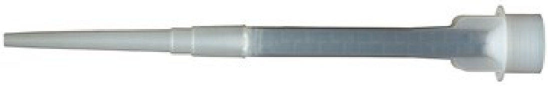
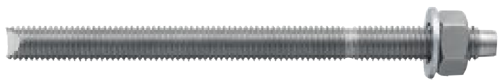
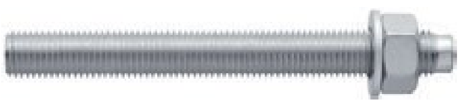
Hilti HIT-HY 110 with HIT-V / HAS

Injection Mortar System	Benefits
 Hilti-HY 110 available in 330ml and 500ml foil packs. (also 1400ml subject to lead time)  Static mixer  HAS-E rod  HIT-V rods HIT-V (Zinc) HIT-V-F (Gal) HIT-V-R (A4-70) HIT-V-HCR rods	■ suitable for non-cracked concrete C 20/25 to C 50/60 ■ suitable for dry and water saturated concrete ■ small edge distance and anchor spacing possible ■ large diameter applications ■ high corrosion resistant ■ in service temperature range up to 120°C short term/72°C long term ■ manual cleaning for drill hole sizes ≤ 18 mm and embedment depth hef ≤ 10d ■ embedment depth range M8: 60 to 160 mm M30: 120 to 600 m

Concrete | Small edge distance & spacing | Variable embedment depth | Corrosion resistance | High corrosion resistance | European Technical Approval | CE conformity

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval a)	DIBt, Berlin	ETA-08/0341 / 2013-03-18

a) All data given in this section according ETA-08/0341 issue 2013-03-18.

Service temperature range

Hilti HIT-HY 110 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 V2.4.7 in compliance with the design method according to EOTA TR 029. Design resistance according to data given in ETA-08/0341, issue 2013-03-18.

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

The design method is based on the following simplification:

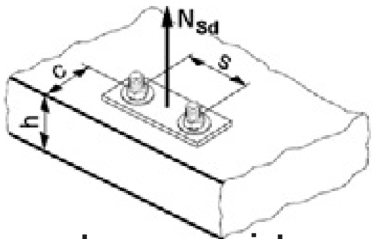
- No different loads are acting on individual anchors (no eccentricity)

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
$f_{B,p}$	0.95	0.97	1.00	1.02	1.04

- **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) $N_{Rd,s}$**

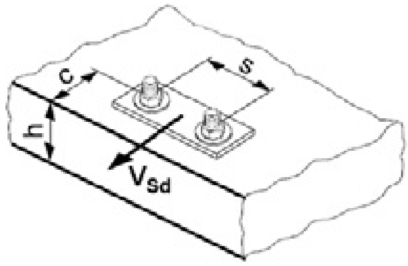
Anchor size			M8	M10	M12	M16	M20	M24	M30
$N_{Rd,s}$	HAS – E 5.8	[kN]	11.3	17.3	25.3	48.0	74.7	106.7	-
	HIT-V 5.8	[kN]	12.0	19.3	28.0	52.7	82.0	118.0	187.3
	HIT-V 8.8	[kN]	19.3	30.7	44.7	84.0	130.7	188.0	299.3
	HAS-E-R	[kN]	12.3	19.8	28.3	54.0	84.0	119.8	92.0
	HIT-V-R	[kN]	13.9	21.9	31.6	58.8	92.0	132.1	98.3

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

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

STEP 2: SHEAR LOADING

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



- **Design Concrete Edge Resistance**
  $V_{Rd,c} = f_B \cdot V^*_{Rd,c}$

$V^*_{Rd,c}$ 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	M24	M30
$V_{Rd,s}$	HAS – E 5.8	[kN]	6.8	10.4	15.2	28.8	44.8	64.0	-
	HIT-V 5.8	[kN]	7.2	12.0	16.8	31.2	48.8	70.4	112.0
	HIT-V 8.8	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
	HAS-E-R	[kN]	7.7	12,2	17.3	32.7	50.6	71.8	55.5
	HIT-V-R	[kN]	8.3	12.8	19.2	35.3	55.1	79.5	58.8

