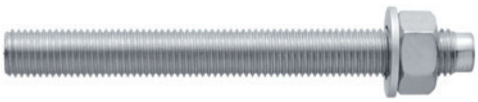
Hilti HIT-HY 200 with HIT-V

Injection Mortar System

Hilti HIT-HY 200-R
500 ml foil pack
(also available as 330 ml foil pack)

Static mixer



HIT-V rods
HIT-V (Zinc)
HIT-V-F (Gal)
HIT-V-R (A4-70)
HIT-V-HCR rods

Benefits

- Suitable for non-cracked and cracked concrete C 20/25 to C 50/60
- Suitable for dry and water saturated concrete
- High loading capacity, excellent handling and fast curing
- Small edge distance and anchor spacing possible
- Large diameter applications
- Max In service temperature range up to 120°C short term/ 72°C long term
- Manual cleaning for borehole diameter up to 20 mm and hef ≤ 10d for non-cracked concrete only
- Embedment depth range: from 60 ... 160 mm for M8 to 120 ... 600 mm for M30

Concrete | Tensile zone | Small edge distance & spacing | Variable embedment depth | Corrosion resistance | High corrosion resistance | European Technical Approval | CE conformity | PROFIS anchor design software | SAFEset approved automatic cleaning

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval [a)]	DIBt, Berlin	ETA-12/0084 / 2013-06-20 (Hilti HIT-HY 200-R)
Fire test report	IBMB, Brunswick	3501/676/13 / 2012-08-03

a) All data given in this section according ETA-12/0084, issue 2013-06-20.

Service temperature range

Hilti HIT-HY 200 injection mortar may be applied in the temperature ranges given below. An elevated base material temperature may lead to a reduction of the design bond resistance.

Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range I	-40 °C to +40 °C	+24 °C	+40 °C
Temperature range II	-40 °C to +80 °C	+50 °C	+80 °C
Temperature range III	-40 °C to +120 °C	+72 °C	+120 °C

Max short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

Max long term base material temperature

Long-term elevated base material temperatures are roughly constant over significant periods of time

Design process for typical anchor layouts

The design values in the tables are obtained from Profis V2.2.1 in compliance with the design method according to EOTA TR 029. Design resistance according to data given in ETA-12/0084, issue 2013-06-20.

- Influence of concrete strength
- Influence of edge distance
- Influence of spacing

The design method is based on the following simplification:

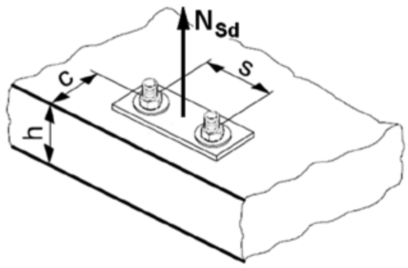
- No different loads are acting on individual anchors (no eccentricity)

The values are valid for the anchor configuration.

For more complex fastening applications please use the anchor design software PROFIS Anchor.

STEP 1: TENSION LOADING

The design tensile resistance N_{Rd} is the lower of:



- **Combined pull-out and concrete cone resistance**
  $N_{Rd,p} = f_{B,p} \cdot N^*_{Rd,p}$

$N^*_{Rd,p}$ is obtained from the relevant design tables

$f_{B,p}$ influence of concrete strength on combined pull-out and concrete cone resistance

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
$f_{B,p}$	1.00	1.00	1.00	1.00	1.00

- **Concrete cone or concrete splitting resistance**
  $N_{Rd,c} = f_B \cdot N^*_{Rd,c}$

$N^*_{Rd,c}$ is obtained from the relevant design tables

f_B influence of concrete strength on concrete cone resistance

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
f_B	0.79	0.87	1.00	1.11	1.22

- **Design steel resistance (tension) $N_{Rd,s}$**

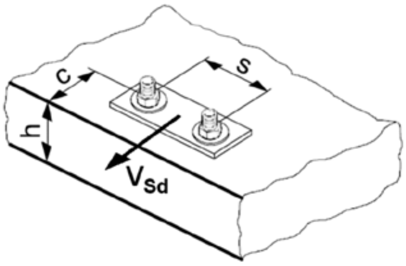
Anchor size			M8	M10	M12	M16	M20	M24
$N_{Rd,s}$	HIT-V 5.8	[kN]	12.0	19.3	28.0	52.7	82.0	118.0
	HIT-V 8.8	[kN]	19.3	30.7	44.7	84.0	130.7	188.0
	HIT-V-R	[kN]	13.9	21.9	31.6	58.8	92.0	132.1

$$N_{Rd} = \min \{ N_{Rd,p}, N_{Rd,c}, N_{Rd,s} \}$$

CHECK $N_{Rd} \geq N_{Sd}$

STEP 2: SHEAR LOADING

The design shear resistance V_{Rd} is the lower of:



■ Design Concrete Edge Resistance

$V_{Rd,c} = f_B \cdot V^*_{Rd,c} \cdot \psi_{re,V}$

$V^*_{Rd,c}$ is obtained from the relevant design table

The factor $\psi_{re,V}$ takes account of the effect of the type of reinforcement used in cracked concrete.

$\psi_{re,V}$ = 1.0 anchorage in non-cracked concrete

$\psi_{re,V}$ = 1.0 anchorage in cracked concrete without edge reinforcement

$\psi_{re,V}$ = 1.2 anchorage in cracked concrete with straight edge reinforcement (≥ ∅12 mm)

$\psi_{re,V}$ = 1.4 anchorage in cracked concrete with edge reinforcement and closely spaced stirrups (a ≤ 100 mm)

f_B influence of concrete strength

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
f_B	0.79	0.87	1.00	1.11	1.22

Shear load acting parallel to edge:

These tables are for a single free edge only

2 anchors:

For shear loads acting parallel to this edge, the concrete resistance **$V^*_{Rd,c}$ can be multiplied by the factor = 2.5**

4 anchors:

For shear loads acting parallel to the edge - the anchor row closest to the edge is checked to resist half the total design load. To obtain the concrete resistance use the corresponding 2 anchor configuration **$V^*_{Rd,c}$ and multiply by the factor = 2.5**

■ Design steel resistance (shear): $V_{Rd,s}$

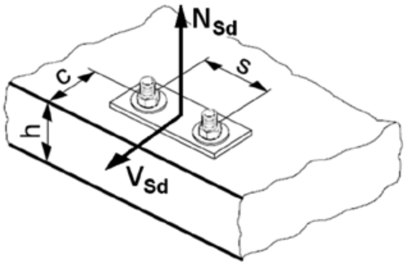
Anchor size			M8	M10	M12	M16	M20	M24
$V_{Rd,s}$	HIT-V 5.8	[kN]	7.2	12.0	16.8	31.2	48.8	70.4
	HIT-V 8.8	[kN]	12.0	18.4	27.2	50.4	78.4	112.8
	HIT-V-R	[kN]	8.3	12.8	19.2	35.3	55.1	79.5

$$V_{Rd} = \min\{V_{Rd,c}, V_{Rd,s}\}$$

CHECK $V_{Rd} \geq V_{Sd}$

STEP 3: COMBINED TENSION AND SHEAR LOADING

The following equations must be satisfied:



$$N_{Sd}/N_{Rd} + V_{Sd}/V_{Rd} \leq 1.2$$

and

$$N_{Sd}/N_{Rd} \leq 1, V_{Sd}/V_{Rd} \leq 1$$

Precalculated table values – design resistance values

General:

The following tables provide the total ultimate limit state design resistance for the configurations.
All tables are based upon:

- correct setting (See setting instruction)
- non cracked and cracked concrete – $f_{c,cyl}$ = 32 MPa
- temperature range I (see service temperature range)
- base material thickness, as specified in the table
- One typical embedment depth, as specified in the tables

The following tables give design values for typical embedment depths. The latest version of the Hilti software Profis allows the engineer to optimise their design by varying the embedment depth according to the applied loads to achieve an economical solution every time. This is done by selecting HIT-V-Rods.

For more information on the HIT-V rods please refer to the Chemical Anchor Components & Accessories section on page 266.

The anchor design software program Profis can be download from the Hilti Australia website, www.hilti.com.au.

Basic loading data (for a single anchor) – no edge distance and spacing influence

Embedment depth and base material thickness for the basic loading data

Anchor size	M8	M10	M12	M16	M20	M24
Typical embedment depth h_{ef} [mm]	80	90	110	125	170	210
Base material thickness h [mm]	110	120	150	200	250	300

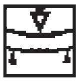
Design resistance: concrete 32 MPa

Anchor size			M8	M10	M12	M16	M20	M24
Non-cracked concrete								
Tensile	Concrete Pull	$N^*_{Rd,p}$	Steel governed refer $N_{Rd,s}$ table			69.8	118.7	175.9
	Concrete Cone	$N^*_{Rd,c}$	Steel governed refer $N_{Rd,s}$ table			49.6	78.7	108.0
Shear		$V_{Rd,s}$	Steel governed refer $V_{Rd,s}$ table					
Cracked concrete								
Tensile	Concrete Pull	$N^*_{Rd,p}$	6.7	9.4	18.4	27.9	47.5	70.4
	Concrete Cone	$N^*_{Rd,c}$	18.1	21.6	29.2	35.4	56.1	77.0
Shear		$V_{Rd,s}$	NA	Steel governed refer $V_{Rd,s}$ table				

Basic loading data (for a single anchor) – with minimum edge distance

Design resistance [kN] - uncracked concrete, 32 Mpa

Anchor size		M8	M10	M12	M16	M20	M24
Min. edge distance	c_{min} [mm]	40	50	60	80	100	120
Base thickness	h [mm]	110	120	150	200	250	300
Tensile NRd							
Pull-out	$N^*_{Rd,p}$ [kN]	11.9	17.5	25.4	41.2	67.5	98.9
Concrete	$N^*_{Rd,c}$ [kN]	12.1	14.7	20.9	29.3	44.8	58.8
Shear VRd							
Shear (without lever arm)	$V^*_{Rd,c}$	4.7	6.7	9.3	14.5	21.7	29.8

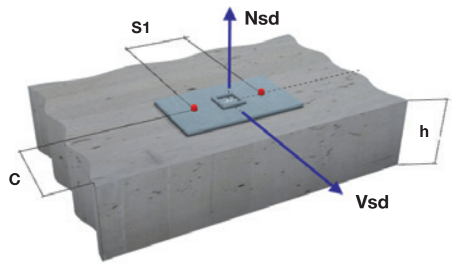

Tensile zone

Design resistance [kN] - cracked concrete, 32 Mpa

Anchor size		M8	M10	M12	M16	M20	M24
Min. edge distance	c_{min} [mm]	40	50	60	80	100	120
Base thickness	h [mm]	110	120	150	200	250	300
Tensile NRd							
Pull-out	$N^*_{Rd,p}$ [kN]	3.6	5.2	10.2	16.5	27.0	39.6
Concrete	$N^*_{Rd,c}$ [kN]	8.6	10.5	14.9	20.8	31.9	41.9
Shear VRd							
Shear (without lever arm)	$V^*_{Rd,c}$	3.3	4.8	6.6	10.3	15.4	21.1

Two anchors

Table 1: One edge influence – non cracked concrete



Design Data: $f_{c,cyl}$=32 MPa

Anchor size	M8	M10	M12	M16	M20	M24
Typical embedment depth h_{ef} [mm]	80	90	110	125	170	210
Base material thickness h [mm]	110	120	150	200	250	300

ANCHOR M8	Edge C (mm)														
	40			80			100			150			170		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
40	14.5	13.5	6.3	20.4	17.6	13.2	13.6	19.8	15.4	27.1	25.8	21.0	27.1	28.4	23.2
80	16.4	14.9	7.9	23.0	19.4	15.0	26.7	21.8	17.2	30.7	28.5	22.7	30.7	31.4	24.9
100	17.3	15.6	8.6	24.3	20.3	15.9	28.2	22.9	18.1	32.4	29.8	23.6	32.4	32.9	25.7
120	18.2	16.4	9.4	25.6	21.2	16.9	29.8	23.9	19.0	34.2	31.2	24.4	34.2	34.4	26.6
150	19.7	17.4	9.4	27.6	22.6	18.3	32.1	25.5	20.4	36.8	33.2	25.7	36.8	36.6	27.9
200	22.0	19.2	9.4	30.9	24.9	20.6	35.9	28.1	22.6	41.2	36.6	27.9	41.2	43.0	30.0

ANCHOR M10	Edge C (mm)														
	50			80			100			150			200		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
50	20.7	16.6	9.0	26.0	19.7	15.0	29.9	21.9	17.4	37.2	27.8	23.4	37.2	34.1	29.3
100	23.9	18.4	11.3	30.1	21.9	17.6	34.6	24.3	19.9	43.1	30.9	25.7	43.1	38.0	31.5
150	27.2	20.3	13.5	34.2	24.1	20.2	39.2	26.8	22.4	48.9	34.1	28.1	48.9	41.8	33.8
200	30.4	22.2	13.5	38.2	26.3	22.8	43.9	29.2	24.9	54.7	37.2	30.4	54.7	45.6	36.0
250	33.6	24.0	13.5	42.3	28.5	24.8	48.6	31.7	27.4	60.5	40.3	32.7	60.5	49.4	38.3
300	34.9	25.9	13.5	43.9	30.7	24.8	50.4	34.1	29.9	62.8	43.4	35.1	62.8	53.3	40.6

ANCHOR M12	Edge C (mm)														
	60			80			100			150			200		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
60	30.0	23.5	12.3	34.2	25.9	16.7	38.6	28.5	21.4	50.6	35.2	28.2	54.5	42.6	35.0
100	33.1	25.3	14.4	37.7	27.9	18.9	42.5	30.6	23.8	55.7	37.8	30.5	60.0	45.8	37.1
150	37.0	27.5	16.9	42.1	30.3	21.7	47.5	33.3	26.7	62.2	41.1	33.2	67.0	49.8	39.7
200	40.8	29.7	18.5	46.5	32.8	24.5	52.4	35.9	29.7	68.7	44.5	36.0	74.0	53.8	42.4
250	44.7	31.9	18.5	50.8	35.2	26.7	57.3	38.6	32.7	75.2	47.8	38.7	81.0	57.8	45.0
300	48.5	34.1	18.5	55.2	37.6	26.7	62.3	41.3	35.7	81.7	51.1	41.5	88.0	61.8	47.7

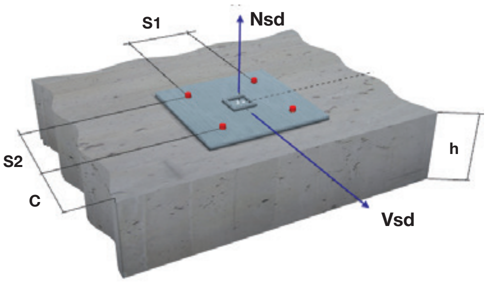
ANCHOR **M16**	Edge C (mm)														
	80			100			150			200			250		
spacing	**tension**		**shear**	**tension**		**shear**	**tension**		**shear**	**tension**		**shear**	**tension**		**shear**
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
80	50.0	35.5	19.3	55.9	39.7	24.4	71.7	50.9	36.2	84.7	60.2	44.1	84.7	60.2	52.0
100	52.2	37.1	20.5	58.3	41.4	25.7	74.8	53.1	37.5	88.4	62.8	45.4	88.4	62.8	53.2
150	57.7	41.0	23.6	64.4	45.8	28.9	82.7	58.7	41.0	97.7	69.4	48.6	97.7	69.4	56.3
200	63.2	44.9	26.6	70.6	50.1	32.1	90.6	64.3	44.4	107.0	76.0	51.9	107.0	76.0	59.4
250	68.7	48.8	29.1	76.7	54.5	35.3	98.4	69.9	47.8	116.4	82.7	55.1	116.4	82.7	62.6
300	74.2	54.2	29.1	82.9	58.9	38.6	106.3	75.1	51.2	125.7	89.3	58.4	125.7	89.3	65.7

ANCHOR **M20**	Edge C (mm)														
	120			150			200			250			300		
spacing	**tension**		**shear**	**tension**		**shear**	**tension**		**shear**	**tension**		**shear**	**tension**		**shear**
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
100	80.8	51.6	28.9	98.8	60.9	44.0	118.5	70.9	55.5	139.7	81.5	64.6	142.0	92.8	73.5
150	87.4	55.0	32.5	106.9	64.9	48.0	128.2	75.5	59.5	151.2	86.8	68.4	153.6	98.9	77.2
200	94.0	58.4	36.1	115.0	68.9	52.0	137.9	80.1	63.5	162.6	92.1	72.2	165.2	104.9	80.9
250	100.7	61.8	39.7	123.1	72.8	56.0	147.6	84.7	67.4	174.1	97.5	76.0	176.9	111.0	84.6
300	107.3	65.1	43.4	131.2	76.8	60.0	157.3	89.4	71.4	185.6	102.8	79.8	188.5	117.1	88.2
350	113.9	68.5	43.4	139.3	80.8	64.1	167.0	94.0	75.4	197.0	108.1	83.6	200.1	123.2	92.0

ANCHOR **M24**	Edge C (mm)														
	120			150			200			250			350		
spacing	**tension**		**shear**	**tension**		**shear**	**tension**		**shear**	**tension**		**shear**	**tension**		**shear**
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
120	117.8	67.1	39.7	130.3	72.7	49.7	152.5	82.5	67.5	176.2	92.8	77.6	209.4	115.1	97.6
150	122.5	69.2	42.3	135.5	75.0	52.3	158.6	85.0	70.3	183.3	95.7	80.2	217.8	118.6	100.1
200	130.3	73.6	46.4	144.2	78.7	56.6	168.7	89.3	75.0	195.0	100.4	84.7	231.8	124.6	104.2
250	138.2	76.1	50.5	152.9	82.4	61.0	178.9	93.5	79.7	206.7	105.2	89.2	245.7	130.5	108.4
300	146.0	79.5	54.7	161.6	86.2	65.3	189.0	97.7	84.3	218.5	110.0	93.6	259.7	136.4	112.6
350	153.9	83.0	58.8	170.3	89.9	69.7	199.2	102.0	89.0	230.2	114.7	98.1	273.7	142.3	116.8

Four anchors

Table 2: One edge influence – non cracked concrete



Design Data: $f_{c,cyl}$=32 MPa

Anchor size	M8	M10	M12	M16	M20	M24
Typical embedment depth h_{ef} [mm]	80	90	110	125	170	210
Base material thickness h [mm]	110	120	150	200	250	300

ANCHOR M8	Edge C (mm)														
	40			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
40	19.1	16.1	12.6	25.8	20.4	17.7	29.5	22.7	19.9	33.4	29.0	25.4	33.4	31.7	30.9
80	25.5	20.6	15.8	33.5	25.6	23.8	37.9	28.3	26.0	42.6	35.6	31.4	42.6	38.7	36.8
100	29.1	23.1	17.2	37.7	28.5	26.8	42.5	31.3	29.0	47.5	39.2	34.4	47.5	42.5	39.7
120	32.8	25.7	18.8	42.2	31.4	29.8	47.3	34.5	32.0	52.8	42.9	37.3	52.8	46.5	42.6
150	38.8	29.9	18.8	49.3	36.2	34.3	55.1	39.6	36.4	61.1	48.8	41.7	61.1	52.7	47.0
200	49.9	37.5	18.8	62.3	44.9	41.2	69.1	48.9	43.7	76.2	59.5	49.0	76.2	64.1	54.2

