot \frac{A_{p,N}}{A^0_{p,N}} \cdot \psi_{g,Np} \cdot \psi_{s,Np} \cdot \psi_{re,Np} \cdot \psi_{ec1,Np} \cdot \psi_{ec2,Np}$	EN 1992-4, Eq. (7.13)
$N^0_{Rk,p} = \psi_{sus} \cdot \tau_{Rk} \cdot \pi \cdot d \cdot h_{ef}$	EN 1992-4, Eq. (7.14)
$\psi_{sus} = 1$	EN 1992-4, Eq. (7.14a)
$s_{cr,Np} = 7.3 \cdot d \cdot \sqrt{\psi_{sus} \cdot \tau_{Rk}} \leq 3 \cdot h_{ef}$	EN 1992-4, Eq. (7.15)
$\psi_{g,Np} = \psi^0_{g,Np} - \left(\frac{s}{s_{cr,Np}}\right)^{0,5} \cdot \left(\psi^0_{g,Np} - 1\right) \geq 1.00$	EN 1992-4, Eq. (7.17)
$\psi^0_{g,Np} = \sqrt{n} - (\sqrt{n} - 1) \cdot \left(\frac{\tau_{Rk}}{\tau_{Rk,c}}\right)^{1,5} \geq 1.00$	EN 1992-4, Eq. (7.18)
$\tau_{Rk,c} = \frac{k_3}{\pi \cdot d} \cdot \sqrt{h_{ef} \cdot f_{ck}}$	EN 1992-4, Eq. (7.19)
$\psi_{s,Np} = 0.7 + 0.3 \cdot \frac{c}{c_{cr,Np}} \leq 1.00$	EN 1992-4, Eq. (7.20)
$\psi_{ec1,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c1,N}}{s_{cr,Np}}\right)} \leq 1.00$	EN 1992-4, Eq. (7.21)
$\psi_{ec2,Np} = \frac{1}{1 + \left(\frac{2 \cdot e_{c2,N}}{s_{cr,Np}}\right)} \leq 1.00$	EN 1992-4, Eq. (7.21)

$A_{p,N}$ [mm^2]	$A^0_{p,N}$ [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]
118,750	140,625	13.00	375.0	187.5	75.0	40.00

ψ_c	$\tau_{Rk,cr}$ [N/mm^2]	k_3	$\tau_{Rk,c}$ [N/mm^2]	k_8	$\psi^0_{g,Np}$
1.072	7.50	7.700	8.45	2.000	1.164

$\psi_{g,Np}$	$e_{c1,V}$ [mm]	$\psi_{ec1,Np}$	$e_{c2,V}$ [mm]	$\psi_{ec2,Np}$	$\psi_{s,Np}$
1.079	0.0	1.000	0.0	1.000	0.820

$\psi_{re,Np}$	ψ^0_{sus}	α_{sus}	ψ_{sus}
1.000	0.800	0.000	1.000

$N^0_{Rk,p}$ [kN]	$N_{Rk,p}$ [kN]	$\gamma_{Mc,p}$	$V_{Rd,cp}$ [kN]	V_{Ed} [kN]
60.397	45.139	1.500	60.185	2.250

Group anchor ID
1-4

1.4.3 Concrete edge failure in direction y-

$V_{Ed} \leq V_{Rd,c} = \frac{V_{Rk,c}}{\gamma_{Mc}}$	EN 1992-4, Table 7.2
$V_{Rk,c} = V^0_{Rk,c} \cdot \frac{A_{c,V}}{A^0_{c,V}} \cdot \psi_{s,V} \cdot \psi_{h,V} \cdot \psi_{\alpha,V} \cdot \psi_{ec,V} \cdot \psi_{re,V}$	EN 1992-4, Eq. (7.40)
$V^0_{Rk,c} = k_9 \cdot d_{nom}^{\alpha} \cdot l_f^{\beta} \cdot \sqrt{f_{ck}} \cdot c_1^{1,5}$	EN 1992-4, Eq. (7.41)
$\alpha = 0.1 \cdot \left(\frac{l_f}{c_1}\right)^{0,5}$	EN 1992-4, Eq. (7.42)
$\beta = 0.1 \cdot \left(\frac{d_{nom}}{c_1}\right)^{0,2}$	EN 1992-4, Eq. (7.43)
$A^0_{c,V} = 4.5 \cdot c_1^2$	EN 1992-4, Eq. (7.44)
$\psi_{s,V} = 0.7 + 0.3 \cdot \frac{c_2}{1.5 \cdot c_1} \leq 1.00$	EN 1992-4, Eq. (7.45)
$\psi_{h,V} = \left(\frac{1.5 \cdot c_1}{h}\right)^{0,5} \geq 1.00$	EN 1992-4, Eq. (7.46)
$\psi_{ec,V} = \frac{1}{1 + \left(\frac{2 \cdot e_V}{3 \cdot c_1}\right)} \leq 1.00$	EN 1992-4, Eq. (7.47)
$\psi_{\alpha,V} = \sqrt{\frac{1}{(\cos \alpha_V)^2 + (0.5 \cdot \sin \alpha_V)^2}} \geq 1.00$	EN 1992-4, Eq. (7.48)

