Specifier's comments:

1. Input data

General

Design method	EN 1992-1-1:2004 + AC:2010
Consider the effect of ΔF_{td}	no
Verification of interface shear	no
Consider compression reinforcement for CSD	yes
Application type	Column to slab
Continuous in X	yes
Loading type	Static
Design for yield	no
Design working life	50 years

Product

Mortar	**HIT-HY 200**
Item number	2045036 HIT-HY 200-R (adhesive)
European Technical Assessment	ETA-12/0083
Issued	21. 06. 2019
Installation	Hammer drilling (HD), Installation Condition: Dry Concrete
Drilling direction	No Drilling aid

Material and Geometry

Existing concrete	C35/45, f_{ck} = 35.0 N/mm²
New concrete	C25/30, f_{ck} = 25.0 N/mm²
Joint roughness	Rough
Interface between new and old concrete	Rectangular cross section, width = 500 mm, height = 1,500 mm
Length of existing concrete	1,950 mm
Temperature	During installation: from 26°C to 40°C; During service: 30 °C / 30 °C (short / long term)
Concrete reinforcement	Wide

Post installed rebar

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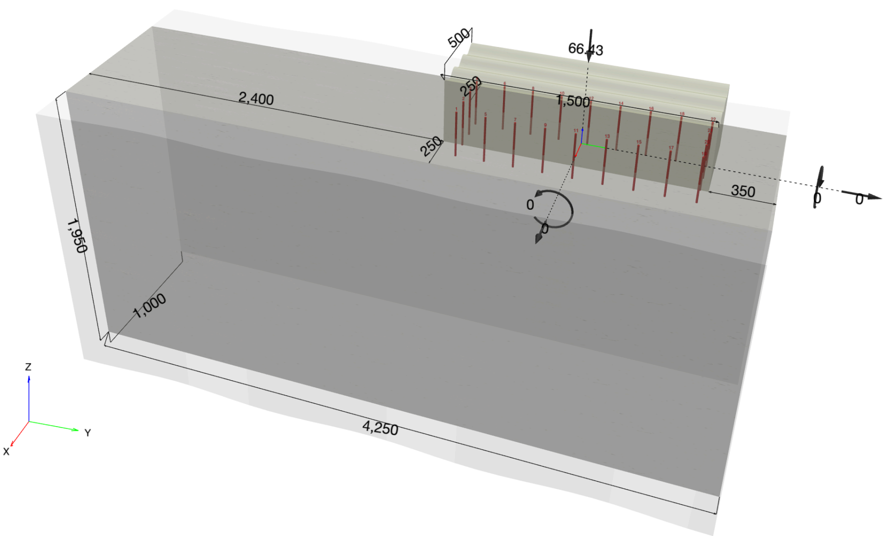
	Diameter	Coordinate X	Coordinate Y	Bond	f_{yk}	Drilling length (l_v)
1	12mm	-194 mm	694 mm	Poor	500.00 N/mm²	120 mm
2	12mm	-65 mm	694 mm	Poor	500.00 N/mm²	120 mm
3	12mm	65 mm	694 mm	Poor	500.00 N/mm²	120 mm
4	12mm	194 mm	694 mm	Poor	500.00 N/mm²	120 mm
5	12mm	-194 mm	521 mm	Poor	500.00 N/mm²	120 mm
6	12mm	194 mm	521 mm	Poor	500.00 N/mm²	120 mm
7	12mm	-194 mm	347 mm	Poor	500.00 N/mm²	120 mm
8	12mm	194 mm	347 mm	Poor	500.00 N/mm²	120 mm
9	12mm	-194 mm	174 mm	Poor	500.00 N/mm²	120 mm
10	12mm	194 mm	174 mm	Poor	500.00 N/mm²	120 mm
11	12mm	-194 mm	0 mm	Poor	500.00 N/mm²	120 mm
12	12mm	194 mm	0 mm	Poor	500.00 N/mm²	120 mm
13	12mm	-194 mm	-174 mm	Poor	500.00 N/mm²	120 mm
14	12mm	194 mm	-174 mm	Poor	500.00 N/mm²	120 mm
15	12mm	-194 mm	-347 mm	Poor	500.00 N/mm²	120 mm
16	12mm	194 mm	-347 mm	Poor	500.00 N/mm²	120 mm
17	12mm	-194 mm	-521 mm	Poor	500.00 N/mm²	120 mm
18	12mm	194 mm	-521 mm	Poor	500.00 N/mm²	120 mm
19	12mm	-194 mm	-694 mm	Poor	500.00 N/mm²	120 mm
20	12mm	-65 mm	-694 mm	Poor	500.00 N/mm²	120 mm
21	12mm	65 mm	-694 mm	Poor	500.00 N/mm²	120 mm
22	12mm	194 mm	-694 mm	Poor	500.00 N/mm²	120 mm
					Final drilling length (l_v)	**120 mm**