ANCHOR M10	Edge C (mm)														
	50			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
50	26.3	19.9	17.4	32.1	23.2	21.0	36.2	25.5	23.4	44.1	31.8	29.3	44.1	38.4	35.1
100	36.9	25.9	22.6	44.1	29.8	29.2	49.3	32.5	31.5	59.0	39.8	37.2	59.0	47.5	43.0
150	49.2	32.6	27.0	58.0	37.1	37.2	64.3	40.2	39.4	76.0	48.7	45.1	76.0	57.6	50.7
200	63.3	40.0	27.0	73.8	45.2	45.0	81.3	48.8	47.2	95.2	58.5	52.8	95.2	68.6	58.4
250	79.1	48.2	27.0	91.5	54.1	49.6	100.2	58.2	54.8	116.5	69.2	60.5	116.5	80.6	66.0
300	85.9	57.2	27.0	99.1	63.8	49.9	108.4	68.5	59.8	125.7	80.8	68.0	125.7	93.6	73.5

ANCHOR M12	Edge C (mm)														
	60			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
60	38.1	28.3	24.1	42.6	30.9	26.9	47.3	33.5	29.6	60.2	40.7	36.3	64.4	48.5	42.9
100	47.8	33.8	28.8	53.1	36.7	34.4	58.6	39.7	37.1	73.4	47.6	43.6	78.2	56.3	50.1
150	61.6	41.4	33.8	67.8	44.7	43.4	74.3	48.1	46.2	91.9	57.1	52.7	97.5	66.9	59.1
200	77.1	49.8	37.0	84.4	53.5	49.0	92.0	57.3	55.2	112.3	67.5	61.5	118.9	78.5	67.9
250	94.3	58.9	37.0	102.7	63.0	53.4	111.4	67.3	64.0	134.9	78.7	70.3	142.3	90.9	76.6
300	113.2	68.7	37.0	122.8	73.4	53.4	132.8	78.1	71.4	159.5	90.8	79.0	167.9	104.3	85.2

ANCHOR M16	Edge C (mm)														
	80			100			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
80	65.0	46.2	37.8	71.4	50.7	40.9	88.7	63.0	48.8	102.8	73.0	56.6	102.8	73.0	64.3
100	71.8	51.0	41.0	78.6	55.8	45.4	97.0	68.9	53.2	112.0	79.6	60.9	112.0	79.6	68.6
150	90.1	64.0	47.2	98.1	69.7	56.3	119.4	84.2	64.0	136.8	97.2	71.5	136.8	97.2	79.1
200	110.5	78.5	53.2	119.7	84.4	64.1	144.2	100.3	74.5	164.1	116.6	82.0	164.1	116.6	89.5
250	133.0	93.2	58.0	143.4	100.0	70.6	171.4	117.9	85.0	193.9	137.2	92.4	193.9	137.8	99.7
300	157.5	109.3	58.0	169.3	116.8	77.2	200.8	136.8	95.3	226.2	158.4	102.6	226.2	160.7	110.0

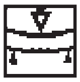
ANCHOR M20	Edge C (mm)														
	100			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
100	103.6	63.6	55.5	123.2	73.5	64.6	144.5	84.2	73.5	167.4	95.5	82.4	169.8	107.5	91.2
150	124.4	74.1	65.0	146.5	85.1	77.2	170.4	96.8	86.0	196.1	109.2	94.7	198.8	122.3	103.4
200	147.0	85.4	72.2	171.8	97.4	89.6	198.5	110.2	98.2	227.1	123.8	106.8	230.0	138.1	115.5
250	171.5	97.5	79.4	199.1	110.6	101.7	228.7	124.6	110.3	260.3	139.3	118.8	263.6	154.9	127.3
300	197.9	110.4	86.8	228.4	124.6	113.7	261.0	139.8	122.2	295.8	155.8	130.7	299.4	172.7	139.1
350	226.2	124.0	86.8	259.7	139.5	125.6	295.5	155.9	134.0	333.5	173.2	142.4	337.5	191.4	150.8

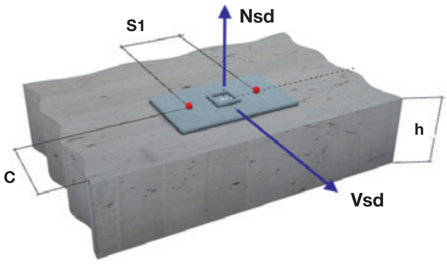
ANCHOR M24	Edge C (mm)														
	120			150			200			250			350		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
120	150.2	81.9	75.5	163.9	87.9	81.6	188.0	98.3	91.6	213.6	109.3	101.5	249.3	132.9	121.2
150	164.7	88.2	84.2	179.2	94.5	90.2	204.7	105.4	100.1	231.9	116.9	109.9	269.7	141.6	129.4
200	190.2	99.2	92.8	206.2	106.0	104.2	234.2	117.8	114.0	264.0	130.1	123.7	305.4	156.7	142.9
250	217.6	110.9	101.0	235.1	118.2	118.0	265.7	130.8	127.7	298.2	144.1	137.2	343.3	172.5	156.3
300	246.7	123.2	109.4	265.8	131.1	130.6	299.2	144.6	141.1	334.5	158.8	150.6	383.4	189.1	169.5
350	277.7	136.2	117.6	298.4	144.5	139.5	334.6	159.0	154.5	372.9	174.2	163.9	425.7	206.5	182.6

Two anchors

Table 1: One edge influence – cracked concrete

Design Data: fc,cyl=32 MPa – Cracked Concrete


Tensile zone



Anchor size	M10	M12	M16	M20	M24
Typical embedment depth h_{ef} [mm]	90	110	125	170	210
Base material thickness h [mm]	120	150	200	250	300

ANCHOR M10	Edge C (mm)														
	50			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
50	7.3	11.8	6.4	9.1	14.0	10.6	10.5	15.6	12.4	13.1	19.8	16.6	13.1	24.3	20.8
100	8.0	13.1	8.0	10.1	15.6	12.5	11,6	17.3	14.1	14.4	22,0	18.5	14.4	27.1	22.4
150	8.8	14.5	9.6	11.0	17.2	14.3	12.7	19.1	15.9	15.8	24.3	19.9	15.8	29.8	24.0
200	9.5	15.8	9.6	11.9	18.7	16.2	13.7	20.8	17.7	17.1	26.5	21.6	17.1	32.5	25.5
250	10.2	17.1	9.6	12.8	20.3	17.6	14.7	22.6	19.4	18.4	28.7	23.2	18.4	35.2	27.1
300	10.5	18.4	9.6	13.2	21.9	17.6	15.1	24.3	21.2	18.9	30.9	24.9	18.9	39.0	28.7

ANCHOR M12	Edge C (mm)														
	60			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
60	13.4	16.8	8.7	15.3	18.5	11.8	17.3	20.3	15.2	22.6	25.1	20.0	24.4	30.4	24.8
100	14.5	18.0	10.2	16.5	19.9	13.4	18.6	21.8	16.9	24.4	27.0	21.6	26.3	32.6	26.3
150	15.8	19.6	12.0	18.0	21.6	15.4	20.3	23.7	19.0	26.6	29.3	23.6	28.6	35.5	28.2
200	17.1	21.2	13.1	19.4	23.4	17.4	21.9	25.6	21.1	28.7	31.7	25.5	31.0	38.4	30.0
250	18.4	22.8	13.1	20.9	25.1	18.9	23.6	27.5	23.2	30.9	34.1	27.5	33.2	41.2	31.9
300	19.6	24.3	13.1	22.3	26.8	18.9	25.2	29.4	25.3	33.0	36.4	29.4	35.5	44.1	33.8

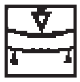
ANCHOR M16	Edge C (mm)														
	80			100			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
80	21.4	25.3	13.7	23.8	28.3	17.3	30.6	36.3	25.6	36.2	42.9	31.3	36.2	42.9	36.8
100	22.2	26.5	14.6	24.7	29.5	18.2	31.7	37.9	26.6	37.5	44.8	32.2	37.5	44.8	37.7
150	24.2	29.2	16.7	27.0	32.6	20.5	34.6	41.9	29.0	40.9	49.5	34.5	40.9	49.5	39.9
200	26.1	32.0	18.9	29.2	35.7	22.8	37.4	45.9	31.4	44.3	54.2	36.8	44.3	54.2	42.1
250	28.1	34.8	20.6	31.4	38.9	25.0	40.3	49.9	33.9	47.6	58.9	39.1	47.6	58.9	44.3
300	30.1	37.6	20.6	33.6	42.0	27.3	43.1	53.5	36.3	50.9	63.6	41.4	50.9	63.6	46.6

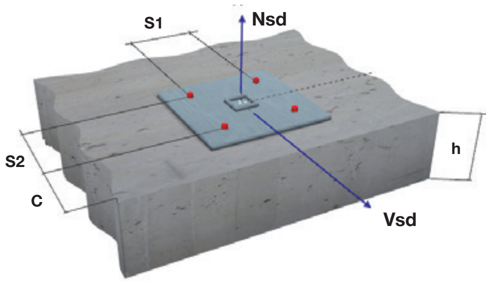
ANCHOR M20	Edge C (mm)														
	100			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
100	34.0	36.8	20.5	41.6	43.4	31.2	49.8	50.5	39.4	58.8	58.1	45.8	59.7	66.1	52.1
150	36.5	39.2	23.1	44.6	46.2	34.0	53.5	53.8	42.2	63.1	61.9	48.5	64.1	70.5	54.7
200	38.9	41.6	25.6	47.6	49.1	36.9	57.1	57.1	45.0	67.3	65.7	51.1	68.4	74.8	57.3
250	41.4	44.0	28.2	50.6	51.9	39.7	60.7	60.4	47.8	71.6	69.5	53.8	72.7	79.1	60.0
300	43.8	46.4	30.7	53.6	54.8	42.6	64.3	63.7	50.6	75.8	73.3	56.5	77.0	83.5	62.5
350	46.3	48.8	30.7	56.6	57.6	45.4	67.9	67.0	53.4	80.1	77.1	59.2	81.3	87.8	65.1

ANCHOR M24	Edge C (mm)														
	120			150			200			250			350		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
120	48.5	47.8	28.2	53.7	51.8	35.2	62.8	58.8	47.8	72.6	66.1	55.0	86.3	82.0	69.1
150	50.3	49.3	29.9	55.7	53.4	37.0	65.2	60.6	49.8	75.3	68.2	56.9	89.5	84.6	70.9
200	53.4	51.8	32.9	59.0	56.1	40.1	69.1	63.6	53.1	78.9	71.6	60.0	94.9	88.8	73.9
250	56.4	54.2	35.8	62.4	58.8	43.2	73.0	66.7	56.4	84.4	75.0	63.2	100.3	93.0	76.8
300	59.4	56.7	38.8	65.7	61.4	46.3	76.9	69.7	59.8	88.9	78.4	66.3	105.6	97.2	79.8
350	62.4	59.2	41.7	69.0	64.1	49.4	80.8	72.7	63.1	93.4	81.8	69.5	111.0	101.5	82.7

Four anchors

Table 2: One edge influence – cracked concrete





Design Data: $f_{c,cyl}$=32 MPa– Cracked Concrete

Anchor size	M10	M12	M16	M20	M24
Typical embedment depth h_{ef} [mm]	90	110	125	170	210
Base material thickness h [mm]	120	150	200	250	300

ANCHOR M10	Edge C (mm)														
	50			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
50	11.1	14.2	12.4	13.5	16.5	14.9	15.3	18.2	16.6	18.6	22.7	20.8	18.6	27.4	24.9
100	14.1	18.4	16.0	16.9	21.2	20.7	18.9	23.2	22.4	22.6	28.4	26.4	22.6	33.9	30.4
150	17.4	23.2	19.1	20.6	26.4	26.4	22.8	28.7	28.0	26.9	34.7	32.0	26.9	41.1	35.9
200	20.9	28.5	19.1	24.3	32.2	31.9	26.8	34.8	33.5	31.4	41.7	37.4	31.4	48.9	41.4
250	24.4	34.4	19.1	28.2	38.6	35.2	30.9	41.5	38.8	35.9	49.3	42.9	35.9	57.5	46.8
300	25.8	40.8	19.1	29.7	45.5	35.2	32.5	48.8	42.4	37.7	57.6	48.2	37.7	66.7	52.1

ANCHOR M12	Edge C (mm)														
	60			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
60	19.6	20.2	17.1	21.9	22.0	19.1	24.4	23.9	21.0	31.0	29.0	25.7	33.1	34.6	30.4
100	23.4	24.1	20.4	26.0	26.2	24.4	28.7	28.3	26.3	36.0	34.0	30.9	38.3	40.1	35.6
150	28.7	29.5	24.0	31.6	31.9	30.8	34.6	34.3	32.8	42.7	40.7	37.3	45.4	47.7	41.9
200	34.3	35.5	26.2	37.5	38.1	34.7	40.9	40.9	39.1	49.9	48.1	43.6	52.8	55.9	48.1
250	40.2	42.0	26.2	43.8	44.9	37.9	47.5	48.0	45.4	57.5	56.1	49.8	60.6	64.8	54.3
300	46.3	49.0	26.2	50.3	52.3	37.9	54.4	55.7	50.6	65.3	64.7	56.0	68.7	74.4	60.4

ANCHOR M16	Edge C (mm)														
	80			100			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
80	30.2	34.3	26.8	33.2	37.4	29.0	41.2	44.9	34.6	47.8	52.0	40.1	47.8	52.0	45.6
100	32.9	36.3	29.2	36.0	39.8	32.2	44.5	49.1	37.7	51.3	56.7	43.2	51.3	56.7	48.6
150	40.0	45.6	33.5	43.6	49.7	39.9	53.1	60.0	45.3	60.8	69.3	50.7	60.8	69.3	56.0
200	47.8	55.9	37.7	51.8	60.2	45.5	62.4	71.5	52.8	71.0	83.1	58.1	71.0	83.1	63.4
250	56.1	66.5	41.2	60.5	71.3	50.1	72.3	84.0	60.2	81.9	97.8	65.4	81.9	98.2	70.7
300	65.0	77.9	41.2	69.9	83.3	54.6	82.9	97.5	67.5	93.4	112.9	72.7	93.4	114.6	77.9

ANCHOR **M20**	Edge C (mm)														
	100			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
100	46.6	45.3	39.4	55.5	52.4	45.8	65.0	60.0	52.1	75.4	68.1	58.4	76.4	76.6	64.6
150	54.9	52.8	46.1	64.6	60.6	54.7	75.2	69.0	60.9	86.5	77.8	67.1	87.7	87.2	73.3
200	63.8	60.9	51.2	74.5	69.5	63.5	86.1	78.6	69.6	98.5	88.3	75.7	99.8	98.5	81.8
250	73.3	69.5	56.4	85.0	78.9	72.1	97.6	88.8	78.2	111.1	99.3	84.2	112.6	110.4	90.2
300	83.3	78.7	61.5	96.1	88.9	80.6	109.9	99.7	86.6	124.5	111.1	92.6	126.0	123.1	98.5
350	94.0	88.4	61.5	107.9	99.4	89.0	122.7	111.1	95.0	138.6	123.4	100.9	140.2	136.4	106.8

ANCHOR **M24**	Edge C (mm)														
	120			150			200			250			350		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
120	64.5	58.4	53.5	70.4	62.6	57.8	80.7	70.1	64.9	91.7	77.9	72.0	107.1	94.7	85.9
150	70.3	62.9	59.7	76.5	67.3	63.9	87.4	75.1	70.9	99.0	83.3	77.9	115.1	100.9	91.7
200	80.4	70.8	65.8	87.2	75.6	73.9	99.0	84.0	80.8	111.6	92.8	87.6	129.1	111.7	101.2
250	91.2	79.1	71.6	98.6	84.3	83.6	111.4	93.3	90.4	125.1	102.7	97.2	143.9	123.0	110.7
300	102.7	87.9	77.5	110.6	93.4	92.6	124.5	103.1	100.0	139.2	113.2	106.7	159.6	134.8	120.1
350	114.8	97.1	83.4	123.3	103.0	98.8	138.3	113.4	109.5	154.1	124.2	116.1	176.0	147.2	129.4

Materials

Mechanical properties of HIT-V

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Nominal tensile strength f_{uk}	HIT-V 5.8	[N/mm²]	500	500	500	500	500	500	500	500
	HIT-V 8.8	[N/mm²]	800	800	800	800	800	800	800	800
	HIT-V-R	[N/mm²]	700	700	700	700	700	700	500	500
	HIT-V-HCR	[N/mm²]	800	800	800	800	800	700	700	700
Yield strength f_{yk}	HIT-V 5.8	[N/mm²]	400	400	400	400	400	400	400	400
	HIT-V 8.8	[N/mm²]	640	640	640	640	640	640	640	640
	HIT-V-R	[N/mm²]	450	450	450	450	450	450	210	210
	HIT-V-HCR	[N/mm²]	600	600	600	600	600	400	400	400
Stressed cross-section A_s	HIT-V	[mm²]	36.6	58.0	84.3	157	245	353	459	561
Moment of resistance W	HIT-V	[mm³]	31.2	62.3	109	277	541	935	1387	1874

Material quality

Part	Material
Threaded rod HIT-V(F)	Strength class 5.8, A_5 > 8% ductile steel galvanized ≥ 5 µm, (F) hot dipped galvanized ≥ 45 µm,
Threaded rod HIT-V(F)	Strength class 8.8, A_5 > 8% ductile steel galvanized ≥ 5 µm, (F) hot dipped galvanized ≥ 45 µm,
Threaded rod HIT-V-R	Stainless steel grade A4, A_5 > 8% ductile strength class 70 for M24 and class 50 for M27 to M30, 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
Threaded rod HIT-V-HCR	High corrosion resistant steel, 1.4529; 1.4565 strength M20: R_m = 800 N/mm², $R_{p\,0.2}$ = 640 N/mm², A_5 > 8% ductile M24 to M30: R_m = 700 N/mm², $_{Rp\,0.2}$ = 400 N/mm², A_5 > 8% ductile
Washer ISO 7089	Steel galvanized, hot dipped galvanized
	Stainless steel, 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
	High corrosion resistant steel, 1.4529; 1.4565
Nut EN ISO 4032	Strength class 8, steel galvanized ≥ 5 µm, hot dipped galvanized ≥ 45 µm
	Strength class 70, stainless steel grade A4, 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
	Strength class 70, high corrosion resistant steel, 1.4529; 1.4565

Anchor dimensions

Anchor size	M8	M10	M12	M16	M20	M24	M27	M30
Anchor rod HIT-V, HIT-V-R, HIT-V-HCR	Anchor rods HIT-V (-R / -HCR) are available in variable length							

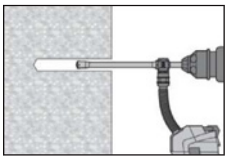
Setting

Installation equipment

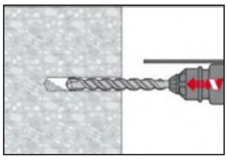
Anchor size	M8	M10	M12	M16	M20	M24	M27	M30
Rotary hammer	TE 2 – TE 30				TE 40 – TE 70			
Other tools	compressed air gun or blow out pump, set of cleaning brushes, dispenser							

Setting instructions

Bore hole drilling



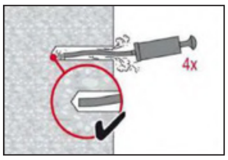
Drill hole to the required embedment depth with an appropriately sized Hilti TE-CD or TE-YD hollow drill bit with Hilti vacuum attachment. This drilling method properly cleans the borehole and removes dust while drilling.
After drilling is complete, proceed to the "injection preparation" step in the instructions for use



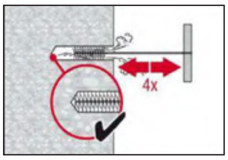
Drill Hole to the required embedment depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit.