l_f [mm]	d_{nom} [mm]	k_9	α	β	$f_{c,cyl}$ [N/mm^2]	c_1 [mm]
125.0	20.50	1.700	0.129	0.077	40.00	75.0

$A_{c,V}$ [mm^2]	$A^0_{c,V}$ [mm^2]	$\psi_{s,V}$	$\psi_{h,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$
36,562	25,312	1.000	1.000	0.0	1.000

α_V [°]	$\psi_{\alpha,V}$	$\psi_{re,V}$
2.13	1.001	1.000

$V^0_{Rk,c}$ [kN]	γ_{Mc}	$V_{Rd,c}$ [kN]	V_{Ed} [kN]
14.969	1.500	14.422	2.252

Group anchor ID
1, 2

www.hilti.es

Company:		Page:	9
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Immingham. Dolphin Removable Handrail	Date:	18/11/2025
Fastening Point:			

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

Steel failure

β_N	β_V	α	Utilization $\beta_{N,V}$ [%]	Status
0.303	0.021	2.000	10	OK

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

Concrete failure

β_N	β_V	α	Utilization $\beta_{N,V}$ [%]	Status
0.941	0.156	1.000	92	OK

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

1.6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (EN1992-4, ACI318, IS1946, AS 5216:2021, ETAG 001/Annex C, EOTA TR029 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 CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid base 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.
- Checking the transfer of loads into the base material is required in accordance with EN 1992-4, Annex A!
- Attention! In case of compressive anchor forces a buckling check as well as the proof of the local load transfer into and within the base material (incl. punching) has to be done separately.
- 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
- 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 anchor design methods in PROFIS Engineering require rigid baseplates, as per current regulations (EN1992-4, AS5216, etc.). This means that the baseplate should be sufficiently rigid to prevent load re-distribution to the anchors due to elastic/plastic displacements. The user accepts that the baseplate is considered close to rigid by engineering judgment."
- The characteristic bond resistances depend on the return period (service life in years): 50

Company:		Page:	10
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Immingham. Dolphin Removable Handrail	Date:	18/11/2025
Fastening Point:			

1.7 Installation data

Baseplate, steel: S 275; E = 210,000.00 N/mm^2; f_{yk} = 275.00 N/mm^2

Profile: Pipe, 88,9 x 5,6; (L x W x T) = 88.9 mm x 88.9 mm x 5.6 mm

Hole diameter in the fixture: d_f = 14.0 mm

Plate thickness (input): 10.0 mm

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-A V3 + HIS-N + 8.8 M12

Item number: 258017 HIS-N M12x125 (insert) / 2378171 HIT-HY 200-A V3 (mortar)

Maximum installation torque: 40 Nm

Hole diameter in the base material: 22.0 mm

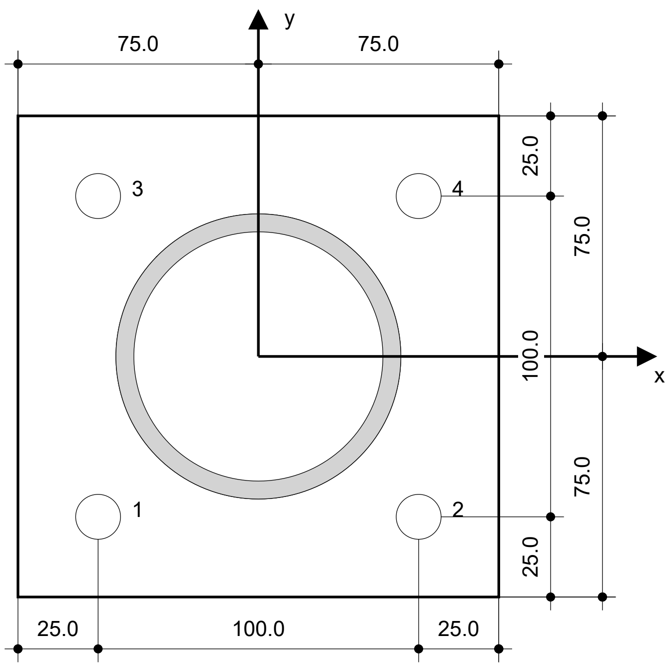
Hole depth in the base material: 125.0 mm