1.1. Geometry & Loading

Geometrical dimensions in [mm]. Loading values in [kN, kNm]



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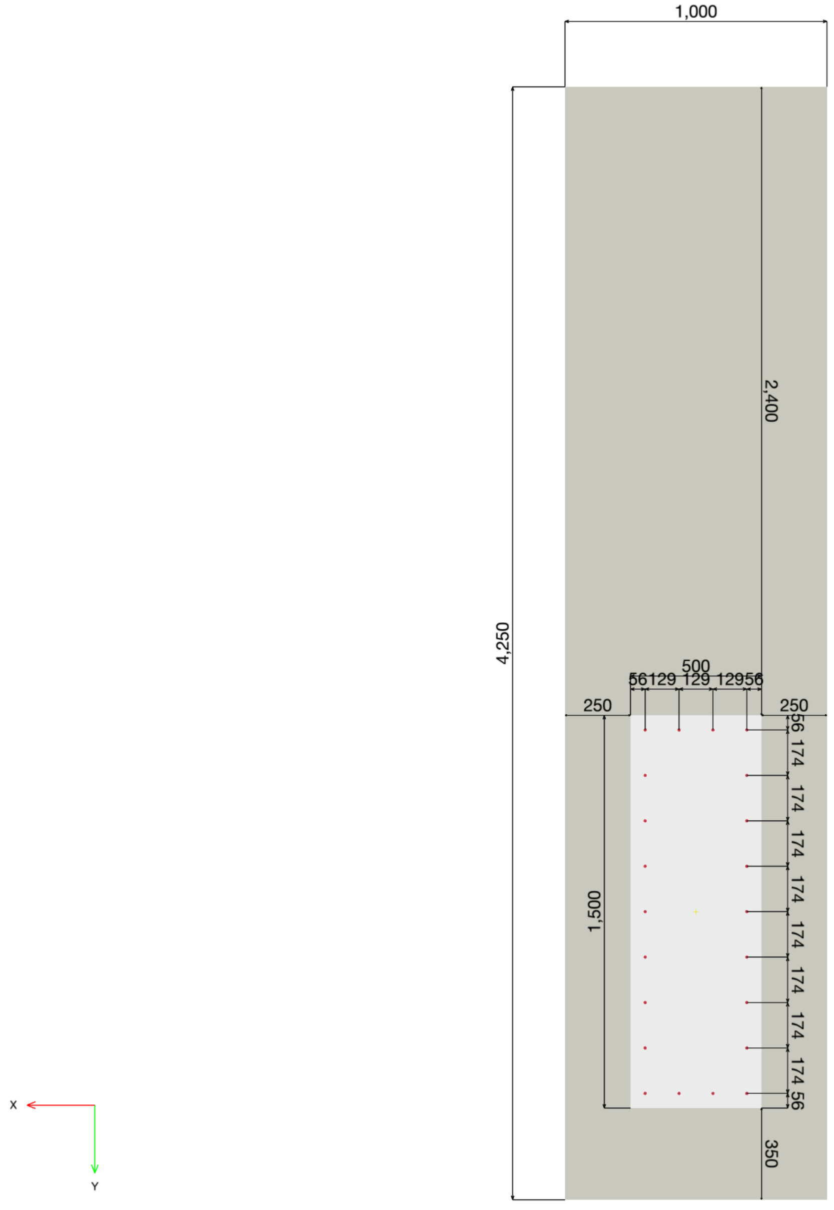
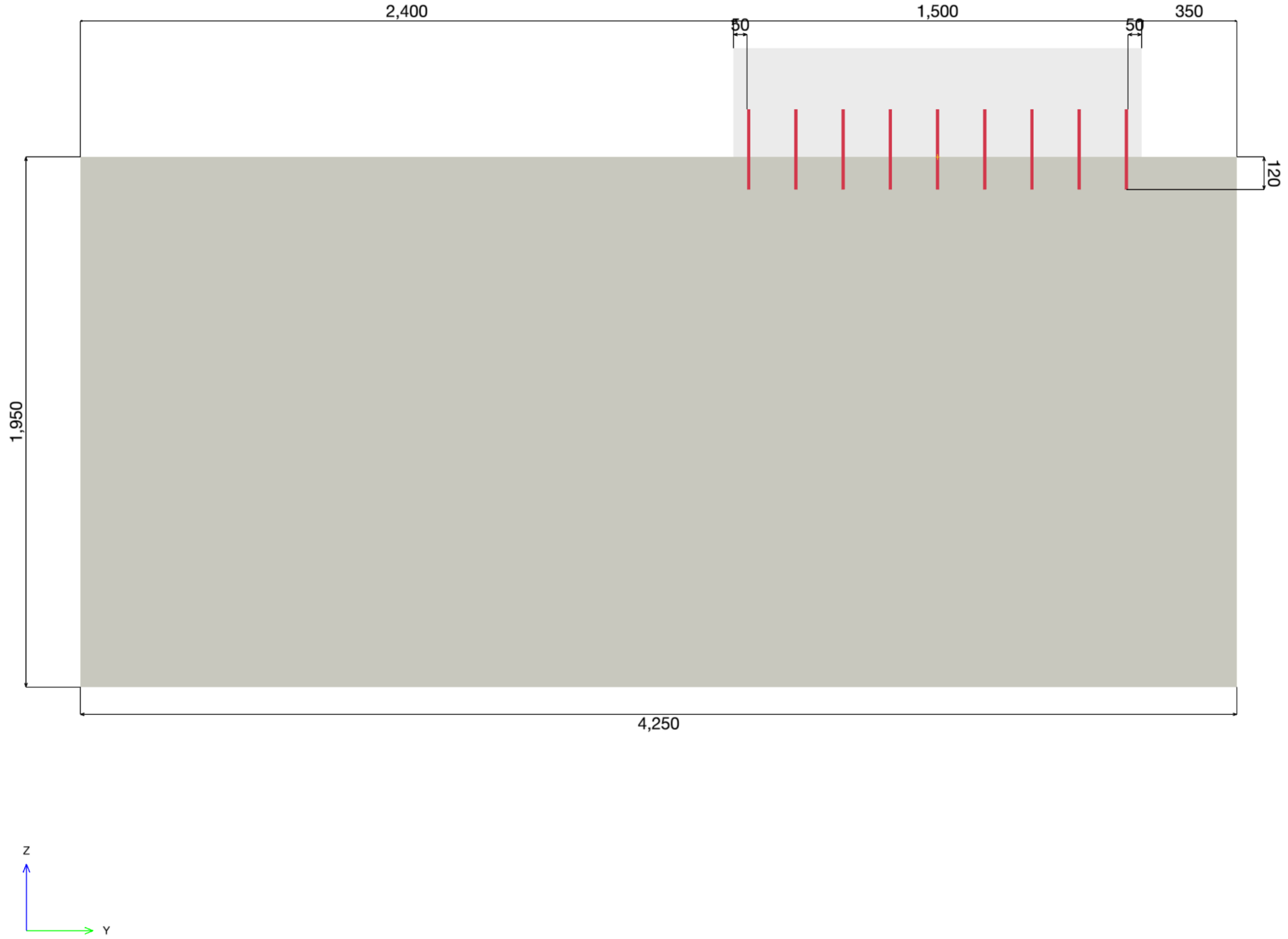
1.2. Cross section view



1.3. Side section view



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2. Loads

2.1. Load combination and Geometry

LC	Load type	V_x [kN]	V_y [kN]	N [kN]	M_x [kNm]	M_y [kNm]	Design Method	Max drill length l_v [mm]	Max. Utilization [%]
Combination 1	Static	0.000	0.000	-66.430	0.000	0.000	EN1992-1-1	120.000	1