Bore hole cleaning **Just before setting an anchor, the bore hole must be free of dust and debris.**

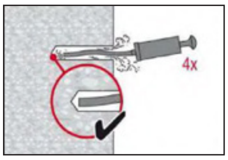
a) Manual Cleaning (MC) non-cracked concrete only for bore hole diameters d_0 ≤ 20mm and bore hole depth h_0 ≤ 10d



The Hilti manual pump may be used for blowing out bore holes up to diameters d_0 ≤ 20 mm and embedment depths up to h_{ef} ≤ 10d.
Blow out at least 4 times from the back of the bore hole until return air stream is free of noticeable dust

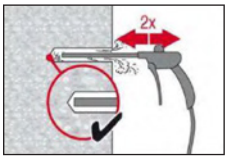


Brush 4 times with the specified brush size by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole -- if not the brush is too small and must be replaced with the proper brush diameter.

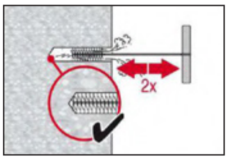


Blow out again with manual pump at least 4 times until return air stream is free of noticeable dust.

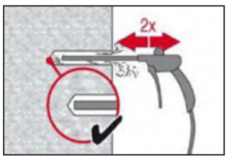
b) Compressed air cleaning (CAC) for all bore hole diameters d_0 and all bore hole depth h_0



Blow 2 times from the back of the hole (if needed with nozzle extension) over the hole length with oil-free compressed air (min. 6 bar at 6 m³/h) until return air stream is free of noticeable dust. Bore hole diameter ≥ 32 mm the compressor must supply a minimum air flow of 140 m³/hour.



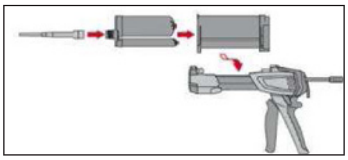
Brush 2 times with the specified brush size (brush Ø ≥ bore hole Ø) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole -- if not the brush is too small and must be replaced with the proper brush diameter.



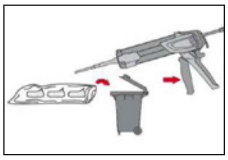
Blow again with compressed air 2 times until return air stream is free of noticeable dust.

Setting instructions

Injection preparation

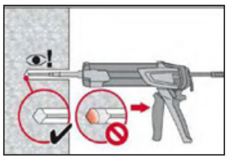


Tightly attach new Hilti mixing nozzle HIT-RE-M to foil pack manifold (snug fit). Do not modify the mixing nozzle. Observe the instruction for use of the dispenser. Check foil pack holder for proper function. Do not use damaged foil packs / holders. Swing foil pack holder with foil pack into HIT dispenser.

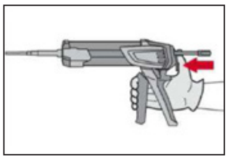


Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded.
Discard quantities are:
2 strokes for 330 ml foil pack,
3 strokes for 500 ml foil pack,
4 strokes for 500 ml foil pack ≤ 5°C.

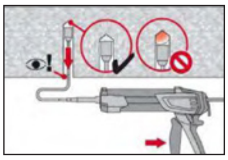
Inject adhesive **from the back of the borehole without forming air voids**



Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull. Fill holes approximately 2/3 full, or as required to ensure that the annular gap between the anchor and the concrete is completely filled with adhesive along the embedment length.

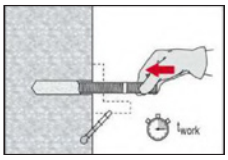


After injection is completed, depressurise the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

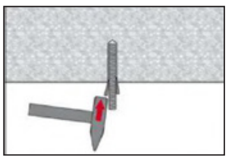


Overhead installation and/or installation with embedment depth h_{ef} > 250mm.
For overhead installation the injection is only possible with the aid of extensions and piston plugs. Assemble HIT-RE-M mixer, extension(s) and appropriately sized piston plug. Insert piston plug to back of the hole and inject adhesive. During injection the piston plug will be naturally extruded out of the bore hole by the adhesive pressure.

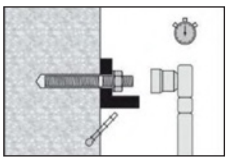
Setting the element



Before use, verify that the element is dry and free of oil and other contaminants.
Mark and set element to the required embedment depth untill working time t_{work} has elapsed



For overhead installation use piston plugs and fix embedded parts with e.g. wedges



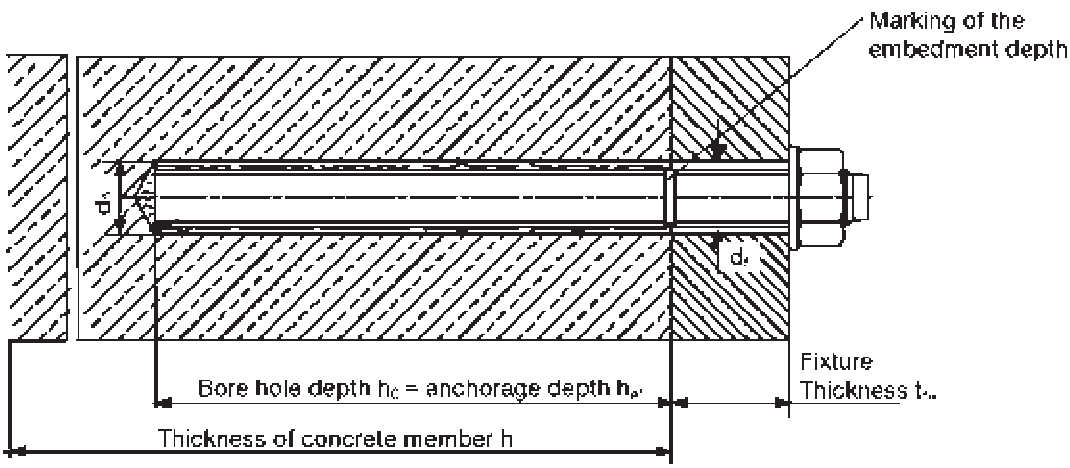
Loading the anchor:
After required curing time t_{cure} the anchor can be loaded.
The applied installation torque shall not exceed T_{max}.

For detailed information on installation see instruction for use given with the package of the product.

Working time, curing time

Temperature of the base material T_{BM}	Working time in which anchor can be inserted and adjusted t_{work}	Curing time before anchor can be loaded t_{cure}
-10 °C to -5 °C	3 hour	20 hour
-4 °C to 0 °C	2 hour	7 hour
1 °C to 5 °C	1 hour	3 hour
6 °C to 10 °C	40 min	2 hour
11 °C to 20 °C	15 min	1 hour
21 °C to 30 °C	9 min	1 hour
31 °C to 40 °C	6 min	1 hour

Setting details



Anchor size			M8	M10	M12	M16	M20	M24
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	22	28
Effective embedment and drill hole depth range a) for HIT-V	$h_{ef,min}$	[mm]	60	60	70	80	90	96
	$h_{ef,max}$	[mm]	160	200	240	320	400	480
Effective anchorage and drill hole depth for HAS	h_{ef}	[mm]	80	90	110	125	170	210
Minimum base material thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm			h_{ef} + 2 d_0		
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26
Torque moment	T_{max} b)	[Nm]	10	20	40	80	150	200
Minimum spacing	s_{min}	[mm]	40	50	60	80	100	120
Minimum edge distance	c_{min}	[mm]	40	50	60	80	100	120

a) Embedment depth range: hef,min ≤ hef ≤ hef,max

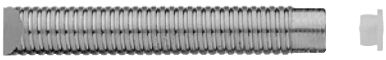
b) Maximum recommended torque moment to avoid splitting failure during installation with minimum spacing and/or edge distance

Hilti HIT-HY 200 with HIS-(R)N

Injection Mortar System

Hilti HIT-HY 200-R
500 ml foil pack
(also available as 330 ml foil pack)

Static mixer



Internal threaded sleeve
HIS-N
HIS-RN

Benefits

- Suitable for non-cracked and cracked concrete C 20/25 to C 50/60
- Suitable for dry and water saturated concrete
- High loading capacity, excellent handling and fast curing
- Small edge distance and anchor spacing possible
- Corrosion resistant
- In service temperature range up to 120°C short term/72°C long term
- Manual cleaning for anchor size M8 and M10

Concrete | Tensile zone | Small edge distance & spacing | Corrosion resistance | European Technical Approval | CE conformity | PROFIS anchor design software | SAFEset approved automatic cleaning

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval [a)]	DIBt, Berlin	ETA-12/0084 / 2013-06-20 (Hilti HIT-HY 200-R)

a) All data given in this section according ETA-11/0493 and ETA-12/0084, issue 2013-06-20.

Service temperature range

Hilti HIT-HY 200 injection mortar may be applied in the temperature ranges given below. An elevated base material temperature may lead to a reduction of the design bond resistance.

Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range I	-40 °C to +40 °C	+24 °C	+40 °C
Temperature range II	-40 °C to +80 °C	+50 °C	+80 °C
Temperature range III	-40 °C to +120 °C	+72 °C	+120 °C

Max short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

Max long term base material temperature

Long-term elevated base material temperatures are roughly constant over significant periods of time

Design process for typical anchor layouts

The design values in the tables are obtained from Profis V2.2.1 in compliance with the design method according to EOTA TR 029. Design resistance according to data given in ETA-12/0084, issue 2013-06-20.

- Influence of concrete strength
- Influence of edge distance
- Influence of spacing

The design method is based on the following simplification:

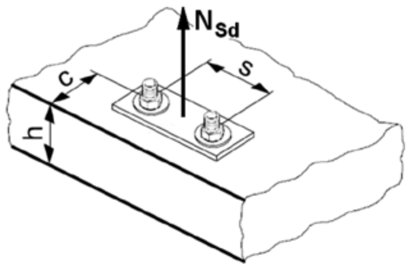
- No different loads are acting on individual anchors (no eccentricity)

The values are valid for the anchor configuration.

For more complex fastening applications please use the anchor design software PROFIS Anchor.

STEP 1: TENSION LOADING

The design tensile resistance N_{Rd} is the lower of:



- **Combined pull-out and concrete cone resistance**
  $N_{Rd,p} = f_{B,p} \cdot N^*_{Rd,p}$

$N^*_{Rd,p}$ is obtained from the relevant design tables

$f_{B,p}$ influence of concrete strength on combined pull-out and concrete cone resistance

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
$f_{B,p}$	1.00	1.00	1.00	1.00	1.00

- **Concrete cone or concrete splitting resistance**
  $N_{Rd,c} = f_B \cdot N^*_{Rd,c}$

$N^*_{Rd,c}$ is obtained from the relevant design tables

f_B influence of concrete strength on concrete cone resistance

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
f_B	0.79	0.87	1.00	1.11	1.22

- **Design steel resistance (tension) $N_{Rd,s}$**

Anchor size				M8	M10	M12	M16	M20
$N_{Rd,s}$	HIS-N		[kN]	17.5	30.7	44.7	80.3	74.1
	HIS-RN		[kN]	13.9	21.9	31.6	58.8	69.2
	Bolt	Grade 5.8	[kN]	12.0	19.3	28.0	52.7	82.0
	Bolt	Grade 8.8	[kN]	19.3	30.7	44.7	84.0	130.7
	Bolt	Grade A 4-70 / 316	[kN]	13.9	21.9	31.6	58.8	92.0

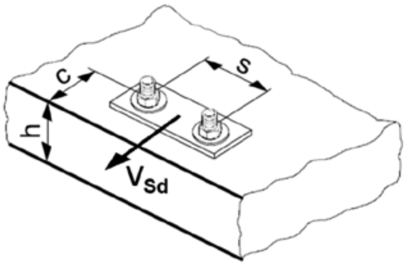
Note: Designer needs to check the bolt tensile resistance.

$$N_{Rd} = \min \{ N_{Rd,p}, N_{Rd,c}, N_{Rd,s} \}$$

CHECK $N_{Rd} \geq N_{Sd}$

STEP 2: SHEAR LOADING

The design shear resistance V_{Rd} is the lower of:



■ Design Concrete Edge Resistance

$V_{Rd,c} = f_B \cdot V^*_{Rd,c}$

$V^*_{Rd,c}$ is obtained from the relevant design table

f_B influence of concrete strength

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
f_B	0.79	0.87	1.00	1.11	1.22

Shear load acting parallel to edge:

These tables are for a single free edge only

2 anchors:

For shear loads acting parallel to this edge, the concrete resistance **$V^*_{Rd,c}$ can be multiplied by the factor = 2.5**

4 anchors:

For shear loads acting parallel to the edge - the anchor row closest to the edge is checked to resist half the total design load. To obtain the concrete resistance use the corresponding 2 anchor configuration **$V^*_{Rd,c}$ and multiply by the factor = 2.5**

■ Design steel resistance (shear): $V_{Rd,s}$

Anchor size				M8	M10	M12	M16	M20
$V_{Rd,s}$	HIS-N		[kN]	10.4	18.4	26.0	39.3	36.7
	HIS-RN [kN]		[kN]	8.3	12.8	19.2	35.3	41.5
	Bolt	Grade 5.8	[kN]	7.2	12.0	16.8	31.2	48.8
	Bolt	Grade 8.8	[kN]	12.0	18.4	27.2	50.4	78.4
	Bolt	Grade A 4-70 / 316	[kN]	8.3	12.8	19.2	35.3	55.1

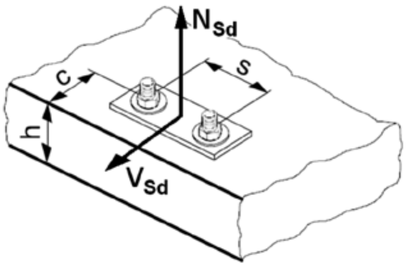
Note: Designer needs to check the bolt shear resistance.

$V_{Rd} = \min\{ V_{Rd,c}, V_{Rd,s} \}$

CHECK $V_{Rd} \geq V_{Sd}$

STEP 3: COMBINED TENSION AND SHEAR LOADING

The following equations must be satisfied:



$$N_{Sd}/N_{Rd} + V_{Sd}/V_{Rd} \leq 1.2$$

and

$$N_{Sd}/N_{Rd} \leq 1, V_{Sd}/V_{Rd} \leq 1$$

Precalculated table values – design resistance values

General:

The following tables provide the total ultimate limit state design resistance for the configurations.
All tables are based upon:

- correct setting (See setting instruction)
- non cracked and cracked concrete – $f_{c,cyl}$ = 32 MPa
- temperature range I (see service temperature range)
- base material thickness, as specified in the table
- One typical embedment depth, as specified in the tables

Basic loading data (for a single anchor) – no edge distance and spacing influence

Embedment depth and base material thickness for the basic loading data

Anchor size	M8x90	M10x110	M12x125	M16x170	M20x205
Typical embedment depth h_{ef} [mm]	90	110	125	170	205
Base material thickness h [mm]	120	150	200	250	300

Design resistance: concrete 32 MPa

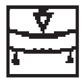
Anchor size			M8	M10	M12	M16	M20
Non-cracked concrete							
Tensile	Pull-out	$N^*_{Rd,p}$ [kN]	30.6	49.4	69.8	117.6	154.1
	Concrete	$N^*_{Rd,c}$ [kN]	36.4	49.1	59.5	94.4	125.0
Shear		$V_{Rd,s}$ [kN]	Steel governed refer $V_{Rd,s}$ table				
Cracked concrete							
Tensile	Pull-out	$N^*_{Rd,p}$ [kN]	16.5	26.6	37.6	63.3	82.9
	Concrete	$N^*_{Rd,c}$ [kN]	25.9	35.0	42.4	67.3	89.1
Shear		$V_{Rd,s}$ [kN]	Steel governed refer $V_{Rd,s}$ table				

Basic loading data (for a single anchor) – with minimum edge distance

Design resistance [kN] - uncracked concrete, 32 Mpa

Anchor size		M8	M10	M12	M16	M20
Min. edge distance	c_{min} [mm]	40	45	55	65	90
Min Base thickness	h_{min} [mm]	120	150	200	250	300
Tensile NRd						
Pull-out	$N^*_{Rd,p}$ [kN]	15.7	24.6	35.6	57.3	78.4
Concrete	$N^*_{Rd,c}$ [kN]	16.6	22.1	30.3	45.3	62.9
Shear VRd						
Shear (without lever arm)	$V^*_{Rd,c}$	5.3	7.0	9.7	13.7	21.7

Basic loading data (for a single anchor) – with minimum edge distance



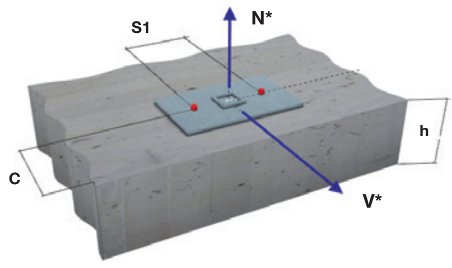
Tensile zone

Design resistance [kN] - cracked concrete, 32 Mpa

Anchor size		M8	M10	M12	M16	M20
Min. edge distance	c_{min} [mm]	40	45	55	65	90
Min Base thickness	h_{min} [mm]	120	150	200	250	300
Tensile NRd						
Pull-out	$N^*_{Rd,p}$ [kN]	8.4	13.2	19.1	30.8	42.2
Concrete	$N^*_{Rd,c}$ [kN]	11.8	15.8	21.6	32.3	44.8
Shear VRd						
Shear (without lever arm)	$V^*_{Rd,c}$	3.8	4.9	6.9	9.7	15.4

Two anchors

Table 1: One edge influence – non cracked concrete



Design Data: f_c=32 MPa

Anchor size	M8	M10	M12	M16	M20
Min Slab depth	120	150	200	250	300
Embedment Depth	90	110	125	170	205

ANCHOR M8	Edge C (mm)														
	40			80			100			150			200		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
40	19.0	18.3	7.1	26.0	23.1	15.1	29.8	25.7	17.5	37.2	32.6	23.6	37.2	40.0	29.6
80	21.2	20.0	8.9	28.9	25.2	17.2	33.2	28.0	19.6	41.4	35.6	25.6	41.4	43.7	31.5
100	22.2	20.8	9.8	30.4	26.3	18.3	34.9	29.2	20.6	43.5	37.1	26.5	43.5	45.5	32.4
150	24.9	22.9	10.7	34.1	28.9	21.0	39.1	32.1	23.2	48.8	40.9	28.9	48.8	50.1	34.7
200	27.6	25.0	10.7	37.8	31.5	23.7	43.3	35.1	25.8	54.0	44.6	31.4	54.0	54.7	37.0

ANCHOR M10	Edge C (mm)														
	45			80			100			150			200		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
45	27.9	24.3	9.3	35.3	28.9	16.8	39.8	31.7	21.7	52.1	39.2	28.7	56.2	47.4	35.6
80	30.5	25.9	11.1	38.5	30.8	18.9	43.5	33.8	23.9	57.0	41.9	30.8	61.4	50.6	37.6
100	32.0	26.8	12.1	40.4	32.0	20.1	45.6	35.1	25.1	59.8	43.4	31.9	64.4	52.5	38.7
150	35.8	29.2	13.9	45.1	34.8	23.0	50.9	38.1	28.3	66.7	47.2	34.8	71.9	57.1	41.4
200	39.5	31.5	13.9	49.8	37.5	26.0	56.2	41.2	31.4	73.7	51.0	37.7	79.4	61.7	44.2
250	43.2	33.9	13.9	54.5	40.3	28.3	61.5	44.3	34.6	80.6	54.7	40.6	86.9	66.2	47.0