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

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

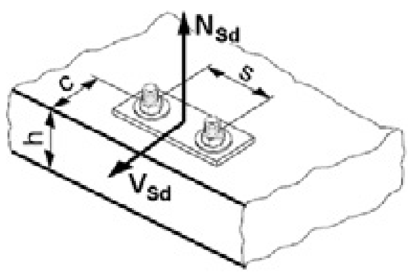
STEP 3: COMBINED TENSION AND SHEAR LOADING

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 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
- hammer drilled hole

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

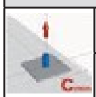
Anchor size	M8	M10	M12	M16	M20	M24
Typical embedment depth h_{ef} [mm]	80	90	110	125	170	210
Base material thickness h [mm]	110	120	140	170	220	270

Design resistance [kN] - dry concrete, 32 Mpa

Anchor size			M8	M10	M12	M16	M20	M24
Non-cracked concrete								
Tensile	Pull-out	$N^*_{Rd,p}$	15.8	18.5	27.2	28.9	46.4	64.7
	Concrete	$N^*_{Rd,c}$	Concrete cone or splitting not critical					
Shear		$V_{Rd,s}$	Steel governed refer $V_{Rd,s}$ table					

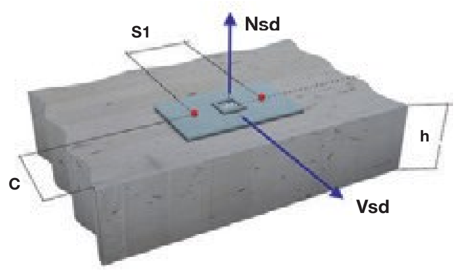
Basic loading data (for a single anchor) – with minimum edge distance

Design resistance [kN] - dry concrete, 32 Mpa

Anchor size			M8	M10	M12	M16	M20	M24
Min. edge distance		c_{min} [mm]	40	50	60	80	100	120
Min Base thickness		h_{min} [mm]	110	120	140	170	220	270
Tensile NRd								
	Pull-out	$N^*_{Rd,p}$	9.2	10.8	15.8	17.6	28.7	40.6
	Concrete	$N^*_{Rd,c}$	14.5	14.7	19.6	22.6	33.7	45.4
Shear VRd								
	Shear (without lever arm)	$V^*_{Rd,c}$	4.7	6.8	9.3	14.5	21.7	29.8

Two Anchors

Table 1: One edge influence



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	140	170	220	270

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	12.7	16.2	6.3	18.8	21.1	13.1	21.8	23.7	15.4	21.8	30.9	21.0	21.8	34.1	23.2
80	14.2	17.9	7.9	21.1	23.3	15.0	24.4	26.2	17.2	24.4	34.2	22.7	24.4	37.6	24.9
100	15.0	18.8	8.6	22.3	24.4	15.9	25.7	27.4	18.1	25.7	35.8	23.6	25.7	39.4	25.7
120	15.7	19.6	9.4	23.4	25.5	16.9	27.0	28.7	19.0	27.0	37.4	24.4	27.0	41.2	26.6
150	16.8	20.4	9.4	25.0	27.2	18.3	28.9	30.6	20.4	28.9	39.9	25.7	28.9	43.9	27.9
200	18.4	23.0	9.4	27.4	29.9	20.6	31.6	33.7	22.6	31.6	43.9	27.9	31.6	48.4	30.0

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	14.5	16.6	9.0	18.6	19.7	15.0	21.6	21.9	17.4	25.0	27.8	23.4	25.0	34.1	29.3
100	16.4	18.4	11.3	21.0	21.9	17.6	24.4	24.3	19.9	28.2	30.9	25.7	28.2	38.0	31.5
150	18.3	20.3	13.5	23.4	24.1	20.2	27.2	26.8	22.4	31.4	34.0	28.1	31.4	41.8	33.8
200	20.1	22.2	13.5	25.7	26.3	22.8	29.9	29.2	24.9	34.5	37.2	30.4	34.5	45.6	36.0
250	21.6	24.0	13.5	27.7	28.5	24.8	32.1	31.7	27.4	37.1	40.3	32.7	37.1	49.4	38.3
300	21.6	25.9	13.5	27.7	30.7	24.8	32.1	34.1	29.9	37.1	43.4	35.1	37.1	53.3	40.6