3. Overview of results

3.1. References

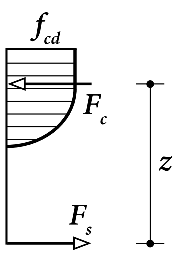
[1] EN 1992-1-1:2011 (01/2011): Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings

3.2. Cross-section verification

Description	Variable	Value
Post-Installed Rebar diameter	ϕ	12 mm
Reinforcement yield strength, post installed	f_{yk}	500.00 N/mm²
Concrete compressive strength, existing	f_{ck}	35.00 N/mm²
Concrete compressive strength, new	f_{ck}	25.00 N/mm²
Member height	h	1,500 mm
Member width	b	500 mm

The determination of the load bearing capacity of the reinforced concrete member is performed assuming the Bernoulli Hypothesis ("plane sections remain plane").

For the (compressed) concrete the following stress-strain relationship (parabola-rectangle diagram) is used.



σ_c	$= f_{cd} \cdot \left[1 - \left(1 - \frac{\varepsilon_c}{\varepsilon_{c2}}\right)^n\right] \; for \; 0 \leq \varepsilon_c \leq \varepsilon_{c2}$	[1] Eq. (3.17)
σ_c	$= f_{cd} \; for \; \varepsilon_{c2} \leq \varepsilon_c \leq \varepsilon_{cu2}$	[1] Eq. (3.18)
f_{cd}	$= \frac{\alpha_{cc} \cdot f_{ck}}{\gamma_c}$	[1] (3.15)

The design stress-strain diagram for reinforcing steel (in tension and compression) is assumed as bi-linear with a horizontal top branch.

f_{yd}	$= \frac{f_{yk}}{\gamma_s}$	design yield stress
ε_{yd}	$= \frac{f_{yd}}{E_s}$	design strain at yielding of steel reinforcement
ε_{ud}		design ultimate strain for steel reinforcement

f_{ck} [N/mm²]	α_{cc} [-]	γ_c [-]	f_{cd} [N/mm²]	ε_{c2} [-]	ε_{cu2} [-]
25.00	1.000	1.500	16.67	0.002	0.0035

f_{yk} [N/mm²]	γ_s [-]	f_{yd} [N/mm²]	E_s [N/mm²]	ε_{yd} [-]	ε_{ud} [-]
500.00	1.150	434.78	200,000.00	0.002	0.020

Evaluation of minimum reinforcement area

$$A_{s,min} = max\left(0.10 \cdot \frac{N_{Ed}}{f_{yd}}; 0.002 \cdot A_c\right)$$ [1] Eq. (9.1N)

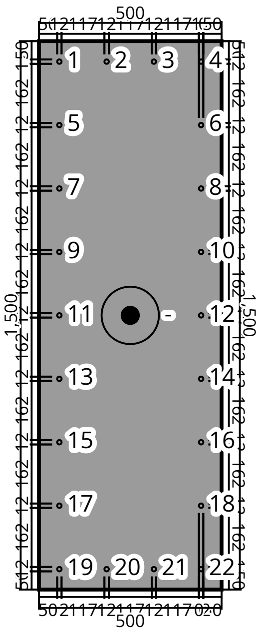
N_{Ed} [kN]	f_{yk} [N/mm²]	γ_s [-]	f_{yd} [N/mm²]	A_c [mm²]	$A_{s,min}$ [mm²]
-66.430	500.00	1.150	434.78	750,000	1,500

Evaluation of maximum reinforcement area (outside lap locations)

$$A_{s,max} = 0.04 \cdot A_c$$ [1] Section 9.5.2 (3)

A_c [mm²]	$A_{s,max}$ [mm²]
750,000	30,000

Rebar arrangement and diameter at the interface; see figure below



Resulting rebar forces

Force (+Tension, -Compression)