ANCHOR M12	Edge C (mm)														
	55			80			100			150			200		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
55	40.8	34.8	12.9	47.3	40.3	18.8	52.7	45.0	23.9	67.7	57.7	35.8	80.0	70.7	44.0
100	45.0	38.4	15.5	52.2	44.5	21.6	58.3	49.7	26.9	74.8	63.1	39.0	88.4	75.4	47.0
150	49.8	42.5	18.5	57.7	49.2	24.8	64.4	54.9	30.2	82.6	69.1	42.6	97.7	83.3	50.4
200	54.5	46.5	19.4	63.2	53.9	28.0	70.5	59.8	33.6	90.5	75.0	46.1	107.0	91.3	53.7
250	59.3	50.5	19.4	68.7	58.4	30.5	76.7	64.5	37.0	98.4	81.0	49.7	116.3	99.1	57.1
300	64.0	54.6	19.4	74.2	62.7	30.5	82.8	69.2	40.3	106.2	86.9	53.2	125.6	106.4	60.5

ANCHOR M16	Edge C (mm)														
	65			100			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
65	64.6	49.7	18.3	75.4	56.3	27.7	92.3	66.4	43.0	110.6	77.3	54.8	130.5	88.9	64.1
100	68.5	52.1	20.7	80.0	59.0	30.4	97.9	69.6	46.0	117.3	81.0	57.7	138.4	93.2	66.9
150	74.1	55.5	24.2	86.6	62.9	34.2	105.9	74.2	50.1	127.0	86.3	61.8	149.8	99.3	70.8
200	79.7	58.9	27.4	93.2	66.8	38.0	113.9	78.8	54.3	136.6	91.6	66.0	161.1	105.4	74.8
250	85.4	62.3	27.4	99.7	70.6	41.8	121.9	83.3	58.5	146.2	96.9	70.1	172.5	111.5	78.7
300	90.8	65.7	27.4	106.3	74.5	45.6	130.0	87.9	62.7	155.8	102.2	74.2	183.8	117.6	82.6

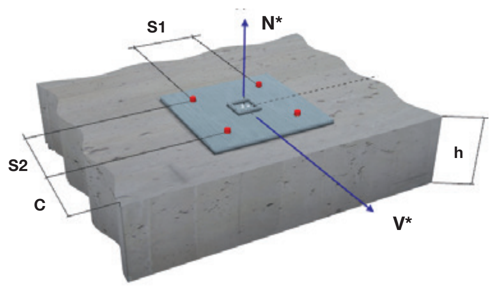
ANCHOR M20	Edge C (mm)														
	90			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
90	89.9	69.9	28.9	111.2	83.0	48.1	130.4	94.7	65.9	151.1	107.0	76.2	173.2	120.0	86.4
150	97.6	74.6	33.8	120.6	88.6	53.4	141.5	101.0	71.6	164.0	114.2	81.7	187.9	128.1	91.7
200	104.0	78.5	37.8	128.5	93.2	57.8	150.8	106.3	76.4	174.4	120.1	86.2	200.2	134.8	96.1
250	110.3	82.4	41.8	136.4	97.8	62.3	160.0	111.6	81.2	185.4	126.1	90.7	212.5	141.5	100.4
300	116.7	86.3	43.4	144.3	102.5	66.7	169.3	116.9	85.9	196.1	132.1	95.3	224.7	148.2	104.8
350	123.1	90.2	43.4	152.2	107.1	71.2	178.6	122.1	90.7	206.8	138.1	99.8	237.0	154.9	109.1

Four anchors

Table 2: One edge influence – non cracked concrete

Design Data: f_c=32 MPa

Anchor size	M8	M10	M12	M16	M20
Min Slab depth	120	150	200	250	300
Embedment Depth	90	110	125	170	205



ANCHOR M8	Edge C (mm)														
	40			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
40	25.1	21.4	14.2	33.1	26.4	22.0	37.5	29.1	22.4	45.9	36.4	28.4	45.9	44.1	34.3
80	32.6	26.7	17.8	41.9	32.4	26.8	47.0	35.5	29.1	56.7	43.8	35.0	56.7	52.5	40.8
100	36.6	29.6	19.6	46.7	35.7	30.1	52.2	39.0	32.4	62.5	47.8	38.2	62.5	57.0	44.0
150	47.8	37.4	21.4	59.7	44.5	38.2	66.2	48.3	40.5	78.3	58.5	46.2	78.3	69.1	51.8
200	60.2	46.0	21.4	74.2	54.2	46.1	81.7	58.6	48.4	95.7	70.2	54.0	95.7	82.4	59.6

ANCHOR M10	Edge C (mm)														
	45			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
45	33.9	28.1	18.6	41.7	33.0	25.2	46.5	35.9	28.0	59.6	43.7	35.0	63.8	52.3	41.8
80	42.2	33.3	22.2	51.1	38.7	32.1	56.6	41.9	34.8	71.5	50.5	41.6	76.3	59.9	48.3
100	47.3	36.4	24.2	56.9	42.1	36.0	62.8	45.5	38.7	78.8	54.6	45.4	83.9	64.5	52.0
150	61.3	44.8	27.8	72.7	51.2	45.4	79.7	55.1	48.0	98.5	65.5	54.6	104.6	76.7	61.1
200	77.1	54.0	27.8	90.5	61.3	52.0	98.6	65.7	57.2	120.5	77.3	63.7	127.5	89.9	70.1
250	94.7	64.0	27.8	110.1	72.2	56.7	119.5	77.2	66.2	144.7	90.2	72.6	152.6	104.2	79.0

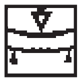
ANCHOR M12	Edge C (mm)														
	55			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
55	50.0	42.7	25.8	57.0	48.6	33.4	62.8	53.6	36.7	78.7	66.4	44.8	91.7	78.3	52.8
100	63.6	54.3	31.0	71.7	61.0	43.2	78.5	66.2	47.0	96.9	80.4	54.9	111.9	95.5	62.8
150	80.6	67.9	37.0	90.0	75.1	49.6	98.0	81.2	58.2	119.4	97.4	65.9	136.7	115.1	73.6
200	99.5	82.5	38.8	110.4	90.8	56.0	119.6	97.7	67.2	144.1	116.1	76.7	164.0	136.1	84.3
250	120.3	98.5	38.8	132.9	107.9	61.0	143.3	115.7	74.0	171.2	136.4	87.3	193.8	158.8	94.8
300	143.2	115.9	38.8	157.4	126.5	61.0	169.2	135.2	80.6	200.7	158.3	97.8	226.1	183.3	105.2

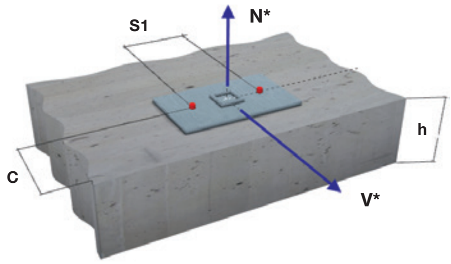
ANCHOR M16	Edge C (mm)														
	65			100			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
65	77.7	57.8	36.6	89.3	64.8	48.0	107.1	75.4	57.6	126.4	86.8	66.9	147.3	98.8	76.1
100	89.9	65.2	41.4	102.6	72.7	57.7	122.0	84.1	66.9	143.1	96.2	76.0	165.8	109.2	85.0
150	108.9	76.5	48.5	123.2	84.7	68.4	145.1	97.3	79.8	168.8	110.7	88.7	194.3	124.9	97.6
200	129.6	88.6	54.8	145.6	97.7	76.0	170.2	111.4	92.4	196.6	126.1	101.2	224.9	141.6	109.9
250	152.0	101.6	54.8	169.9	111.5	83.6	197.2	126.5	104.8	226.5	142.5	113.5	257.8	159.4	122.1
300	176.3	115.4	54.8	196.1	126.2	91.2	226.2	142.6	117.0	258.5	159.9	125.6	293.0	178.2	134.2

ANCHOR M20	Edge C (mm)														
	90			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
90	110.3	82.7	57.8	133.1	96.5	74.2	153.6	108.8	84.4	175.5	121.8	94.5	198.8	135.4	104.6
150	134.4	97.3	67.6	160.2	112.6	91.7	183.4	126.1	101.6	208.1	140.4	111.5	234.3	155.4	121.4
200	156.3	110.4	75.6	184.7	126.9	105.9	210.2	141.5	115.7	237.3	157.0	125.4	266.1	173.1	135.1
250	179.7	124.2	83.6	211.0	142.1	119.8	238.9	157.8	129.5	268.5	174.4	139.1	299.9	191.8	148.7
300	204.8	138.9	86.8	238.9	158.0	133.5	269.4	175.0	143.1	301.7	192.8	152.6	335.7	211.4	162.1
350	231.5	154.3	86.8	268.6	174.9	142.4	301.7	193.0	156.5	336.7	212.1	166.0	373.6	232.0	175.4

Two anchors

Table 1: One edge influence – cracked concrete


Tensile zone



Design Data: f_c=32 MPa

Anchor size	M8	M10	M12	M16	M20
Min Slab depth	120	150	200	250	300
Embedment Depth	90	110	125	170	205

ANCHOR M8	Edge C (mm)														
	40			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
40	10.9	13.0	5.0	14.9	16.5	10.7	17.1	18.3	12.4	21.3	23.3	16.7	21.3	28.5	21.0
80	12.0	14.2	6.3	16.3	18.0	12.2	18.8	20.0	13.9	23.4	25.4	18.1	23.4	31.2	22.3
100	12.5	14.8	6.9	17.1	18.7	13.0	19.6	20.8	14.6	24.4	26.5	18.8	24.4	32.5	22.9
150	13.8	16.3	7.6	18.9	20.6	14.9	21.7	22.9	16.4	27.0	29.1	20.5	27.0	35.7	24.6
200	15.1	17.8	7.6	20.6	22.5	16.8	23.7	25.0	18.3	29.5	31.8	22.2	29.5	39.0	26.2

ANCHOR M10	Edge C (mm)														
	45			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
45	16.4	17.3	6.6	20.7	20.6	11.9	23.3	22.6	15.4	30.6	27.9	20.3	32.9	33.8	25.2
80	17.6	18.5	7.8	22.2	22.0	13.4	25.1	24.1	16.9	32.9	29.8	21.8	35.4	36.1	26.8
100	18.3	19.1	8.6	23.1	22.8	14.2	26.1	25.0	17.8	34.2	30.9	22.6	36.9	37.4	27.4
150	20.1	20.8	9.9	25.4	24.8	16.3	28.7	27.2	20.0	37.6	33.6	24.7	40.5	40.7	29.3
200	22.0	22.5	9.9	27.7	26.8	18.4	31.2	29.4	22.2	40.9	36.3	26.7	44.1	44.0	31.3
250	23.7	24.2	9.9	29.9	28.8	20.1	33.7	31.5	24.5	44.2	39.0	28.8	47.6	47.2	33.3

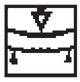
ANCHOR M12	Edge C (mm)														
	55			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
55	22.9	26.0	9.1	26.6	29.7	13.3	29.6	32.8	16.9	38.0	41.2	25.4	45.0	48.6	31.2
100	25.1	28.4	11.0	29.1	31.7	15.3	32.5	35.4	19.0	41.6	45.0	27.6	49.2	53.7	33.3
150	27.5	30.3	13.1	31.9	35.1	17.6	35.6	39.2	21.4	45.7	49.2	30.2	54.0	59.4	35.7
200	29.9	33.2	13.7	34.7	38.4	19.8	38.7	42.6	23.8	49.7	53.5	32.7	58.7	65.1	38.1
250	32.3	36.0	13.7	37.5	41.6	21.6	41.8	46.0	26.2	53.7	57.7	35.2	63.4	70.7	40.4
300	34.7	38.9	13.7	40.2	44.7	21.6	44.9	49.4	28.6	57.6	62.0	37.7	68.1	75.8	42.8

ANCHOR M16	Edge C (mm)														
	65			100			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
65	35.6	35.4	12.9	41.6	42.0	19.6	50.9	47.4	30.5	61.0	55.1	38.8	72.0	63.4	45.4
100	37.7	37.1	14.7	44.0	42.1	21.5	53.8	49.6	32.6	64.5	57.8	40.9	76.1	66.4	47.4
150	40.6	39.6	17.2	47.4	44.8	24.2	58.0	52.9	35.5	69.6	61.5	43.8	82.1	70.8	50.2
200	43.6	42.0	19.4	50.9	47.6	26.9	62.2	56.1	38.5	74.6	65.3	46.7	88.0	75.1	53.0
250	46.5	44.4	19.4	54.3	50.4	29.6	66.4	59.4	41.4	79.6	69.1	49.6	93.9	79.5	55.7
300	49.4	46.9	19.4	57.7	53.1	32.3	70.6	62.6	44.4	84.6	72.9	52.6	99.9	83.8	58.5

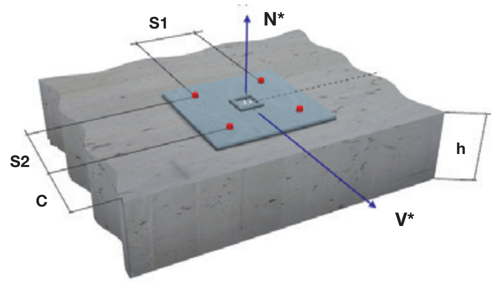
ANCHOR M20	Edge C (mm)														
	90			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
90	49.7	49.9	20.5	61.5	59.2	34.0	72.2	67.5	46.7	83.6	76.3	54.0	95.8	85.6	61.2
150	53.7	53.2	23.9	66.4	63.1	37.8	77.9	72.0	50.7	90.3	81.4	57.8	103.4	91.3	64.9
200	57.0	56.0	26.8	70.5	66.4	41.0	82.7	75.7	54.1	95.8	85.7	61.1	109.8	96.1	68.0
250	60.4	58.8	29.6	74.6	69.7	44.1	87.6	79.5	57.5	101.4	89.9	64.3	116.2	100.9	71.1
300	63.7	61.5	30.7	78.7	73.0	47.3	92.4	83.3	60.9	107.0	94.2	67.5	122.6	105.6	74.2
350	67.0	64.3	30.7	82.8	76.3	50.4	97.2	87.1	64.3	112.6	98.4	70.7	129.0	110.4	77.3

Four anchors

Table 2: One edge influence – cracked concrete



Tensile zone



Design Data: f_c=32 MPa

Anchor size	M8	M10	M12	M16	M20
Min Slab depth	120	150	200	250	300
Embedment Depth	90	110	125	170	205

ANCHOR M8	Edge C (mm)														
	40			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
40	15.5	15.2	10.1	20.5	18.8	14.2	23.2	20.7	15.9	28.4	25.9	20.1	28.4	31.4	24.3
80	19.5	19.0	12.6	25.1	23.1	19.0	28.2	25.3	20.6	34.0	31.2	24.8	34.0	37.5	28.9
100	21.7	21.1	13.8	27.6	25.4	21.3	30.9	27.8	22.9	37.0	34.1	27.1	37.0	40.7	31.1
150	27.4	26.6	15.1	34.3	31.7	27.0	38.0	34.4	28.7	44.9	41.7	32.7	44.9	49.3	36.7
200	33.6	32.8	15.1	41.4	38.7	32.7	45.6	41.8	34.3	53.4	50.1	38.3	53.4	58.7	42.2

ANCHOR M10	Edge C (mm)														
	45			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
45	22.2	20.1	13.1	27.3	23.5	17.9	30.4	25.6	19.8	39.0	31.2	24.8	41.8	37.3	29.6
80	26.6	23.7	15.7	32.3	27.6	22.8	35.8	29.9	24.7	45.2	36.0	29.5	48.2	42.7	34.2
100	29.4	25.9	17.2	35.3	30.0	25.5	39.0	32.4	27.4	48.9	38.9	32.1	52.1	46.0	36.8
150	36.7	31.9	19.7	43.5	36.5	32.2	47.7	39.3	34.0	59.0	46.7	38.7	62.6	54.7	43.3
200	44.7	38.5	19.7	52.4	43.7	36.8	57.1	46.8	40.5	69.8	55.1	45.1	73.8	64.1	49.7
250	53.2	45.6	19.7	61.9	51.5	45.1	67.2	55.0	46.9	81.3	64.3	51.4	85.8	74.3	55.8

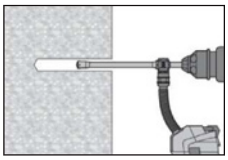
ANCHOR M12	Edge C (mm)														
	55			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
55	29.8	31.3	18.3	33.9	35.2	23.6	37.4	38.2	26.0	46.9	47.4	31.7	54.6	55.8	37.4
100	37.1	38.7	22.0	41.8	43.4	30.6	45.8	47.2	33.3	56.5	57.3	38.9	65.3	68.1	44.5
150	46.1	48.4	26.2	51.5	53.6	35.1	56.1	57.9	41.2	68.3	69.5	46.7	78.3	82.0	52.1
200	56.0	58.8	27.4	62.2	64.7	39.6	67.4	69.7	47.6	81.2	82.8	54.3	92.4	97.0	59.7
250	66.8	70.2	27.4	73.8	76.9	43.2	79.6	82.5	52.4	95.1	97.2	61.8	107.6	113.2	67.2
300	78.5	82.6	27.4	82.3	90.1	43.2	92.8	96.4	57.1	110.0	112.9	69.2	123.9	130.7	74.5

ANCHOR M16	Edge C (mm)														
	65			100			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
65	44.3	41.2	25.9	50.9	46.2	34.0	61.1	53.8	40.8	72.1	61.8	47.4	84.0	70.5	53.9
100	50.9	46.5	29.4	58.1	51.8	40.9	69.1	59.9	47.4	81.0	68.6	53.8	93.9	77.8	60.2
150	61.1	54.5	34.3	69.1	60.4	48.4	81.4	69.4	56.5	94.7	78.9	62.8	109.0	89.0	69.1
200	72.2	63.1	38.8	81.1	69.6	53.8	94.8	79.4	65.5	109.5	89.9	71.7	125.3	100.9	77.9
250	84.1	72.4	38.8	94.0	79.5	59.2	109.1	90.2	74.2	125.3	101.6	80.4	142.7	113.6	86.5
300	97.0	82.3	38.8	107.9	90.0	64.6	124.4	101.6	82.9	142.2	114.0	89.0	161.2	127.0	95.0

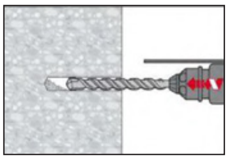
ANCHOR M20	Edge C (mm)														
	90			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1= s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
90	63.3	59.0	41.0	76.4	68.8	52.5	88.1	77.6	59.8	100.7	86.8	67.0	114.1	96.5	74.1
150	76.3	69.4	47.8	90.9	80.3	64.9	104.1	89.9	72.0	118.1	100.1	79.0	133.0	110.8	86.0
200	88.0	78.7	53.5	104.0	90.5	75.0	118.4	100.9	81.9	133.7	111.9	88.8	149.8	123.4	95.7
250	100.5	88.5	59.2	118.0	101.3	84.9	133.6	112.5	91.7	150.2	124.3	98.5	167.7	136.7	105.4
300	113.8	99.0	61.5	132.8	112.7	94.5	149.7	124.7	101.4	167.6	137.4	108.1	186.6	150.7	114.8
350	127.9	110.0	61.5	148.4	124.7	100.9	166.7	137.6	110.9	186.0	151.2	117.6	206.4	165.4	124.3

Setting instructions

Bore hole drilling



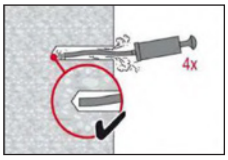
Drill hole to the required embedment depth with an appropriately sized Hilti TE-CD or TE-YD hollow drill bit with Hilti vacuum attachment. This drilling method properly cleans the borehole and removes dust while drilling.
After drilling is complete, proceed to the "injection preparation" step in the instructions for use



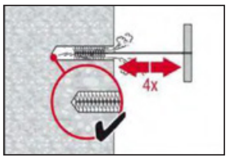
Drill Hole to the required embedment depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit.