Minimum thickness of the base material: 170.0 mm

Hilti HIS-N 8.8 insert with HIT-HY 200-A V3 injection mortar with 125 mm embedment hef, M12, Steel galvanized, Hammer drill bit installation per ETA 19/0601

1.7.1 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	-50.0	-50.0	1,450.0	1,550.0	75.0	175.0
2	50.0	-50.0	1,550.0	1,450.0	75.0	175.0
3	-50.0	50.0	1,450.0	1,550.0	175.0	75.0
4	50.0	50.0	1,550.0	1,450.0	175.0	75.0

2 Baseplate rigidity check

2.1 Input data

Baseplate:	Shape: Rectangular l_x x l_y x t = 150.0 mm x 150.0 mm x 10.0 mm Calculation: Baseplate Rigidity Check Material: S 275; F_y = 275.00 N/mm²; ε_{lim} = 5.00%
Anchor type and size:	HIT-HY 200-A V3 + HIS-N + 8.8 M12, h_{ef} = 125.0 mm
Anchor stiffness:	The anchor is modelled considering stiffness values determined from load displacement curves tested in an independent laboratory. Please note that no simple replacement of the anchor is possible as the anchor stiffness has a major impact on the load distribution results.
Design method:	EN based design using component-based FEM
Stand-off installation:	e_b = 0.0 mm (No stand-off); t = 10.0 mm
Profile:	88,9 x 5,6; (L x W x T x FT) = 88.9 mm x 88.9 mm x 5.6 mm x - Material: S 235; F_y = 235.00 N/mm²; ε_{lim} = 5.00% Eccentricity x: 0.0 mm Eccentricity y: 0.0 mm
Base material:	Cracked concrete; C40/50; $f_{c,cyl}$ = 40,00 N/mm²; h = 1.000,0 mm; E = 35.000,00 N/mm²; G = 14.583,33 N/mm²; ν = 0,20
Welds (profile to baseplate):	Type of redistribution: Plastic Material: S 235
Mesh size:	Number of elements on edge: 8 Min. size of element: 10.0 mm Max size of element: 50.0 mm

Company:		Page:	12
Address:		Specifier:	
Phone I Fax:		E-Mail:	
Design:	Immingham. Dolphin Removable Handrail	Date:	18/11/2025
Fastening Point:			

2.2 Baseplate plate classification

Results below are displayed for the decisive load combinations: Combinación 1

Anchor tension forces	Equivalent rigid baseplate (CBFEM)	Component-based Finite Element Method (CBFEM) baseplate
Anchor 1	-0,002 kN	-0,001 kN
Anchor 2	-0,002 kN	-0,001 kN
Anchor 3	11,672 kN	13,545 kN
Anchor 4	11,672 kN	13,552 kN

User accepted to consider the selected baseplate as rigid by his/her engineering judgement. This means the anchor design guidelines can be applied.

2.3 Warnings

- By using the CBFEM calculation functionality of PROFIS Engineering you may act outside the applicable design codes and your specified baseplate may not behave rigidly. Please, have the results validated by a professional designer and/or structural engineer to ensure suitability and adequacy for your specific jurisdiction and project requirements.
- The anchor is modelled considering stiffness values determined from load displacement curves tested in an independent laboratory. Please note that no simple replacement of the anchor is possible as the anchor stiffness has a major impact on the load distribution results.

Company:		Page:	14
Address:		Specifier:	
Phone I Fax:		E-Mail:	
Design:	Immingham. Dolphin Removable Handrail	Date:	18/11/2025
Fastening Point:			

3 Summary of results

	Load combination	**Max. utilisation**	**Status**
Anchors	Combinación 1	95%	OK

Fastening meets the design criteria!

4 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.