Rebar	Tension Force [kN]	Total Force [kN]
1	-0.116	-0.116
2	-0.116	-0.116

3	-0.116	-0.116
4	-0.116	-0.116
5	-0.116	-0.116
6	-0.116	-0.116
7	-0.116	-0.116
8	-0.116	-0.116
9	-0.116	-0.116
10	-0.116	-0.116
11	-0.116	-0.116
12	-0.116	-0.116
13	-0.116	-0.116
14	-0.116	-0.116
15	-0.116	-0.116
16	-0.116	-0.116
17	-0.116	-0.116
18	-0.116	-0.116
19	-0.116	-0.116
20	-0.116	-0.116
21	-0.116	-0.116
22	-0.116	-0.116

max. concrete compressive strain:	0.005 ‰
max. concrete compressive stress:	0.09 N/mm^2
resulting tension force in (x/y) = (-/-):	- kN
resulting compression force in (x/y) = (-0.000/-0.000):	66.430 kN
inner lever arm z =	- mm

4. Rebar design in compression ([1] Section 8.4, 8.7)

4.1. Steel verification and anchorage length determination

Input

Description	Variable	Value
Characteristic concrete compressive strength, existing	f_{ck}	35.00 N/mm²
Characteristic concrete tensile strength (5%-fractile), existing	$f_{ctk;0.05}$	2.25 N/mm²
Partial material safety factor	γ_c	1.500
Coefficient for long-term effects on the tensile strength	α_{ct}	1.000
Design concrete tensile strength, existing	f_{ctd}	1.50 N/mm²
Rebar diameter, Post-installed	ϕ	12 mm
Reinforcement yield strength	f_{yk}	500.000 N/mm²
Partial material safety factor	γ_s	1.150
Shape of rebar influence ([1] Table 8.2)	α_1	1.000
Concrete cover influence ([1] Table 8.2)	α_2	1.000
Transverse pressure influence ([1] Table 8.2)		
Transverse pressure	p	0.00 N/mm²
	α_5	1.000

Governing loading situation

The results presented in the following are valid for the governing loading situation:

The design is performed based on the results of the cross-section analysis (incl. additional tension forces due to shear loads)

Installation/Drill length results

$l_v \geq l_{bd}$

Rebar	ϕ	l_{bd}	l_v
	[mm]	[mm]	[mm]
1	12	120	120
2	12	120	120
3	12	120	120
4	12	120	120
5	12	120	120
6	12	120	120
7	12	120	120
8	12	120	120
9	12	120	120
10	12	120	120
11	12	120	120
12	12	120	120
13	12	120	120
14	12	120	120
15	12	120	120
16	12	120	120
17	12	120	120

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18	12	120	120
19	12	120	120
20	12	120	120
21	12	120	120
22	12	120	120

Steel verification

$$F_{Ed} \leq F_{yd} = \frac{A_s \cdot f_{yk}}{\gamma_s}$$

Rebar	F_{Ed}	ϕ	γ_s	A_s	F_{yd}	Utilization	Status
	[kN]	[mm]	[-]	[mm²]	[kN]	[%]	
Post-Installed 1	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 2	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 3	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 4	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 5	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 6	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 7	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 8	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 9	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 10	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 11	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 12	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 13	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 14	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 15	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 16	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 17	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 18	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 19	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 20	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 21	-0.116	12	1.150	113	49.173	1	Ok
Post-Installed 22	-0.116	12	1.150	113	49.173	1	Ok

Anchorage length

l_{bd}	$= \alpha_1 \cdot \alpha_2 \cdot \alpha_3 \cdot \alpha_4 \cdot \alpha_5 \cdot l_{b,rqd} \geq l_{b,min}$	[1] Eq. (8.4)
$l_{b,rqd}$	$= \frac{\phi}{4} \cdot \frac{\sigma_{sd}}{f_{bd}}$	[1] Eq. (8.3)
$l_{b,min}$	$= max\,(0.6 \cdot l_{b,rqd}, 10 \cdot \phi, 100mm)$	[1] Eq. (8.7)
σ_{sd}	$= \frac{F_{Ed}}{A_s}$	
f_{bd}	$= 2.25 \cdot \eta_1 \cdot \eta_2 \cdot f_{ctd}$	[1] Eq. (8.2)
η_1	$= 1.0$ for good bond conditions	[1] Section 8.4.2 (2)
η_1	$= 0.7$ for all other cases	
η_2	$= 1.0$ for rebars with $\phi \leq 32mm$	[1] Section 8.4.2 (2)
η_2	$= \frac{(132-\phi)}{100}$ for rebars with $\phi > 32mm$	
f_{ctd}	$= \frac{\alpha_{ct} \cdot f_{ctk;0.05}}{\gamma_c}$	[1] Eq. (3.16)
$f_{ctk;0.05}$	$= 0.7 \cdot f_{ctm} = 0.7 \cdot 0.3 \cdot f_{ck}^{\frac{2}{3}}$	[1] Table (3.1)