Bore hole cleaning **Just before setting an anchor, the bore hole must be free of dust and debris.**

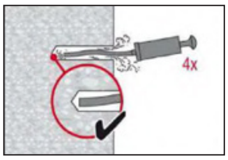
a) Manual Cleaning (MC) non-cracked concrete only for bore hole diameters d_0 ≤ 20mm and bore hole depth h_0 ≤ 10d for HIS- R(N) M8 and M10.



The Hilti manual pump may be used for blowing out bore holes up to diameters d_0 ≤ 20 mm and embedment depths up to h_{ef} ≤ 10d.
Blow out at least 4 times from the back of the bore hole until return air stream is free of noticeable dust

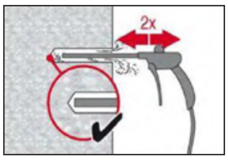


Brush 4 times with the specified brush size by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole – if not the brush is too small and must be replaced with the proper brush diameter.

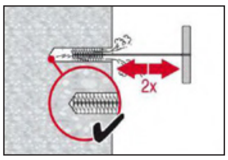


Blow out again with manual pump at least 4 times until return air stream is free of noticeable dust.

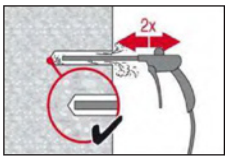
b) Compressed air cleaning (CAC) for all bore hole diameters d_0 and all bore hole depth h_0 for HIS-R(N) M12, M16 and M20.



Blow 2 times from the back of the hole (if needed with nozzle extension) over the hole length with oil-free compressed air (min. 6 bar at 6 m³/h) until return air stream is free of noticeable dust. Bore hole diameter ≥ 32 mm the compressor must supply a minimum air flow of 140 m³/hour.



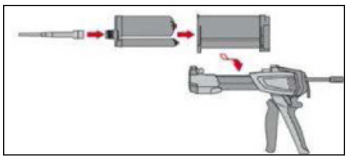
Brush 2 times with the specified brush size (brush Ø ≥ bore hole Ø) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole -- if not the brush is too small and must be replaced with the proper brush diameter.



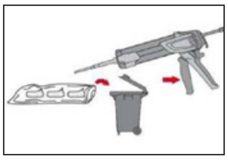
Blow again with compressed air 2 times until return air stream is free of noticeable dust.

Setting instructions

Injection preparation

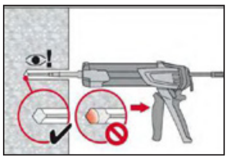


Tightly attach new Hilti mixing nozzle HIT-RE-M to foil pack manifold (snug fit). Do not modify the mixing nozzle. Observe the instruction for use of the dispenser. Check foil pack holder for proper function. Do not use damaged foil packs / holders. Swing foil pack holder with foil pack into HIT dispenser.

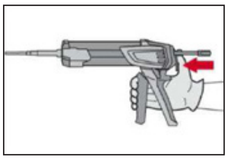


Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded.
Discard quantities are:
2 strokes for 330 ml foil pack,
3 strokes for 500 ml foil pack,
4 strokes for 500 ml foil pack ≤ 5°C.

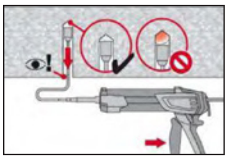
Inject adhesive **from the back of the borehole without forming air voids**



Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull. Fill holes approximately 2/3 full, or as required to ensure that the annular gap between the anchor and the concrete is completely filled with adhesive along the embedment length.

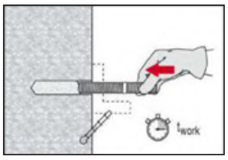


After injection is completed, depressurise the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

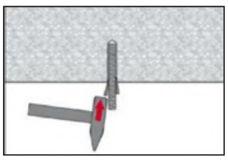


Overhead installation and/or installation with embedment depth h_{ef} > 250mm. For overhead installation the injection is only possible with the aid of extensions and piston plugs. Assemble HIT-RE-M mixer, extension(s) and appropriately sized piston plug. Insert piston plug to back of the hole and inject adhesive. During injection the piston plug will be naturally extruded out of the bore hole by the adhesive pressure.

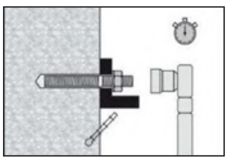
Setting the element



Before use, verify that the element is dry and free of oil and other contaminants.
Mark and set element to the required embedment depth untill working time t_{work} has elapsed



For overhead installation use piston plugs and fix embedded parts with e.g. wedges



Loading the anchor:
After required curing time t_{cure} the anchor can be loaded.
The applied installation torque shall not exceed T_{max}.

For detailed information on installation see instruction for use given with the package of the product.

Materials

Mechanical properties of HIS-(R)N

Anchor size			M8x90	M10x110	M12x125	M16x170	M20x205
Nominal tensile strength f_{uk}	HIS-N	[N/mm²]	490	490	460	460	460
	Screw 8.8	[N/mm²]	800	800	800	800	800
	HIS-RN	[N/mm²]	700	700	700	700	700
	Screw A4-70	[N/mm²]	700	700	700	700	700
Yield strength f_{yk}	HIS-N	[N/mm²]	410	375	375	375	375
	Screw 8.8	[N/mm²]	640	640	640	640	640
	HIS-RN	[N/mm²]	350	350	350	350	350
	Screw A4-70	[N/mm²]	450	450	450	450	450
Stressed cross-section A_s	HIS-(R)N	[mm²]	51.5	108.0	169.1	256.1	237.6
	Screw	[mm²]	36.6	58	84.3	157	245
Moment of resistance W	HIS-(R)N	[mm³]	145	430	840	1595	1543
	Screw	[mm³]	31.2	62.3	109	277	541

Material quality

Part	Material
Internal threaded sleeve [a)] HIS-N	C-steel 1.0718 Steel galvanized ≥ 5µm
Internal threaded sleeve [b)] HIS-RN	Stainless steel 1.4401 and 1.4571

a) related fastening screw: strength class 8.8, A_s > 8% Ductile
steel galvanized ≥ 5µm

b) related fastening screw: strength class 70, A_s > 8% Ductile
stainless steel 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362

Anchor dimensions

Anchor size	M8	M10	M12	M16	M20
Internal threaded sleeve HIS-(R)N	M8x90	M10x110	M12x125	M16x170	M20x205
Anchor embedment depth [mm]	90	110	125	170	205

Setting

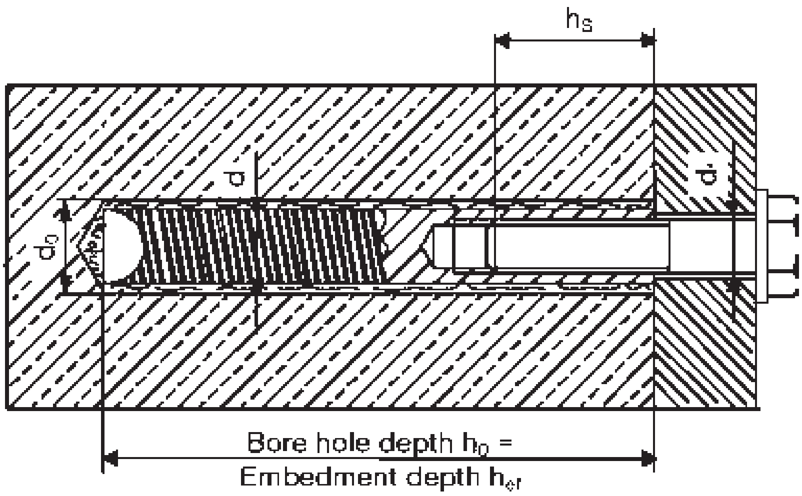
Installation equipment

Anchor size	M8x90	M10x110	M12x125	M16x170	M20x205
Rotary hammer	TE 2 – TE 30		TE 40 – TE 70		
Other tools	compressed air gun or blow out pump, set of cleaning brushes, dispenser				

Working time, curing time

Temperature of the base material T_{BM}	Working time in which anchor can be inserted and adjusted t_{work}	Curing time before anchor can be loaded t_{cure}
-10 °C to -5 °C	3 hour	20 hour
-4 °C to 0 °C	2 hour	7 hour
1 °C to 5 °C	1 hour	3 hour
6 °C to 10 °C	40 min	2 hour
11 °C to 20 °C	15 min	1 hour
21 °C to 30 °C	9 min	1 hour
31 °C to 40 °C	6 min	1 hour

Setting details



Anchor size			M8x90	M10x110	M12x125	M16x170	M20x205
Nominal diameter of drill bit	d_0	[mm]	14	18	22	28	32
Diameter of element	d	[mm]	12,5	16,5	20,5	25,4	27,6
Effective anchorage and drill hole depth	h_{ef}	[mm]	90	110	125	170	205
Minimum base material thickness	h_{min}	[mm]	120	150	170	230	270
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22
Thread engagement length; min - max	h_s	[mm]	8-20	10-25	12-30	16-40	20-50
Torque moment [a)]	T_{max}	[Nm]	10	20	40	80	150
Minimum spacing	s_{min}	[mm]	40	45	55	65	90
Minimum edge distance	c_{min}	[mm]	40	45	55	65	90

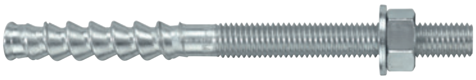
a) Maximum recommended torque moment to avoid splitting failure during installation with minimum spacing and/or edge distance.

Hilti HIT-HY 200 with HIT-Z

Injection Mortar System

Hilti HIT-HY 200-R
500 ml foil pack
(also available as 330 ml foil pack)

Static mixer



HIT-Z
HIT-Z-R rod

Benefits

- No cleaning required: Zero succeptability to borehole cleaning conditions with dry and water saturated concrete base material
- Maximum load performance in cracked concrete and uncracked concrete
- Suitable for cracked and non-cracked concrete C 20/25 to C 50/60
- Suitable for use with diamond cored holes in non-cracked or cracked concrete with no load reductions

Concrete | Tensile zone | Corrosion resistance | European Technical Approval | CE conformity | PROFIS anchor design software | No cleaning required for approved loads | Seismic | Diamond drilled holes

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval a)	DIBt, Berlin	ETA-12/0028 / 2013-03-15 (HIT-HY 200-R)
Fire test report	IBMB, Brunswick	3501/676/13 / 2012-08-03

a) All data given in this section according ETA-12/0028, issue 2013-03-15.

Service temperature range

Hilti HIT-HY 200 injection mortar may be applied in the temperature ranges given below. An elevated base material temperature may lead to a reduction of the design bond resistance.

Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range I	-40 °C to +40 °C	+24 °C	+40 °C
Temperature range II	-40 °C to +80 °C	+40 °C	+80 °C
Temperature range III	-40 °C to +120 °C	+72 °C	+120 °C

Max short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

Max long term base material temperature

Long-term elevated base material temperatures are roughly constant over significant periods of time

Design process for typical anchor layouts

The design values in the tables are obtained from Profis V2.4.3 in compliance with the design method according to EOTA TR 029. Design resistance according to data given in ETA-12/2008 issue 2013-03-15.

- Influence of concrete strength
- Influence of edge distance
- Influence of spacing

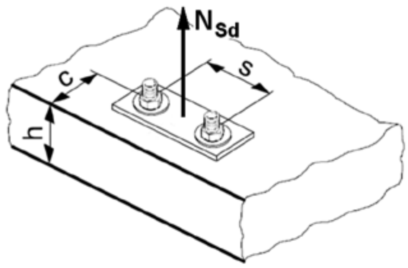
The design method is based on the following simplification:

- No different loads are acting on individual anchors (no eccentricity)

The values are valid for the anchor configuration.

For more complex fastening applications please use the anchor design software PROFIS Anchor.

STEP 1: TENSION LOADING



The design tensile resistance N_{Rd} is the lower of:

- **Combined pull-out and concrete cone resistance**
  $N_{Rd,p} = f_{B,p} \cdot N^*_{Rd,p}$

$N^*_{Rd,p}$ is obtained from the relevant design tables

$f_{B,p}$ influence of concrete strength on combined pull-out and concrete cone resistance

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
$f_{B,p}$	1.00	1.00	1.00	1.00	1.00

- **Concrete cone or concrete splitting resistance**
  $N_{Rd,c} = f_B \cdot N^*_{Rd,c}$

$N^*_{Rd,c}$ is obtained from the relevant design tables

f_B influence of concrete strength on concrete cone resistance

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
f_B	0.79	0.87	1.00	1.11	1.22

The definition of dry concrete, as per Hilti is: concrete not in contact with water before/during installation and curing.

- **Design steel resistance (tension) $N_{Rd,s}$**

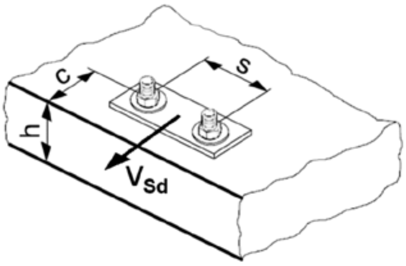
Anchor size			M8	M10	M12	M16	M20
$N_{Rd,s}$	HIT-Z / HIT-Z-R	[kN]	16.0	25.3	36.7	64.0	97.3

$$N_{Rd} = \min \{ N_{Rd,p}, N_{Rd,c}, N_{Rd,s} \}$$

CHECK $N_{Rd} \geq N_{Sd}$

STEP 2: SHEAR LOADING

The design shear resistance V_{Rd} is the lower of:



- **Design Concrete Edge Resistance**

  $V_{Rd,c} = f_B \cdot V^*_{Rd,c} \cdot \psi_{re,V}$

$V^*_{Rd,c}$ is obtained from the relevant design table

The factor $\psi_{re,V}$ takes account of the effect of the type of reinforcement used in cracked concrete.

$\psi_{re,V}$ = 1.0 anchorage in non-cracked concrete

$\psi_{re,V}$ = 1.0 anchorage in cracked concrete without edge reinforcement

$\psi_{re,V}$ = 1.2 anchorage in cracked concrete with straight edge reinforcement (≥ ⌀12 mm)

$\psi_{re,V}$ = 1.4 anchorage in cracked concrete with edge reinforcement and closely spaced stirrups (a ≤ 100 mm)

f_B influence of concrete strength

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
f_B	0.79	0.87	1.00	1.11	1.22

Shear load acting parallel to edge:

These tables are for a single free edge only

2 anchors:

For shear loads acting parallel to this edge, the concrete resistance **$V^*_{Rd,c}$ can be multiplied by the factor = 2.5**

4 anchors:

For shear loads acting parallel to the edge - the anchor row closest to the edge is checked to resist half the total design load. To obtain the concrete resistance use the corresponding 2 anchor configuration **$V^*_{Rd,c}$ and multiply by the factor = 2.5**

- **Design steel resistance (shear): $V_{Rd,s}$**

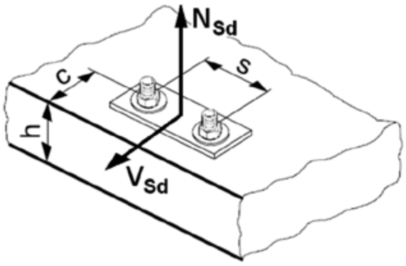
Anchor size			M8	M10	M12	M16	M20
$V_{Rd,s}$	HIT-Z	[kN]	9.6	15.2	21.6	38.4	58.4
	HIT-Z-R	[kN]	11.2	18.4	26.4	45.6	70.4

$$V_{Rd} = \min\{V_{Rd,c}, V_{Rd,s}\}$$

CHECK $V_{Rd} \geq V_{Sd}$

STEP 3: COMBINED TENSION AND SHEAR LOADING

The following equations must be satisfied:



$$N_{Sd}/N_{Rd} + V_{Sd}/V_{Rd} \leq 1.2$$

and

$$N_{Sd}/N_{Rd} \leq 1, \; V_{Sd}/V_{Rd} \leq 1$$

Precalculated table values – design resistance values

All data applies to:

- temperature range I (see service temperature range)
- no effects of dense reinforcement

Recommended loads can be calculated by dividing the design resistance by an overall partial safety factor for action γ = 1,4. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

Basic loading data (for a single anchor) – no edge distance and spacing influence

Embedment depth and base material thickness for the basic loading data

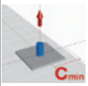
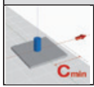
Anchor size	M8	M10	M12	M16	M20
Typical embedment depth h_{ef} [mm]	70	90	110	145	180
Base material thickness h [mm]	130	150	170	245	280

Design resistance: concrete 32 MPa

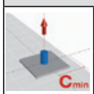
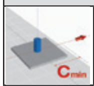
Anchor size			M8	M10	M12	M16	M20
Non-cracked concrete							
Tensile	Concrete Pull	$N^*_{Rd,p}$	Steel governed refer $N_{Rd,s}$ table		36.2	nc	nc
	Concrete Cone	$N^*_{Rd,c}$			nc	74.4	102.8
Shear		$V_{Rd,s}$	Steel governed refer $V_{Rd,s}$ table				
Cracked concrete							
Tensile	Concrete Pull	$N^*_{Rd,p}$	nc	nc	33.1	nc	nc
	Concrete Cone	$N^*_{Rd,c}$	17.8	25.9	35.0	53.0	73.3
Shear		$V_{Rd,s}$	NA	Steel governed refer $V_{Rd,s}$ table			

Basic loading data (for a single anchor) – with minimum edge distance

Design resistance [kN] - uncracked concrete, 32 Mpa

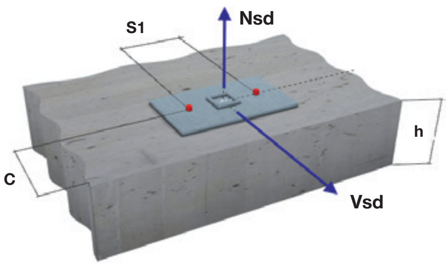
Anchor size		M8	M10	M12	M16	M20
Min. edge distance	c_{min} [mm]	40	65	80	90	120
Min Base thickness	h_{min} [mm]	130	150	170	245	280
Tensile N_{Rd}						
 Pull-out	$N^*_{Rd,p}$ [kN]	13.3	NOT CRITICAL			
Concrete	$N^*_{Rd,c}$ [kN]	11.8	17.6	23.3	34.7	47.8
Shear V_{Rd}						
 Shear (without lever arm)	$V^*_{Rd,c}$	4.5	9.4	13.4	17.4	27.5

Design resistance [kN] - cracked concrete, 32 Mpa

Anchor size		M8	M10	M12	M16	M20
Min. edge distance	c_{min} [mm]	40	65	80	90	120
Min Base thickness	h_{min} [mm]	130	150	170	245	280
Tensile N_{Rd}						
 Pull-out	$N^*_{Rd,p}$ [kN]	NOT CRITICAL				
Concrete	$N^*_{Rd,c}$ [kN]	8.4	12.6	16.6	24.8	34.1
Shear V_{Rd}						
 Shear (without lever arm)	$V^*_{Rd,c}$	3.2	6.7	9.4	12.3	19.5