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	21.0	22.0	12.3	24.2	24.1	16.7	27.7	26.4	20.7	36.2	32.4	27.3	36.2	39.0	33.8
100	22.9	23.5	14.4	26.4	25.9	18.9	30.1	28.3	23.0	39.4	34.7	29.4	39.4	41.8	35.8
150	25.2	25.5	16.9	29.1	28.0	21.7	33.2	30.6	25.9	43.3	37.6	32.1	43.4	45.2	38.4
200	27.5	27.5	18.5	31.8	30.2	24.5	36.2	33.0	28.7	47.4	40.5	34.8	47.4	48.7	41.0
250	29.8	29.5	18.5	34.3	32.4	26.7	39.2	35.4	31.6	51.3	43.4	37.1	51.3	52.2	43.5
300	31.7	31.5	18.5	36.5	34.5	26.7	41.6	37.8	34.5	54.4	46.4	40.1	54.4	55.7	46.1

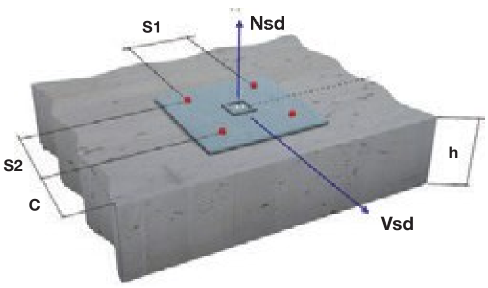
ANCHOR M16	Edge C (mm)														
	80			100			150			200			250		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
80	23.6	25.9	19.3	26.6	28.2	24.4	34.4	34.2	33.3	38.8	38.9	40.1	38.8	45.5	47.2
100	24.5	26.7	20.5	27.5	29.1	25.7	35.7	35.3	34.6	40.2	42.1	41.8	40.2	49.3	49.0
150	26.7	27.8	23.6	30.0	30.1	28.9	38.9	38.1	37.8	43.8	43.2	44.2	43.8	50.5	51.2
200	28.9	29.7	26.6	32.4	32.2	32.1	42.0	39.0	40.3	47.4	48.6	47.9	47.3	57.1	54.8
250	31.0	33.1	29.1	34.8	35.9	35.3	45.2	43.6	44.1	50.9	49.3	50.1	50.9	57.7	56.9
300	33.1	33.7	29.1	37.2	36.5	38.6	48.2	44.1	46.5	54.3	52.4	53.0	54.3	61.3	59.7

ANCHOR M20	Edge C (mm)														
	120			150			200			250			300		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
100	38.6	38.0	28.9	48.5	44.1	43.6	59.5	50.5	52.1	62.5	57.3	60.6	62.5	64.6	69.0
150	41.5	40.2	32.5	52.2	46.6	47.5	64.0	53.4	55.8	67.2	60.6	64.2	67.2	68.3	72.5
200	44.4	42.4	36.1	55.9	49.2	51.5	68.5	56.3	59.6	72.0	63.9	67.7	72.0	72.0	75.9
250	47.4	44.6	39.7	59.5	51.7	55.4	73.0	59.2	63.3	76.7	67.3	71.3	76.7	75.7	79.3
300	50.2	46.8	43.4	63.1	54.2	59.4	77.4	62.2	67.0	81.3	70.6	74.9	81.3	79.4	82.8
350	53.1	49.0	43.4	66.7	56.8	63.4	81.8	65.1	70.7	85.9	73.9	78.4	85.9	83.1	86.3