Post-installed rebars

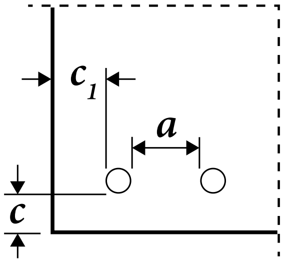
In case of post-installed rebars, use $f_{bd,PIR}$ in [1] Eq. (8.3)

$f_{bd,PIR}$	$= k_b \cdot f_{bd}$
k_b	bond efficiency factor from ETA-12/0083
$l_{0,min}$	$= \alpha_{lb} \cdot l_{0,min}$
α_{lb}	amplification factor from ETA-12/0083

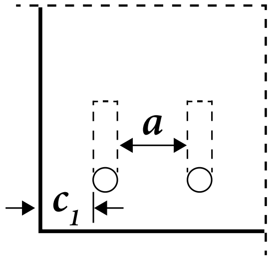
Influencing factor (α_i) equations

Concrete cover

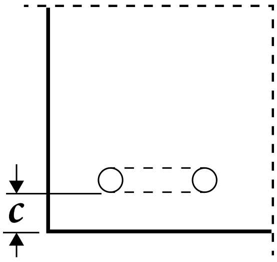
$0.70 \leq \alpha_2$	$= 1 - 0.15 \cdot \frac{(c_d - \phi)}{\phi} \leq 1.00$	[1] Table 8.2



Straight bars
$c_d = min\left(\frac{a}{2}, c_1, c\right)$



Bent or hooked bars
$c_d = min\,(c_1, c)$



Looped bars
$c_d = c$

Transverse pressure

$0.7 \leq \alpha_5 \quad = 1 - 0.04 \cdot p \leq 1.00$ [1] Table 8.2

Combination limit

$\alpha_{2,3,5} \quad = max\left(\alpha_2 \cdot \alpha_3 \cdot \alpha_5; 0.7\right)$ [1] Eq. (8.5)

Rebar	F_{Ed}	ϕ	A_s	σ_{sd}	η_1	η_2	f_{ctd}
	[kN]	[mm]	[mm²]	[N/mm²]	[-]	[-]	[N/mm²]
Post-Installed 1	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 2	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 3	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 4	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 5	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 6	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 7	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 8	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 9	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 10	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 11	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 12	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 13	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 14	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 15	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 16	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 17	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 18	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 19	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 20	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 21	-0.116	12	113	-1.02	0.700	1.000	1.50
Post-Installed 22	-0.116	12	113	-1.02	0.700	1.000	1.50

Rebar	k_b	f_{bd}	$f_{bd,PIR}$	α_{lb}	$l_{b,rqd}$	$l_{b,min}$	c_d
	[-]	[N/mm²]	[N/mm²]	[-]	[mm]	[mm]	[mm]
Post-Installed 1	1.000	2.36	2.36	1.000	1	120	59
Post-Installed 2	1.000	2.36	2.36	1.000	1	120	59
Post-Installed 3	1.000	2.36	2.36	1.000	1	120	59
Post-Installed 4	1.000	2.36	2.36	1.000	1	120	59
Post-Installed 5	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 6	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 7	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 8	1.000	2.36	2.36	1.000	1	120	81

Post-Installed 9	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 10	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 11	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 12	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 13	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 14	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 15	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 16	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 17	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 18	1.000	2.36	2.36	1.000	1	120	81
Post-Installed 19	1.000	2.36	2.36	1.000	1	120	59
Post-Installed 20	1.000	2.36	2.36	1.000	1	120	59
Post-Installed 21	1.000	2.36	2.36	1.000	1	120	59
Post-Installed 22	1.000	2.36	2.36	1.000	1	120	59