Two anchors

Table 1: One edge influence – non cracked concrete



Design Data: $f_{c,cyl}$=32 MPa

Anchor size	M8	M10	M12	M16	M20
Typical embedment depth h_{ef} [mm]	70	90	110	145	180
Min Slab depth	130	150	170	245	280

ANCHOR M8	Edge C (mm)														
	40			80			100			150			170		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
40	-	-	-	NOT CRITICAL	17.0	13.4	NOT CRITICAL	19.1	16.4	25.5	24.8	22.5	25.5	27.3	24.9
80	NOT CRITICAL	14.5	7.6		18.8	15.3		21.1	18.4	30.8	27.4	24.3	30.8	30.1	26.7
100		15.2	8.4		19.6	16.3		22.1	19.3	33.5	28.7	25.2	33.5	31.5	27.6
120		15.9	9.2		20.5	17.3		23.0	20.3	36.2	29.9	26.1	36.2	32.9	28.5
150		16.9	9.2		21.8	18.7		24.5	21.7	40.2	31.9	27.5	40.2	35.0	29.8
200		18.6	9.2		24.0	21.1		27.0	24.1	40.2	35.1	29.8	40.2	38.6	32.1

ANCHOR M10	Edge C (mm)														
	80			110			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
80	-	-	-	NOT CRITICAL	24.8	22.5	NOT CRITICAL	29.0	27.8	NOT CRITICAL	34.8	34.3	43.6	41.0	40.7
100	-	-	-		25.6	23.6		30.0	28.8		35.9	35.3	46.9	42.3	41.7
150	NOT CRITICAL	24.4	20.2		27.7	26.4		32.5	31.4		38.9	37.8	55.3	45.8	44.2
200		26.2	22.8		29.8	29.1		34.9	34.1		41.8	40.3	60.3	49.2	46.6
250		28.0	24.9		31.9	31.8		37.3	36.7		44.7	42.8	60.3	52.7	49.1
300		29.9	24.9		34.0	34.6		39.8	39.3		47.6	45.4	60.3	56.1	51.5

ANCHOR M12	Edge C (mm)														
	100			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
150	-	-	-	NOT CRITICAL	35.8	35.4	NOT CRITICAL	41.6	42.3	NOT CRITICAL	47.7	49.2	66.4	54.2	56.1
180	NOT CRITICAL	31.6	28.6		37.1	37.2		43.1	44.0		49.4	50.9	72.4	56.1	57.7
200		32.3	29.8		38.0	38.4		44.1	45.2		50.5	52.0	72.4	57.4	58.8
250		34.2	32.8		40.1	41.3		46.5	48.0		53.4	54.7	72.4	60.7	61.5
300		36.0	35.7		42.3	44.3		49.0	50.8		56.2	57.4	72.4	63.9	64.1
350		37.8	35.7		44.4	47.2		51.5	53.6		59.1	60.2	72.4	67.1	66.8

ANCHOR M16	Edge C (mm)														
	120			150			200			250			300		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	N*Rd,p	N*Rd,c	V*Rrd,c	N*Rd,p	N*Rd,c	V*Rrd,c	N*Rd,p	N*Rd,c	V*Rrd,c	N*Rd,p	N*Rd,c	V*Rrd,c	N*Rd,p	N*Rd,c	V*Rrd,c
150	-	-	-	NOT CRITICAL	48.7	44.8	NOT CRITICAL	55.5	55.3	NOT CRITICAL	62.6	63.9	NOT CRITICAL	70.2	72.4
180	NOT CRITICAL	46.2	37.7		50.2	47.0		57.2	57.5		64.6	66.0		72.3	74.5
210		47.6	39.8		51.7	49.2		58.9	59.7		66.5	68.1		74.5	76.5
250		49.5	42.6		53.7	52.2		61.2	62.7		69.1	71.0		77.4	79.3
300		51.8	46.1		56.3	55.9		64.1	66.3		72.3	74.5		81.0	82.7
350		54.1	49.6		58.8	59.7		66.9	70.0		75.6	78.1		84.7	86.2

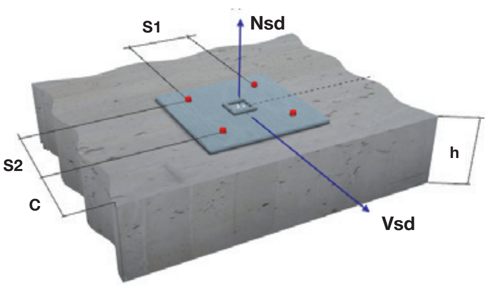
ANCHOR M20	Edge C (mm)														
	180			200			250			300			350		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	N*Rd,p	N*Rd,c	V*Rrd,c	N*Rd,p	N*Rd,c	V*Rrd,c	N*Rd,p	N*Rd,c	V*Rrd,c	N*Rd,p	N*Rd,c	V*Rrd,c	N*Rd,p	N*Rd,c	V*Rrd,c
150	-	-	-	NOT CRITICAL	64.1	63.7	NOT CRITICAL	70.6	73.2	NOT CRITICAL	77.4	82.6	NOT CRITICAL	84.5	91.9
180	NOT CRITICAL	63.0	61.4		65.6	66.3		72.3	75.6		79.3	84.9		86.5	94.2
210		64.5	64.0		67.2	68.8		74.0	78.0		81.1	87.3		88.5	96.5
250		66.5	67.4		69.2	72.2		76.2	81.3		83.6	90.4		91.2	99.6
300		68.9	71.7		71.7	76.5		79.0	85.4		86.6	94.4		94.6	103.4
350		71.3	75.9		74.3	80.7		81.8	89.4		89.7	98.3		97.9	107.2

Four anchors

Table 2: One edge influence – non cracked concrete

Design Data: $f_{c,cyl}$=32 MPa

Anchor size	M8	M10	M12	M16	M20
Typical embedment depth h_{ef} [mm]	70	90	110	145	180
Min Slab depth	130	150	170	245	280



ANCHOR M8	Edge C (mm)														
	40			80			100			150			170		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 = s2	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
40	-	-	-	NOT CRITICAL	19.7	13.4	NOT CRITICAL	21.9	16.4	32.3	27.9	22.5	32.3	31.0	28.4
80	NOT CRITICAL	19.9	7.6		24.7	15.3		27.2	18.4	47.3	34.1	24.3	47.3	37.7	30.2
100		22.3	8.4		27.4	16.3		30.1	19.3	55.9	37.5	25.2	55.9	41.3	31.1
120		24.8	9.2		30.2	17.3		33.1	20.3	65.1	41.0	26.1	65.1	45.1	32.0
150		28.7	9.2		34.7	18.7		37.9	21.7	80.4	46.6	27.5	80.4	51.1	33.3
200		35.9	9.2		42.9	21.1		46.7	24.1	80.4	56.7	29.8	80.4	61.9	35.5

ANCHOR M10	Edge C (mm)														
	80			110			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 = s2	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
100	NOT CRITICAL	31.5	22.3	NOT CRITICAL	37.4	28.8	NOT CRITICAL	43.8	35.3	NOT CRITICAL	50.7	41.7	NOT CRITICAL	51.8	48.1
130		35.1	24.0		41.5	30.4		48.4	36.8		55.8	43.2		57.0	49.5
170		40.4	26.2		47.4	32.5		54.9	38.8		62.9	45.1		64.3	51.4
200		44.5	27.9		52.0	34.1		60.0	40.3		68.6	46.6		70.0	52.9
250		51.9	30.7		60.2	36.7		69.1	42.8		78.6	49.1		80.1	55.3
300		59.9	33.5		69.0	39.3		78.8	45.4		89.2	51.5		90.9	57.7

ANCHOR M12	Edge C (mm)														
	100			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 = s2	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
100	-	-	-	NOT CRITICAL	40.5	32.5	NOT CRITICAL	46.3	39.5	NOT CRITICAL	52.4	46.5	NOT CRITICAL	58.8	53.4
150	-	-	-		46.8	35.4		53.1	42.3		59.7	49.2		66.8	56.1
200	NOT CRITICAL	47.0	29.8		53.4	38.4		60.3	45.2		67.6	52.0		75.3	58.8
250		53.5	32.8		60.5	41.3		68.0	48.0		75.9	54.7		84.3	61.5
300		60.4	35.7		68.1	44.3		76.2	50.8		84.7	57.4		93.8	64.1
350		67.7	35.7		76.0	47.2		84.8	53.6		94.0	60.2		103.7	66.8

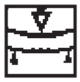
ANCHOR M16	Edge C (mm)														
	120			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 = s2	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
120	-	-	-	NOT CRITICAL	57.3	42.5	NOT CRITICAL	64.3	53.1	NOT CRITICAL	71.7	61.7	NOT CRITICAL	79.5	70.3
170	NOT CRITICAL	60.5	37.0		64.8	46.2		72.4	56.8		80.4	65.3		88.8	73.8
200		65.0	39.1		69.6	48.5		77.5	59.0		85.8	67.4		94.6	75.9
250		72.9	42.6		77.8	52.2		86.3	62.7		95.3	71.0		104.7	79.3
300		81.2	46.1		86.4	55.9		95.6	66.3		105.3	74.5		115.3	82.7
350		89.9	49.6		95.6	59.7		105.4	70.0		115.7	78.1		126.5	86.2

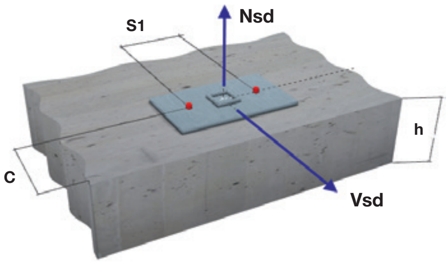
ANCHOR M20	Edge C (mm)														
	180			200			250			300			350		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 = s2	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
150	-	-	-	NOT CRITICAL	76.8	63.7	NOT CRITICAL	83.8	73.2	NOT CRITICAL	91.0	82.6	NOT CRITICAL	98.5	91.9
200	-	-	-		84.3	68.0		91.7	77.2		99.3	86.5		107.3	95.7
250	-	-	-		92.1	72.2		99.9	81.3		108.0	90.4		116.4	99.6
300	NOT CRITICAL	92.3	60.9		100.2	76.5		108.4	85.4		117.0	94.4		125.9	103.4
350		100.3	64.9		108.7	80.7		117.4	89.4		126.4	98.3		135.8	107.2
400		108.6	69.0		117.4	85.0		126.6	93.5		136.1	102.2		146.0	111.0

Two anchors

Table 1: One edge influence – cracked concrete

Design Data: $f_{c,cyl}$=32 MPa – Cracked Concrete





Anchor size	M8	M10	M12	M16	M20
Typical embedment depth h_{ef} [mm]	70	90	110	145	180
Min Slab depth	130	150	170	245	280

ANCHOR M8	Edge C (mm)														
	50			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
50	NOT CRITICAL	10.3	5.8	NOT CRITICAL	12.4	9.8	NOT CRITICAL	14.0	12.0	NOT CRITICAL	18.2	16.2	24.6	20.3	20.4
100		11.6	7.3		14.0	11.5		15.7	13.7		20.4	17.9	30.7	22.9	22.0
150		12.9	8.7		15.6	13.2		17.5	15.4		22.7	19.5	36.9	25.4	23.6
200		14.2	8.7		17.1	14.9		19.2	17.1		25.0	21.1	36.9	28.0	25.2
250		15.5	8.7		18.7	16.3		21.0	18.8		27.3	22.7	36.9	30.6	26.7
300		16.8	8.7		20.3	16.3		22.7	20.5		29.6	24.4	36.9	33.1	28.3

ANCHOR M10	Edge C (mm)														
	70			90			110			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
70	NOT CRITICAL	14.6	9.9	NOT CRITICAL	16.0	13.0	NOT CRITICAL	17.4	15.6	NOT CRITICAL	20.4	19.3	NOT CRITICAL	24.4	23.9
100		15.4	10.9		16.8	14.1		18.3	16.7		21.4	20.4		25.6	25.0
150		16.6	12.7		18.2	16.0		19.8	18.7		23.1	22.3		27.7	26.8
200		17.9	14.4		19.5	17.9		21.2	20.6		24.9	24.1		29.8	28.6
250		19.1	14.8		20.9	19.8		22.7	22.6		26.6	26.0		31.9	30.4
300		20.4	14.8		22.2	20.6		24.2	24.5		28.3	27.8		33.9	32.1

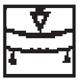
ANCHOR M12	Edge C (mm)														
	80			100			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
80	-	-	-	NOT CRITICAL	19.9	16.0	NOT CRITICAL	23.4	22.2	NOT CRITICAL	27.1	27.2	NOT CRITICAL	31.1	32.2
100	-	-	-		20.4	16.9		24.0	23.0		27.9	28.0		31.9	32.9
150	NOT CRITICAL	20.3	15.4		21.7	19.0		25.5	25.1		29.6	30.0		34.0	34.9
200		21.5	17.4		23.0	21.1		27.1	27.2		31.4	32.0		36.0	36.8
250		22.7	18.9		24.3	23.2		28.6	29.3		33.2	34.0		38.1	38.8
300		23.9	18.9		25.7	25.3		30.1	31.3		35.0	36.0		40.1	40.7

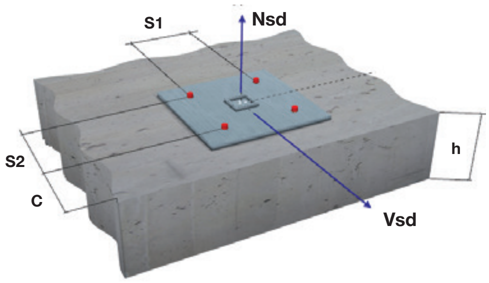
ANCHOR M16	Edge C (mm)														
	100			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
100	NOT CRITICAL	28.6	18.8	NOT CRITICAL	32.9	29.1	NOT CRITICAL	37.5	36.6	NOT CRITICAL	42.3	42.7	NOT CRITICAL	47.4	48.8
150		30.2	21.2		34.7	31.7		39.5	39.2		44.6	45.2		50.0	51.3
200		31.7	23.6		36.5	34.3		41.6	41.8		47.0	47.8		52.6	53.7
250		33.3	25.9		38.3	37.0		43.6	44.4		49.3	50.3		55.2	56.2
300		34.9	28.3		40.1	39.6		45.7	47.0		51.6	52.8		57.8	58.6
350		36.4	28.3		41.9	42.3		47.7	49.6		53.9	55.3		60.4	61.1

ANCHOR M20	Edge C (mm)														
	120			150			200			250			350		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
120	-	-	-	NOT CRITICAL	40.3	32.8	NOT CRITICAL	44.6	43.3	NOT CRITICAL	49.2	50.1	NOT CRITICAL	58.8	63.5
150	-	-	-		41.3	34.5		45.7	45.1		50.4	51.8		60.3	65.1
200	NOT CRITICAL	40.2	30.4		42.9	37.4		47.5	48.2		52.3	54.7		62.6	67.8
250		41.8	33.1		44.5	40.2		49.3	51.2		54.3	57.6		65.0	70.5
300		43.3	35.8		46.2	43.1		51.1	54.2		56.3	60.5		67.4	73.2
350		44.8	38.6		47.8	46.0		52.9	57.2		58.3	63.3		69.8	75.9

Four anchors

Table 2: One edge influence – cracked concrete





Design Data: $f_{c,cyl}$=32 MPa– Cracked Concrete

Anchor size	M8	M10	M12	M16	M20
Typical embedment depth h_{ef} [mm]	70	90	110	145	180
Min Slab depth	130	150	170	245	280

ANCHOR M8	Edge C (mm)														
	50			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
50	NOT CRITICAL	12.6	5.8	NOT CRITICAL	14.9	9.8	NOT CRITICAL	16.5	12.0	NOT CRITICAL	21.0	16.2	32.8	23.3	20.4
100		16.8	7.3		19.5	11.5		21.5	13.7		26.7	17.9	51.2	29.5	22.0
150		21.5	8.7		24.8	13.2		27.0	15.4		33.2	19.5	73.7	36.4	23.6
200		26.8	8.7		30.6	14.9		33.3	17.1		40.4	21.1	73.7	44.1	25.2
250		32.7	8.7		37.1	16.3		40.1	18.8		48.3	22.7	73.7	52.5	26.7
300		39.2	8.7		44.2	16.3		47.6	20.5		56.9	24.4	73.7	61.7	28.3

ANCHOR M10	Edge C (mm)														
	60			80			100			150			200		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
60	-	-	-	NOT CRITICAL	17.7	11.0	NOT CRITICAL	19.1	14.2	NOT CRITICAL	23.0	18.9	NOT CRITICAL	27.1	23.6
100	NOT CRITICAL	19.3	9.4		20.8	12.5		22.4	15.8		26.6	20.4		31.2	25.0
150		23.4	11.1		25.1	14.3		26.9	17.8		31.6	22.3		36.8	26.8
200		27.8	12.1		29.7	16.2		31.8	19.7		37.1	24.1		42.8	28.6
250		32.6	12.1		34.8	17.6		37.0	21.7		42.9	26.0		49.2	30.4
300		37.8	12.1		40.2	17.6		42.7	23.7		49.2	27.8		56.2	32.1

ANCHOR M12	Edge C (mm)														
	80			100			150			200			250		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
80	-	-	-	NOT CRITICAL	23.5	16.0	NOT CRITICAL	27.2	22.2	NOT CRITICAL	31.1	27.2	NOT CRITICAL	35.3	32.2
100	-	-	-		25.1	16.9		28.9	23.0		33.0	28.0		37.3	32.9
150	NOT CRITICAL	27.5	15.4		29.1	19.0		33.3	25.1		37.8	30.0		42.6	34.9
200		31.7	17.4		33.5	21.1		38.1	27.2		43.0	32.0		48.2	36.8
250		36.2	18.9		38.1	23.2		43.1	29.3		48.5	34.0		54.1	38.8
300		41.0	18.9		43.1	25.3		48.5	31.3		54.3	36.0		60.4	40.7

ANCHOR M16	Edge C (mm)														
	100			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
100	NOT CRITICAL	34.3	18.8	NOT CRITICAL	38.8	29.1	NOT CRITICAL	43.7	36.6	NOT CRITICAL	48.8	42.7	NOT CRITICAL	54.1	48.8
150		39.1	21.2		44.0	31.7		49.3	39.2		54.8	45.2		60.6	51.3
200		44.2	23.6		49.6	34.3		55.2	41.8		61.2	47.8		67.4	53.7
250		49.7	25.9		55.4	37.0		61.5	44.4		67.9	50.3		74.7	56.2
300		55.4	28.3		61.6	39.6		68.2	47.0		75.0	52.8		82.2	58.6
350		61.5	28.3		68.1	42.3		75.1	49.6		82.5	55.3		90.2	61.1

ANCHOR M20	Edge C (mm)														
	120			150			200			250			350		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1=s2 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
120	-	-	-	NOT CRITICAL	47.1	32.8	NOT CRITICAL	51.7	43.3	NOT CRITICAL	56.5	50.1	NOT CRITICAL	66.6	63.5
150	-	-	-		50.0	34.5		54.8	45.1		59.7	51.8		70.2	65.1
200	NOT CRITICAL	52.1	30.4		55.0	37.4		60.1	48.2		65.3	54.7		76.5	67.8
250		57.2	33.1		60.3	40.2		65.6	51.2		71.2	57.6		83.0	70.5
300		62.5	35.8		65.8	43.1		71.4	54.2		77.3	60.5		89.7	73.2
350		68.0	38.6		71.5	46.0		77.5	57.2		83.7	63.3		96.8	75.9

Materials

Mechanical properties of HIT-Z and HIT-Z-R

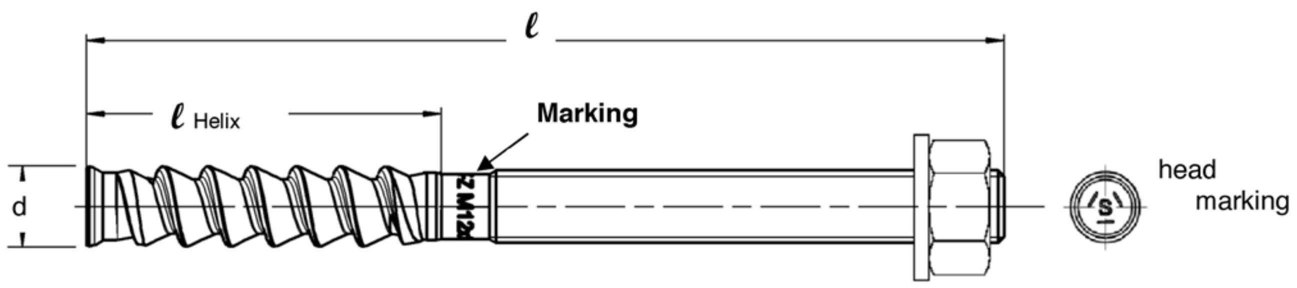
Anchor size			M8	M10	M12	M16	M20
Nominal tensile strength f_{uk}	HIT-Z / HIT-Z-R	[N/mm²]	650	650	650	610	595
Yield strength f_{yk}	HIT-Z / HIT-Z-R	[N/mm²]	520	520	520	490	480
Stressed cross-section A_s	HIT-Z	[mm²]	36.6	58.0	84.3	157	245
Moment of resistance W	HIT-Z	[mm³]	31.9	62.5	109.7	278	542

Material quality

Part	Material
HIT-Z	C-steel cold formed, steel galvanized ≥ 5µm
HIT-Z-R	stainless steel cold formed, A4

Anchor dimensions

Anchor size			M8	M10	M12	M16	M20
Length of anchor	min ℓ	[mm]	80	95	105	155	215
	max ℓ	[mm]	120	160	196	240	250
Helix length	ℓ_{Helix}	[mm]	50	60	60	96	100

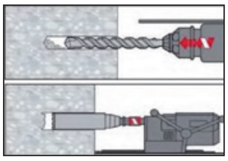


Installation equipment

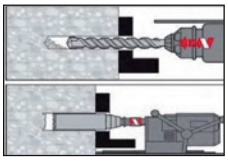
Anchor size	M8	M10	M12	M16	M20
Rotary hammer		TE 2 – TE 40		TE 40 – TE 70	

Setting instructions

Bore hole drilling



Pre-setting: Drill hole to the required drilling depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit.
Diamond coring is permissible when diamond core drilling machine and the corresponding core bit are used.

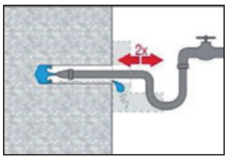


Through-setting: Drill hole through the clearance hole in the fixture to the required drilling depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit.
Diamond coring is permissible when diamond core drilling machine and the corresponding core bit are used.

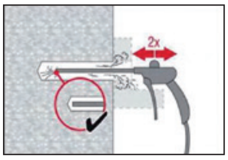
Bore hole cleaning

a) No cleaning required for hammer drilled boreholes.

b) Hole flushing and evacuation for wet-drilled diamond cored holes or flooded holes



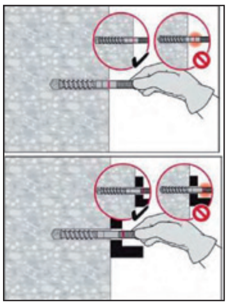
Flush 2 times from the back of the hole over the hole length.



Blow 2 times the hole with oil-free compressed air (min. 6 bar at 6 m³/h) to evacuate the water.

Check of setting depth and compress of the drilling dust

Check of setting depth and compress of the drilling dust

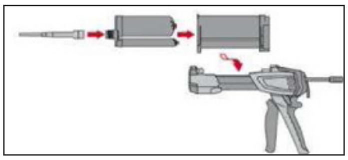


Mark the element and check the setting depth and compress the drilling dust. The element has to fit in the hole until the required embedment depth.
If it is not possible to compress the dust, remove the dust in the drill hole or drill deeper.

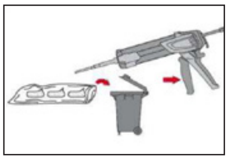
a) When drilling downward with non-cleaning the required drilling depths can vary due to accumulation of dust in the hole.

Setting instructions

Injection preparation



Tightly attach new Hilti mixing nozzle HIT-RE-M to foil pack manifold (snug fit). Do not modify the mixing nozzle. Observe the instruction for use of the dispenser. Check foil pack holder for proper function. Do not use damaged foil packs / holders. Swing foil pack holder with foil pack into HIT dispenser.



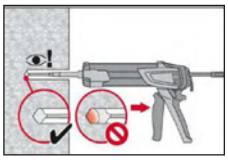
Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded.

Discard quantities are:

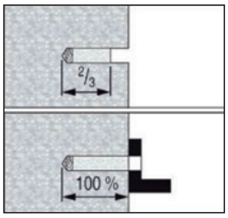
2 strokes for 330 ml foil pack,

3 strokes for 500 ml foil pack,

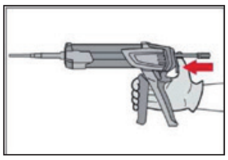
Inject adhesive from the back of the borehole without forming air voids



Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull.

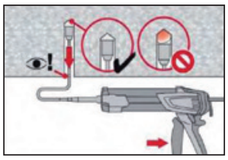


Fill holes approximately 2/3 full for Pre-setting and 100% full for throughsetting, or as required to ensure that the annular gap between the anchor and the concrete is completely filled with adhesive along the embedment length.



After injection is completed, depressurise the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

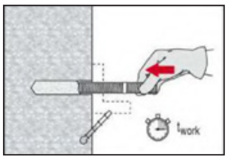
Overhead installation



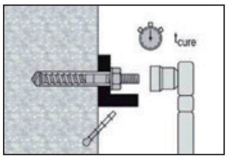
For overhead installation the injection is only possible with the aid of extensions and piston plugs. Assemble HIT-RE-M mixer, extension(s) and appropriately piston plug HIT-SZ. Insert piston plug to back of the hole and inject adhesive. During injection the piston plug will be naturally extruded out of the bore hole by the adhesive pressure

Setting instructions

Setting the element



Before use, verify that the element is dry and free of oil and other contaminants. Set element to the required embedment depth until working time t_{work} has elapsed. After setting the element the annular gap between the anchor and the fixture (through-setting) or concrete (pre-setting) has to be completely filled with mortar.



After required curing time t_{cure} remove excess mortar.
Apply indicated torque moment to activate anchor functioning principles.
The anchor can be loaded.

For detailed information on installation see instruction for use given with the package of the product.

Setting details

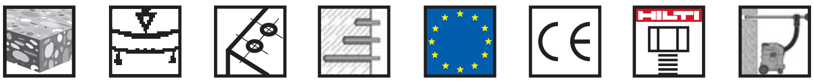
Anchor size			M8	M10	M12	M16	M20
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	22
Effective embedment and drill hole depth range a) for HIT-V	$h_{nom,min}$	[mm]	60	60	60	96	100
	$h_{nom,max}$	[mm]	100	120	150	200	220
Minimum base material thickness	h_{min}	[mm]	h_{nom} + 60			h_{nom} + 100	
Pre-setting: Diameter of clearancehole in the fixture	$d_f \leq$	[mm]	9	12	14	18	22
Through-setting: Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	11	14	16	20	24
Torque moment	T_{max}	[Nm]	10	25	40	80	150

Working time, curing time

Temperature of the base material	HIT-HY 200-R	
	Working time in which anchor can be inserted and adjusted t_{work}	Curing time before anchor can be loaded t_{cure}
5 °C	1 hour	3 hour
6 °C to 10 °C	40 min	2 hour
11 °C to 20 °C	15 min	1 hour
21 °C to 30 °C	9 min	1 hour
31 °C to 40 °C	6 min	1 hour

Hilti HIT-HY 200 with rebar

Injection Mortar System		Benefits
	Hilti HIT-HY 200-R 500 ml foil pack (also available as 330 ml foil pack)	■ Suitable for non-cracked and cracked concrete C 20/25 to C 50/60 ■ Suitable for dry and water saturated concrete ■ High loading capacity, excellent handling and fast curing ■ Small edge distance and anchor spacing possible ■ Large diameter applications ■ Max In service temperature range up to 120°C short term/ 72°C long term ■ Manual cleaning for borehole diameter up to 20mm and hef ≤ 10d for non-cracked concrete only
	Static mixer	
	Rebar BSt 500 S	



Concrete | Tensile zone | Small edge distance & spacing | Variable embedment depth | European Technical Approval | CE conformity | PROFIS anchor design software | SAFEset approved automatic cleaning

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval [a)]	DIBt, Berlin	ETA-12/0084 / 2013-06-20 (Hilti HIT-HY 200-R)

a) All data given in this section according ETA-11/0493 and ETA-12/0084, issue 2013-06-20.

Service temperature range

Hilti HIT-HY 200 injection mortar may be applied in the temperature ranges given below. An elevated base material temperature may lead to a reduction of the design bond resistance.

Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range I	-40 °C to +40 °C	+24 °C	+40 °C
Temperature range II	-40 °C to +80 °C	+50 °C	+80 °C
Temperature range III	-40 °C to +120 °C	+72 °C	+120 °C

Max short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

Max long term base material temperature

Long-term elevated base material temperatures are roughly constant over significant periods of time

Design process for typical anchor layouts

The design values in the tables are obtained from Profis V2.2.1 in compliance with the design method according to EOTA TR 029. Design resistance according to data given in ETA-12/0084, issue 2013-06-20.

- Influence of concrete strength
- Influence of edge distance
- Influence of spacing

The design method is based on the following simplification:

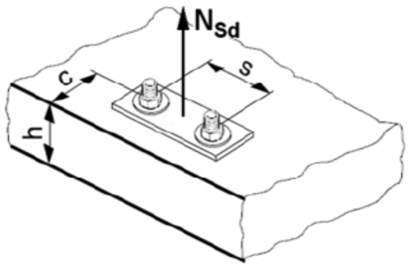
- No different loads are acting on individual anchors (no eccentricity)

The values are valid for the anchor configuration.

For more complex fastening applications please use the anchor design software PROFIS Anchor.

STEP 1: TENSION LOADING

The design tensile resistance N_{Rd} is the lower of:



- **Combined pull-out and concrete cone resistance**
  $N_{Rd,p} = f_{B,p} \cdot N^*_{Rd,p}$

$N^*_{Rd,p}$ is obtained from the relevant design tables

$f_{B,p}$ influence of concrete strength on combined pull-out and concrete cone resistance

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
$f_{B,p}$	1.00	1.00	1.00	1.00	1.00

- **Concrete cone or concrete splitting resistance**
  $N_{Rd,c} = f_B \cdot N^*_{Rd,c}$

$N^*_{Rd,c}$ is obtained from the relevant design tables

f_B influence of concrete strength on concrete cone resistance

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
f_B	0.79	0.87	1.00	1.11	1.22

- **Design steel resistance $N_{Rd,s}$**

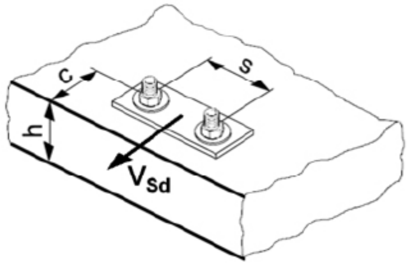
			Data according ETA-11/0493 and ETA-12/0084, issue 2013-06-20								
Anchor size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø28	Ø32
$N_{Rd,s}$	BSt 500 S	[kN]	20.0	30.7	44.3	60.7	79.3	123.6	177.8	242.1	315.7

$$N_{Rd} = \min \{ N_{Rd,p}, N_{Rd,c}, N_{Rd,s} \}$$

CHECK $N_{Rd} \geq N_{Sd}$

STEP 2: SHEAR LOADING

The design shear resistance V_{Rd} is the lower of:



- **Design Concrete Edge Resistance**

$V_{Rd,c} = f_B \cdot V^*_{Rd,c} \cdot \psi_{re,V}$

$V^*_{Rd,c}$ is obtained from the relevant design table

The factor ψ_{re},V takes account of the effect of the type of reinforcement used in cracked concrete.

ψ_{re},V = 1.0 anchorage in non-cracked concrete

ψ_{re},V = 1.0 anchorage in cracked concrete without edge reinforcement

ψ_{re},V = 1.2 anchorage in cracked concrete with straight edge reinforcement (≥ Ø12 mm)

ψ_{re},V = 1.4 anchorage in cracked concrete with edge reinforcement and closely spaced stirrups (a ≤ 100 mm)

f_B influence of concrete strength

Concrete Strengths $f'_{c,cyl}$ (MPa)	20	25	32	40	50
f_B	0.79	0.87	1.00	1.11	1.22

Shear load acting parallel to edge:

These tables are for a single free edge only

2 anchors:

For shear loads acting parallel to this edge, the concrete resistance **$V^*_{Rd,c}$ can be multiplied by the factor = 2.5**

4 anchors:

For shear loads acting parallel to the edge - the anchor row closest to the edge is checked to resist half the total design load. To obtain the concrete resistance use the corresponding 2 anchor configuration **$V^*_{Rd,c}$ and multiply by the factor = 2.5**

- **Design steel resistance $V_{Rd,s}$**

	Data according ETA-11/0493 and ETA-12/0084, issue 2013-06-20								
Anchor size	**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
$V_{Rd,s}$ BSt 500 S [kN]	9.3	14.7	20.7	28.0	36.7	57.3	83.0	112.7	147.3

$$V_{Rd} = \min \{ V_{Rd,c}, V_{Rd,s} \}$$

CHECK $V_{Rd} \geq V_{Sd}$

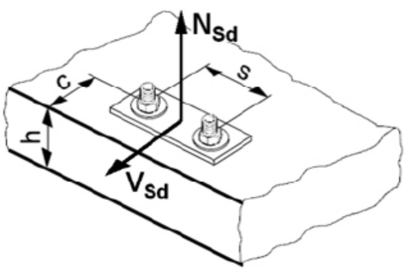
STEP 3: COMBINED TENSION AND SHEAR LOADING

The following equations must be satisfied:

$$N_{Sd}/N_{Rd} + V_{Sd}/V_{Rd} \leq 1.2$$

and

$$N_{Sd}/N_{Rd} \leq 1, \; V_{Sd}/V_{Rd} \leq 1$$



Precalculated table values – design resistance values

General:

The following tables provide the total ultimate limit state design resistance for the configurations.
All tables are based upon:

- correct setting (See setting instruction)
- non cracked and cracked concrete – $f_{c,cyl}$ = 32 MPa
- temperature range I (see service temperature range)
- base material thickness, as specified in the table
- Three typical embedment depths, as specified in the tables

The following tables give design values for typical embedment depths. The latest version of the Hilti software Profis allows the engineer to optimise their design by varying the embedment depth according to the applied loads to achieve an economical solution every time.

The anchor design software program Profis can be download from the Hilti Australia website, www.hilti.com.au.

Single anchor – uncracked concrete – no edge and spacing influences

Embedment 1

Design Resistance $f_{c,cyl}$ - 32Mpa										
Rebar size			**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth		[mm]	60	60	72	96	120	144	168	192
Base material thickness		[mm]	100	100	104	136	170	210	238	272
Tensile Single anchor no edge										
Pull-out	$N^*_{Rd,p}$	[kN]	12.0	15.1	21.7	38.6	60.3	73.6	118.2	154.4
Concrete	$N^*_{Rd,c}$	[kN]	19.8	19.8	26.0	40.1	56.0	90.4	92.7	113.3
Shear Single anchor no edge										
Shear	$V_{Rd,s}$	[kN]	9.3	14.7	20.7	36.7	57.3	83.0	112.7	147.3

Embedment 2

Design Resistance $f_{c,cyl}$ - 32Mpa										
Rebar size			**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth		[mm]	80	90	110	145	170	210	270	300
Base material thickness		[mm]	110	120	142	185	220	274	340	380
Tensile Single anchor no edge										
Pull-out	$N^*_{Rd,p}$	[kN]	16.1	22.6	33.2	58.3	85.4	132.0	190.0	241.3
Concrete	$N^*_{Rd,c}$	[kN]	30.4	36.3	49.1	74.4	94.4	129.6	188.9	221.3
Shear Single anchor no edge										
Shear	$V_{Rd,s}$	[kN]	9.3	14.7	20.7	36.7	57.3	83.0	112.7	147.3

Embedment 3

Design Resistance $f_{c,cyl}$ - 32Mpa										
Rebar size			**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth		[mm]	96	120	144	192	240	288	336	384
Base material thickness		[mm]	126	150	176	232	290	348	406	464
Tensile Single anchor no edge										
Pull-out	$N^*_{Rd,p}$	[kN]	19.3	30.2	43.4	77.2	120.6	188.5	236.4	308.8
Concrete	$N^*_{Rd,c}$	[kN]	40.0	56.0	73.6	113.3	158.3	221.3	262.3	320.4
Shear Single anchor no edge										
Shear	$V_{Rd,s}$	[kN]	9.3	14.7	20.7	36.7	57.3	83.0	112.7	147.3

Single anchor – uncracked concrete – minimum edge distance

Embedment 1

Design Resistance $f_{c,cyl}$ - 32Mpa										
Rebar size			**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth		[mm]	60	60	72	96	120	144	168	192
Base material thickness		[mm]	100	100	104	136	170	210	238	272
Edge Dist c= c_{min}		[mm]	40	50	60	80	100	125	140	160
Tensile Single anchor min edge										
Pull-out	$N^*_{Rd,p}$	[kN]	7.3	10.2	14.6	26.0	40.7	62.4	79.7	104.1
Concrete	$N^*_{Rd,c}$	[kN]	11.5	12.9	15.2	23.1	32.4	44.3	53.6	66.5
Shear Single anchor no edge										
Shear (without lever arm)	$V^*_{Rd,c}$	[kN]	4.4	6.2	8.4	13.7	19.9	28.6	35.0	43.8

Embedment 2

Design Resistance $f_{c,cyl}$ - 32Mpa										
Rebar size			**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth		[mm]	80	90	110	145	170	210	270	300
Base material thickness		[mm]	110	120	142	185	220	270	340	380
Edge Dist c= c_{min}		[mm]	40	50	60	80	100	125	140	160
Tensile Single anchor min edge										
Pull-out	$N^*_{Rd,p}$	[kN]	9.2	12.9	18.9	33.3	48.8	75.5	108.5	137.8
Concrete	$N^*_{Rd,c}$	[kN]	14.5	17.6	23.5	35.8	46.2	63.8	89.3	106.5
Shear Single anchor no edge										
Shear (without lever arm)	$V^*_{Rd,c}$	[kN]	4.7	6.7	9.3	14.5	21.7	31.6	40.0	49.8