Rebar	α_1	α_2	α_3
	[-]	[-]	[-]
Post-Installed 1	1.000	1.000	1.000
Post-Installed 2	1.000	1.000	1.000
Post-Installed 3	1.000	1.000	1.000
Post-Installed 4	1.000	1.000	1.000
Post-Installed 5	1.000	1.000	1.000
Post-Installed 6	1.000	1.000	1.000
Post-Installed 7	1.000	1.000	1.000
Post-Installed 8	1.000	1.000	1.000
Post-Installed 9	1.000	1.000	1.000
Post-Installed 10	1.000	1.000	1.000
Post-Installed 11	1.000	1.000	1.000
Post-Installed 12	1.000	1.000	1.000
Post-Installed 13	1.000	1.000	1.000
Post-Installed 14	1.000	1.000	1.000
Post-Installed 15	1.000	1.000	1.000
Post-Installed 16	1.000	1.000	1.000
Post-Installed 17	1.000	1.000	1.000
Post-Installed 18	1.000	1.000	1.000
Post-Installed 19	1.000	1.000	1.000
Post-Installed 20	1.000	1.000	1.000
Post-Installed 21	1.000	1.000	1.000
Post-Installed 22	1.000	1.000	1.000

Rebar	α_4	p	α_5	$\alpha_{2,3,5}$	l_{bd}

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Rebar application:			

	[-]	[N/mm²]	[-]	[-]	[mm]
Post-Installed 1	1.000	0.00	1.000	1.000	120
Post-Installed 2	1.000	0.00	1.000	1.000	120
Post-Installed 3	1.000	0.00	1.000	1.000	120
Post-Installed 4	1.000	0.00	1.000	1.000	120
Post-Installed 5	1.000	0.00	1.000	1.000	120
Post-Installed 6	1.000	0.00	1.000	1.000	120
Post-Installed 7	1.000	0.00	1.000	1.000	120
Post-Installed 8	1.000	0.00	1.000	1.000	120
Post-Installed 9	1.000	0.00	1.000	1.000	120
Post-Installed 10	1.000	0.00	1.000	1.000	120
Post-Installed 11	1.000	0.00	1.000	1.000	120
Post-Installed 12	1.000	0.00	1.000	1.000	120
Post-Installed 13	1.000	0.00	1.000	1.000	120
Post-Installed 14	1.000	0.00	1.000	1.000	120
Post-Installed 15	1.000	0.00	1.000	1.000	120
Post-Installed 16	1.000	0.00	1.000	1.000	120
Post-Installed 17	1.000	0.00	1.000	1.000	120
Post-Installed 18	1.000	0.00	1.000	1.000	120
Post-Installed 19	1.000	0.00	1.000	1.000	120
Post-Installed 20	1.000	0.00	1.000	1.000	120
Post-Installed 21	1.000	0.00	1.000	1.000	120
Post-Installed 22	1.000	0.00	1.000	1.000	120

5. Sustainability

5.1. CO_2 emissions of Hilti products

Input

Description	Variable	Value
Adhesive CO_2 emissions per mm³	$e_{adh,A1-A3}$	3,638 kg/m³ CO_2
Adhesive CO_2 emissions per mm³	$e_{adh,total}$	5,644 kg/m³ CO_2
Rebar diameter	ϕ_r	(see Table below)
Drill diameter	$d_{0,r}$	(see Table below)
Drill length	$l_{v,r}$	(see Table below)

Installation/Drill results

Rebar r	ϕ_r	$d_{0,r}$	$l_{v,r}$
	[mm]	[mm]	[mm]
1	12	14	120
10	12	14	120
11	12	14	120
12	12	14	120
13	12	14	120
14	12	14	120
15	12	14	120
16	12	14	120
17	12	14	120
18	12	14	120
19	12	14	120
2	12	14	120
20	12	14	120
21	12	14	120
22	12	14	120
3	12	14	120
4	12	14	120
5	12	14	120
6	12	14	120
7	12	14	120
8	12	14	120
9	12	14	120

CO_2 emissions breakdown

Description	Stage	e_{adh} [kg/m³ CO_2]
Raw material	A1	2,614
Transportation to production	A2	696
Production	A3	328
Transportation to customer *	A4	392
Use	B1	0

End-of-life **	C3 + C4 + D	1,614
A1 - A3	**A1 + A2 + A3**	**3,638**
Total	**all**	**5,644**

* The value may be different based on the location of consumer and way of transportation.