Embedment 3

Design Resistance $f_{c,cyl}$ - 32Mpa										
Rebar size			**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth		[mm]	96	120	144	192	240	288	336	384
Base material thickness		[mm]	126	150	176	232	290	348	406	464
Edge Dist c= c_{min}		[mm]	40	50	60	80	100	125	140	160
Tensile Single anchor min edge										
Pull-out	$N^*_{Rd,p}$	[kN]	11.0	17.2	24.8	44.0	68.9	107.6	135.0	176.4
Concrete	$N^*_{Rd,c}$	[kN]	18.0	25.0	32.9	50.7	70.8	99.0	117.3	144.6
Shear Single anchor no edge										
Shear (without lever arm)	$V^*_{Rd,c}$	[kN]	4.9	7.2	9.9	16.3	23.9	35.2	42.8	53.9

2 anchors – uncracked concrete – minimum spacing influence

Embedment 1

Design Resistance $f_{c,cyl}$ - 32Mpa											
Rebar size				**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth			[mm]	60	60	72	96	120	144	168	192
Base material thickness			[mm]	100	100	104	136	170	210	238	272
Spacing dist $s=s_{min}$			[mm]	40	50	60	80	100	120	140	160
Tensile N_{Rd}											
	Pull-out	$N^*_{Rd,p}$	[kN]	16.4	20.5	29.0	49.8	77.1	116.6	151.1	197.3
	Concrete	$N^*_{Rd,c}$	[kN]	23.9	25.0	31.4	48.2	67.4	90.3	111.6	138.4
Shear V_{Rd}											
$V_{Rd,s}$ steel (per anchor)			[kN]	9.3	14.7	20.7	36.7	57.3	83.0	112.7	147.3
$V^*_{Rd,c}$ pryout			[kN]	N/A				143.1	189.7	237.0	289.5

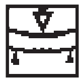
Embedment 2

Design Resistance $f_{c,cyl}$ - 32Mpa											
Rebar size				**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth			[mm]	80	90	110	145	170	210	270	300
Base material thickness			[mm]	110	120	142	185	220	270	340	380
Spacing dist $s=s_{min}$			[mm]	40	50	60	80	100	125	140	160
Tensile N_{Rd}											
	Pull-out	$N^*_{Rd,p}$	[kN]	22.0	30.2	43.7	74.7	105.5	158.1	227.5	289.0
	Concrete	$N^*_{Rd,c}$	[kN]	34.1	41.0	55.1	83.4	106.7	146.7	210.6	250.0
Shear V_{Rd}											
$V_{Rd,s}$ (per anchor)			[kN]	9.3	14.7	20.7	36.7	57.3	83.0	112.7	147.3

Embedment 3

Design Resistance $f_{c,cyl}$ - 32Mpa											
Rebar size				**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth			[mm]	96	120	144	192	240	288	336	384
Base material thickness			[mm]	126	150	176	232	290	348	406	464
Spacing dist $s=s_{min}$			[mm]	40	50	60	80	100	125	140	160
Tensile N_{Rd}											
	Pull-out	$N^*_{Rd,p}$	[kN]	26.6	41.1	58.5	101.7	155.5	236.5	292.2	373.9
	Concrete	$N^*_{Rd,c}$	[kN]	43.8	61.1	80.3	123.7	172.9	241.7	286.4	353.0
Shear V_{Rd}											
$V_{Rd,s}$ (per anchor)			[kN]	9.3	14.7	20.7	36.7	57.3	83.0	112.7	147.3

Single anchor – cracked concrete – no edge and spacing influences



Tensile zone

Embedment 1

Design Resistance $f_{c,cyl}$ - 32Mpa								
Rebar size		**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth	[mm]	60	72	96	120	144	168	192
Base material thickness	[mm]	100	104	136	170	210	238	272
Tensile Single anchor no edge								
Pull-out $N^*_{Rd,p}$	[kN]	6.3	12.7	22.5	35.1	52.8	69.0	90.0
Concrete $N^*_{Rd,c}$	[kN]	14.1	18.5	28.5	39.9	52.4	66.1	80.8
Shear V_{Rd}								
$V_{Rd,s}$ steel (per anchor)	[kN]	14.7	20.7	36.7	57.3	83.0	112.7	147.3
$V^*_{Rd,c}$ pryout	[kN]	12.6	25.3	45.0	70.4	104.9	132.2	161.5

Embedment 2

Design Resistance $f_{c,cyl}$ - 32Mpa								
Rebar size		**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth	[mm]	90	110	145	170	210	270	300
Base material thickness	[mm]	120	142	185	220	274	340	380
Tensile Single anchor no edge								
Pull-out $N^*_{Rd,p}$	[kN]	9.4	19.4	34.0	49.8	77.0	110.8	140.7
Concrete $N^*_{Rd,c}$	[kN]	25.9	35.0	53.0	67.3	92.4	134.7	157.7
Shear Single anchor no edge								
$V_{Rd,s}$	[kN]	14.7	20.7	36.7	57.3	83.0	112.7	147.3

Embedment 3

Design Resistance $f_{c,cyl}$ - 32Mpa								
Rebar size		**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth	[mm]	120	144	192	240	288	336	384
Base material thickness	[mm]	150	176	232	290	348	406	464
Tensile Single anchor no edge								
Pull-out $N^*_{Rd,p}$	[kN]	12.6	25.3	45.0	70.4	105.5	137.9	180.2
Concrete $N^*_{Rd,c}$	[kN]	39.9	52.4	80.8	112.8	148.4	187.0	228.4
Shear Single anchor no edge								
$V_{Rd,s}$	[kN]	14.7	20.7	36.7	57.3	83.0	112.7	147.3

Single – cracked concrete – minimum edge distance

Tensile zone

Embedment 1

Design Resistance $f_{c,cyl}$ - 32Mpa									
Rebar size			**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth		[mm]	60	72	96	120	144	168	192
Base material thickness		[mm]	100	104	136	170	210	238	272
Edge Dist c= c_{min}		[mm]	50	60	80	100	125	140	160
Tensile Single anchor min edge									
Pull-out	$N^*_{Rd,p}$	[kN]	4.2	8.5	15.2	23.7	36.4	46.5	60.7
Concrete	$N^*_{Rd,c}$	[kN]	9.2	10.8	16.5	23.1	31.6	38.2	47.4
Shear Single anchor min edge									
Shear (without lever arm)	$V^*_{Rd,c}$	[kN]	4.4	6.0	9.7	14.1	20.3	24.8	31.0

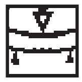
Embedment 2

Design Resistance $f_{c,cyl}$ - 32Mpa									
Rebar size			**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth		[mm]	90	110	145	170	210	270	300
Base material thickness		[mm]	120	142	185	220	270	340	380
Edge Dist c= c_{min}		[mm]	50	60	80	100	125	140	160
Tensile Single anchor min edge									
Pull-out	$N^*_{Rd,p}$	[kN]	5.4	11.1	19.4	28.4	44.0	63.3	80.4
Concrete	$N^*_{Rd,c}$	[kN]	12.6	16.8	22.5	33.0	45.5	63.7	75.9
Shear Single anchor min edge									
Shear (without lever arm)	$V^*_{Rd,c}$	[kN]	4.8	6.6	10.3	15.4	22.4	28.3	35.3

Embedment 3

Design Resistance $f_{c,cyl}$ - 32Mpa									
Rebar size			**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth		[mm]	120	144	192	240	288	336	384
Base material thickness		[mm]	150	176	232	290	348	406	464
Edge Dist c= c_{min}		[mm]	50	60	80	100	125	140	160
Tensile Single anchor min edge									
Pull-out	$N^*_{Rd,p}$	[kN]	7.2	14.5	25.7	40.2	60.3	78.8	102.9
Concrete	$N^*_{Rd,c}$	[kN]	17.8	23.5	36.1	50.5	67.0	83.6	103.0
Shear Single anchor min edge									
Shear (without lever arm)	$V^*_{Rd,c}$	[kN]	5.1	7.0	11.5	17.0	24.6	30.3	38.2

2 anchors – cracked concrete – minimum spacing influence


Tensile zone

Embedment 1

Design Resistance $f_{c,cyl}$ - 32Mpa								
Rebar size		**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth	[mm]	60	72	96	120	144	168	192
Base material thickness	[mm]	100	104	136	170	210	238	272
Spacing dist $s=s_{min}$	[mm]	50	60	80	100	120	140	160
Tensile N_{Rd}								
Pull-out $N^*_{Rd,p}$	[kN]	9.1	17.6	30.5	46.5	68.0	88.1	115.1
Concrete $N^*_{Rd,c}$	[kN]	17.8	22.4	34.4	48.0	64.4	79.5	98.6
Shear V_{Rd}								
$V_{Rd,s}$ steel (per anchor)	[kN]	14.7	20.7	36.7	57.3	83.0	112.7	147.3
$V^*_{Rd,c}$ pryout	[kN]	18.3	35.2	61.0	93.0	135.2	168.9	206.4

Embedment 2

Design Resistance $f_{c,cyl}$ - 32Mpa								
Rebar size		**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth	[mm]	90	110	145	170	210	270	300
Base material thickness	[mm]	120	142	185	220	270	340	380
Spacing dist $s=s_{min}$	[mm]	50	60	80	100	125	140	160
Tensile N_{Rd}								
Pull-out $N^*_{Rd,p}$	[kN]	13.3	26.3	51.0	64.7	97.4	140.6	174.8
Concrete $N^*_{Rd,c}$	[kN]	29.2	39.2	65.9	76.0	104.6	150.1	178.2
Shear V_{Rd}								
$V_{Rd,s}$ steel (per anchor)	[kN]	14.7	20.7	36.7	57.3	83.0	112.7	147.3
$V^*_{Rd,c}$ pryout	[kN]	26.6	52.7	90.6	129.4	194.8	281.2	349.7

Embedment 3

Design Resistance $f_{c,cyl}$ - 32Mpa								
Rebar size		**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Embedment depth	[mm]	120	144	192	240	288	336	384
Base material thickness	[mm]	150	176	232	290	348	406	464
Spacing dist $s=s_{min}$	[mm]	50	60	80	100	125	140	160
Tensile N_{Rd}								
Pull-out $N^*_{Rd,p}$	[kN]	17.9	35.0	61.2	94.2	138.1	179.2	230.8
Concrete $N^*_{Rd,c}$	[kN]	43.6	57.3	88.2	123.3	162.6	204.2	251.7
Shear V_{Rd}								
$V_{Rd,s}$ steel (per anchor)	[kN]	14.7	20.7	36.7	57.3	83.0	112.7	147.3

Materials

Mechanical properties of rebar BSt 500S

Anchor size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø28	Ø32
Nominal tensile strength f_{uk}	BSt 500 S	[N/mm²]	550	550	550	550	550	550	550	550	550
Yield strength f_{yk}	BSt 500 S	[N/mm²]	500	500	500	500	500	500	500	500	500
Stressed cross-section A_s	BSt 500 S	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	452	615.8	804.2
Moment of resistance	BSt 500 S	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1415	2155	3217

Material quality

Part	Material
rebar BSt 500 S	Geometry and mechanical properties according to DIN 488-2:1986 or E DIN 488-2:2006

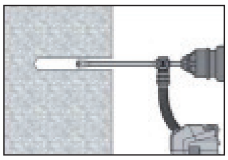
Setting

installation equipment

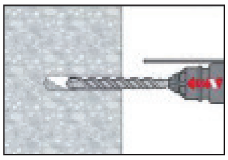
Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø28	Ø32
Rotary hammer	TE 2 – TE 30					TE 40– TE 70			
Other tools	compressed air gun or blow out pump, set of cleaning brushes, dispenser								

Setting instructions

Bore hole drilling



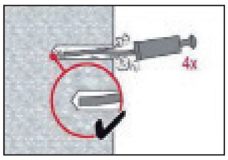
Drill hole to the required embedment depth with an appropriately sized Hilti TE-CD or TE-YD hollow drill bit with Hilti vacuum attachment. This drilling method properly cleans the borehole and removes dust while drilling.
After drilling is complete, proceed to the **"injection preparation"** step in the instructions for use



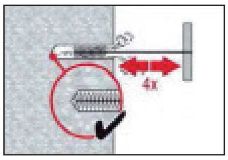
Drill Hole to the required embedment depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit.

Bore hole cleaning **Just before setting an anchor, the bore hole must be free of dust and debris.**

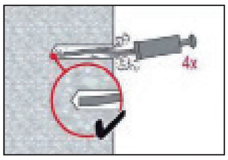
a) Manual Cleaning (MC) non-cracked concrete only for bore hole diameters d_0 ≤ 20 mm and bore hole depth h_0 ≤ 10d



The Hilti manual pump may be used for blowing out bore holes up to diameters d_0 ≤ 20 mm and embedment depths up to h_{ef} ≤ 10d.
Blow out at least 4 times from the back of the bore hole until return air stream is free of noticeable dust

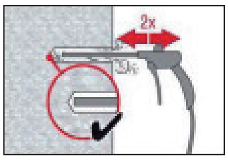


Brush 4 times with the specified brush size by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole -- if not the brush is too small and must be replaced with the proper brush diameter.

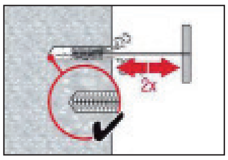


Blow out again with manual pump at least 4 times until return air stream is free of noticeable dust.

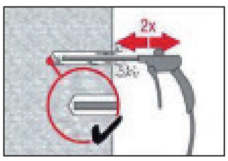
b) Compressed air cleaning (CAC) for all bore hole diameters d_0 and all bore hole depth h_0



Blow 2 times from the back of the hole (if needed with nozzle extension) over the hole length with oil-free compressed air (min. 6 bar at 6 m³/h) until return air stream is free of noticeable dust. Bore hole diameter ≥ 32 mm the compressor must supply a minimum air flow of 140 m³/hour.



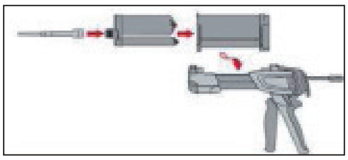
Brush 2 times with the specified brush size by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole -- if not the brush is too small and must be replaced with the proper brush diameter.



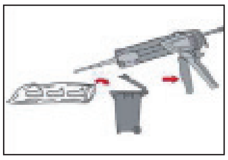
Blow out again with manual pump at least 4 times until return air stream is free of noticeable dust.

Setting instructions

Injection preparation

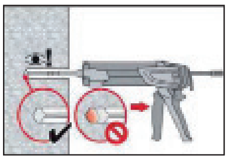


Tightly attach new Hilti mixing nozzle HIT-RE-M to foil pack manifold (snug fit). Do not modify the mixing nozzle. Observe the instruction for use of the dispenser. Check foil pack holder for proper function. Do not use damaged foil packs / holders. Swing foil pack holder with foil pack into HIT dispenser.

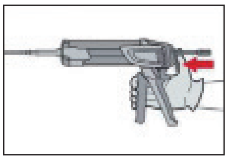


Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded.
Discard quantities are:
2 strokes for 330 ml foil pack,
3 strokes for 500 ml foil pack,
4 strokes for 500 ml foil pack ≤ 5°C.

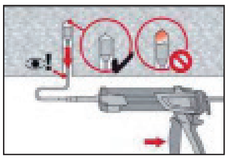
Inject adhesive **from the back of the borehole without forming air voids**



Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull. Fill holes approximately 2/3 full, or as required to ensure that the annular gap between the anchor and the concrete is completely filled with adhesive along the embedment length.

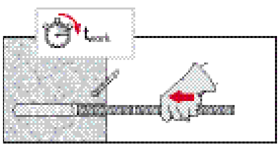


After injection is completed, depressurise the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

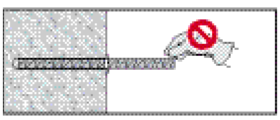


Overhead installation and/or installation with embedment depth h_{ef} > 250mm. For overhead installation the injection is only possible with the aid of extensions and piston plugs. Assemble HIT-RE-M mixer, extension(s) and appropriately sized piston plug. Insert piston plug to back of the hole and inject adhesive. During injection the piston plug will be naturally extruded out of the bore hole by the adhesive pressure.

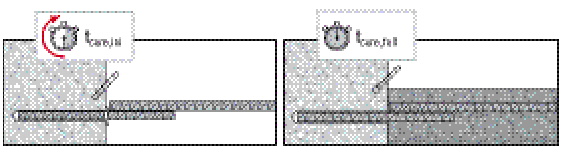
Setting the element



Before use, verify that the element is dry and free of oil and other contaminants.
Mark and set element to the required embedment depth untill working time t_{work} has elapsed



For overhead installation use piston plugs and fix embedded parts with e.g. wedges HIT-OHW

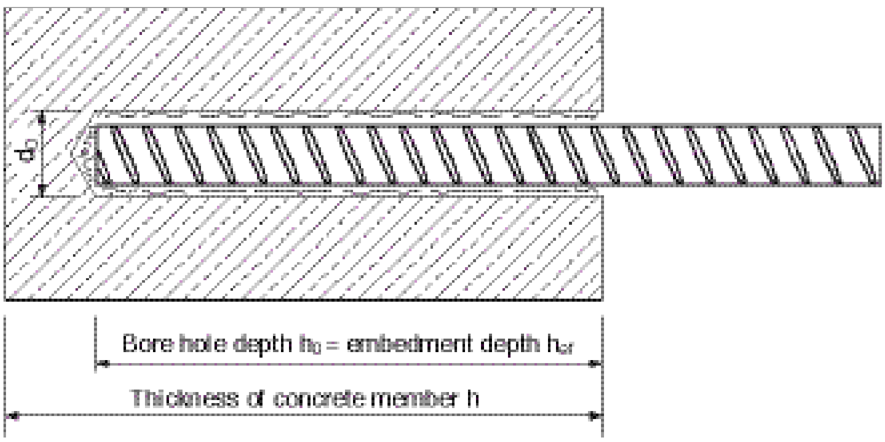


Loading the anchor:
After required curing time t_{cure} the anchor can be loaded.

Working time, curing time

Temperature of the base material T_{BM}	Working time in which anchor can be inserted and adjusted t_{work}	Curing time before anchor can be loaded t_{cure}
-10 °C to -5 °C	3 hour	20 hour
-4 °C to 0 °C	2 hour	7 hour
1 °C to 5 °C	1 hour	3 hour
6 °C to 10 °C	40 min	2 hour
11 °C to 20 °C	15 min	1 hour
21 °C to 30 °C	9 min	1 hour
31 °C to 40 °C	6 min	1 hour

Setting details



			Data according ETA-11/0493 and ETA-12/0084, issue 2013-06-20								
Anchor size			**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø24**	**Ø28**	**Ø32**
Nominal diameter of drill bit	d_0	[mm]	12 (10)[a)]	14 (12)[a)]	16 (14)[a)]	18	20	25	32	35	40
Effective anchorage and drill hole depth range	$h_{ef,min}$	[mm]	60	60	70	75	80	90	100	112	128
	$h_{ef,max}$		160	200	240	280	320	400	500	560	640
Minimum base material thickness	h_{min}	[mm]	h_{ef} + 30 mm			h_{ef} + 2 d_0					
Minimum spacing	s_{min}	[mm]	40	50	60	70	80	100	125	140	160
Minimum edge distance	c_{min}	[mm]	40	50	60	70	80	100	125	140	160

a) both given values for drill bit diameter can be used

b) $h_{ef,min}$ h_{ef} $h_{ef,max}$ (h_{ef}: embedment depth)

c) h: base material thickness ($h \geq h_{min}$)