** This stage includes recycling and reuse of the product at the end-of-life.

Adhesive CO_2 emissions ($E_{adh,A1-A3}$) calculations based on A1 - A3

$$E_{adh,A1-A3} = e_{adh,A1-A3} \cdot V_{adh}$$

Volume of adhesive (V_{adh}) for n rebars:

$$V_{adh} = \sum_{r=1}^{n} l_{v,r} \cdot \left(\left(\frac{\pi \cdot d_{0,r}^2}{4}\right) - \left(\frac{\pi \cdot \phi_r^2}{4}\right)\right)$$

$e_{adh,A1-A3}$	V_{adh}	$E_{adh,A1-A3}$
[kg/m³ CO_2]	[mm³]	[kg CO_2]
3,638	107,819.5	0.39

Total Adhesive CO_2 emissions ($E_{adh,total}$) calculations

$$E_{adh,total} = e_{adh,total} \cdot V_{adh}$$

Volume of adhesive (V_{adh}) for n rebars:

$$V_{adh} = \sum_{r=1}^{n} l_{v,r} \cdot \left(\left(\frac{\pi \cdot d_{0,r}^2}{4}\right) - \left(\frac{\pi \cdot \phi_r^2}{4}\right)\right)$$

$e_{adh,total}$	V_{adh}	$E_{adh,total}$
[kg/m³ CO_2]	[mm³]	[kg CO_2]
5,644	107,819.5	0.61

6. Warnings

This design exclusively considers the load transfer with post-installed rebars at the interface between new and existing concrete.

Load distribution to the rebars is done assuming that cross sections remain plane after bending.

The joint surfaces for concreting must be roughened at least to such an extent that aggregates protrude.

The accessory list in this report is for the information of the user only. All the relevant installation conditions (drilling, cleaning, setting) must be done in accordance with the relevant ETA and product IFUs.

If the design is carried out assuming a simply supported connection a check for partial fixity may be required, acc. to EN1992-1-1.

Assessment of CO2 emissions associated to Hilti products is based on the three key stages: A1, A2, and A3. A1 corresponds to the CO2 emissions arising from raw material production, while A2 accounts for the CO2 emissions associated with the transportation of raw materials to production site. A3 represents the CO2 emissions generated during the actual production of Hilti products. Total CO2 emissions, including stage A4 (CO2 emissions related to the transportation of products to customers) and EOL stage (CO2 emissions during end-of-life phase of the product, encompassing recycling and reuse), are additionally presented in the Sustainability section of the report.

Life Cycle Assessment (LCA) calculation data is provided to Hilti by FIT Umwelttechnik, a third-party consultant:

- According to ISO 14044 (version current at the time of calculation)
- Calculated with Sphera® LCA for Experts modelling software (version current at the time of calculation)

In the event that no LCA is available, estimates may be provided. Although every effort is made to precisely approximate LCA results, this data is supplied for informational purposes only, without warranty, and may not comply with ISO 14044.

Secondary average data of production processes, raw material emissions etc. was used to calculate the LCA. This data is derived from Sphera® and Ecoinvent® external lifecycle inventory databases (version current at the time of calculation).

Hilti LCA records undergo continuous expansion, renewal and improvement. All data is subject to change without notice.

Interface meets the design criteria!

7. Installation data

Mortar: HIT-HY 200-R + Rebar

Item number: 2045036 HIT-HY 200-R (adhesive)

Reinforcement yield strength f_{yk}: 500.00 N/mm^2

Drilling method: Hammer drilling (HD) (No Drilling aid)

Hole type: Dry Concrete

Installation temperature: from 26°C to 40°C

Roughness: Rough

Arrangements

- Rebar diameter: 12mm
- Number of bars: 22
- Concrete cover: 50 mm
- Drill length, l_v: 120 mm
- Drill diameter, d_0: 14 mm
- Hole cleaning: Combined compressed air and pressurized water cleaning

8. 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.