ANCHOR M24	Edge C (mm)														
	120			150			200			250			350		
spacing s1 (mm)	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
120	54.8	51.2	39.7	61.8	55.1	49.7	74.3	61.9	64.0	87.3	69.0	73.6	87.3	84.3	92.6
150	56.9	52.6	42.3	64.2	56.6	52.3	77.3	63.6	66.7	90.8	70.9	76.1	90.8	86.6	95.0
200	60.5	55.0	46.4	68.2	59.2	56.6	82.1	66.5	71.1	96.5	74.1	80.4	96.5	90.6	98.9
250	64.1	57.4	50.5	72.3	61.8	61.0	87.0	69.4	75.6	102.2	77.4	84.6	102.1	94.5	102.9
300	67.6	59.8	54.7	76.3	64.4	65.3	91.8	72.3	80.0	107.8	80.6	88.8	107.8	98.5	106.9
350	71.1	62.2	58.8	80.2	66.9	69.7	96.5	75.2	84.5	113.4	83.8	93.1	113.4	102.4	110.8

Four anchors

Table 2: One edge influence



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	140	170	220	270

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	19.2	19.3	12.6	27.1	24.4	17.7	30.9	27.2	19.9	30.9	34.8	25.4	30.9	38.1	30.9
80	25.2	24.7	15.8	34.3	30.7	23.8	38.6	34.0	26.0	38.6	42.7	31.4	38.6	46.5	36.8
100	28.4	27.7	17.3	38.2	34.1	26.8	42.7	37.6	29.0	42.7	47.0	34.4	42.7	51.0	39.8
120	31.7	30.8	18.8	42.1	37.7	29.8	47.0	41.4	32.0	47.0	51.5	37.4	47.0	55.8	42.7
150	36.5	35.8	18.8	48.2	43.5	34.3	53.5	47.5	36.4	53.5	58.6	41.8	53.5	63.3	47.0
200	44.5	45.0	18.8	57.4	53.9	41.2	63.3	58.6	43.7	63.3	71.4	49.0	63.3	76.9	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	21.6	19.9	17.5	26.7	23.2	21.0	30.4	25.5	23.4	34.6	31.8	29.3	34.6	38.4	35.1
100	28.6	25.9	22.5	34.7	29.8	29.2	39.0	32.5	31.6	43.9	39.8	37.3	43.9	47.5	43.0
150	36.4	32.6	27.0	43.4	37.1	37.2	48.4	40.2	39.5	54.0	48.7	45.1	54.0	57.6	50.8
200	44.8	40.0	27.0	52.7	45.2	45.0	58.4	48.8	47.3	64.7	58.5	52.9	64.7	68.6	58.4
250	52.1	48.2	27.0	61.0	54.1	49.7	67.2	58.2	55.0	74.2	69.2	60.5	74.2	80.6	66.0
300	52.1	57.2	27.0	61.0	63.8	49.7	67.2	68.5	59.8	74.1	80.8	68.1	74.2	93.6	73.6

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	30.8	26.3	23.3	34.8	28.6	26.0	39.0	30.9	28.6	49.4	37.3	35.1	49.4	44.2	41.5
100	37.6	31.2	28.8	42.0	33.7	33.3	46.7	36.4	35.8	58.4	43.4	42.2	58.4	51.1	48.5
150	46.8	38.0	33.8	52.0	40.9	42.2	57.3	43.8	44.7	70.5	51.8	50.9	70.5	60.4	57.1
200	56.8	45.4	37.0	62.6	48.6	49.0	68.7	52.0	53.3	83.5	60.9	59.5	83.5	70.5	65.6
250	67.4	53.3	37.0	73.9	57.0	53.4	80.7	60.8	61.9	97.2	70.7	68.0	97.2	81.4	74.0
300	76.4	62.1	37.0	83.5	66.1	53.4	90.9	70.3	69.0	108.8	81.3	76.3	108.8	93.0	82.4

Shear design: The concrete edge resistance value in this table uses all 4 anchors in shear. You will need to ensure the gap between anchor and the plate is filled. This can be achieved using the Hilti Dynamic Set. (Refer page 41 for further details)

The concrete edge resistance values have been obtained by taking the lesser of:

1. First row resistance multiplied by number of rows and
2. The concrete edge resistance of the furthest row.

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	34.8	31.9	34.8	38.4	34.3	37.8	48.2	40.7	45.0	53.5	47.7	52.2	53.5	55.2	59.3
100	37.9	34.4	39.0	41.7	37.0	41.9	51.9	43.7	49.1	57.4	51.0	56.2	57.4	58.9	63.2
150	45.9	41.3	47.2	50.2	44.1	52.0	61.6	51.7	59.0	67.8	59.9	66.0	67.8	68.6	72.9
200	54.6	48.7	53.2	59.3	51.9	61.8	72.0	60.3	68.7	78.9	69.4	75.6	78.9	79.1	82.5
250	63.7	56.7	58.2	69.0	60.3	70.6	83.0	69.6	78.4	90.5	79.6	85.2	90.5	90.3	92.0
300	73.4	65.4	58.2	79.2	69.3	77.2	94.5	79.6	87.8	102.8	90.6	94.6	102.8	102.3	101.4

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	56.9	45.9	52.1	69.2	52.3	60.6	82.6	59.2	69.0	86.2	66.4	77.3	86.2	74.0	85.6
150	67.2	52.7	64.2	80.7	59.7	72.4	95.5	67.1	80.7	99.5	75.0	88.7	99.5	83.3	97.0
200	78.3	60.0	72.2	93.1	67.6	84.0	109.2	75.6	92.2	113.6	84.1	100.3	113.6	93.0	108.3
250	90.0	67.7	79.5	106.1	75.9	95.5	123.7	84.6	103.5	128.5	93.8	111.5	128.5	103.4	119.5
300	102.2	75.8	86.8	119.8	84.7	106.7	138.9	94.1	114.7	144.0	103.9	122.6	144.0	114.3	130.5
350	115.0	84.4	86.8	134.0	94.0	117.9	154.6	104.0	125.7	160.1	114.6	133.6	160.1	125.7	141.5

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	80.8	61.5	71.7	89.5	65.7	77.4	104.9	72.9	86.9	120.7	80.4	96.4	120.7	96.5	115.0
150	88.2	65.9	79.9	97.3	70.2	85.6	113.5	77.7	95.0	130.1	85.6	104.3	130.1	102.4	122.8
200	101.1	73.5	92.8	111.0	78.2	98.9	128.6	86.2	108.2	146.6	94.6	117.3	146.6	112.6	142.9
250	114.8	81.5	101.0	125.5	86.5	112.0	144.5	95.1	121.1	163.9	104.0	130.2	163.9	123.2	148.3
300	129.1	90.0	109.4	140.7	95.3	124.9	161.1	104.4	133.9	182.0	114.0	142.9	182.0	134.3	160.8
350	144.0	98.8	117.6	156.5	104.4	137.6	178.4	114.2	146.6	200.7	124.3	155.5	200.7	145.9	173.3

Materials

Mechanical properties of HIT-V / HAS

Anchor size			M8	M10	M12	M16	M20	M24	M30
Nominal tensile strength f_{uk}	HIT-V/HAS 5.8	[N/mm²]	500	500	500	500	500	500	500
	HIT-V/HAS 8.8	[N/mm²]	800	800	800	800	800	800	800
	HIT-V/HAS -R	[N/mm²]	700	700	700	700	700	700	500
	HIT-V/HAS -HCR	[N/mm²]	800	800	800	800	800	700	700
Yield strength f_{yk}	HIT-V/HAS 5.8	[N/mm²]	400	400	400	400	400	400	400
	HIT-V/HAS 8.8	[N/mm²]	640	640	640	640	640	640	640
	HIT-V/HAS -R	[N/mm²]	450	450	450	450	450	450	210
	HIT-V/HAS -HCR	[N/mm²]	600	600	600	600	600	400	400
Stressed cross-section A_s	HAS	[mm²]	32.8	52.3	76.2	144	225	324	519
	HIT-V	[mm²]	36.6	58.0	84.3	157	245	353	561
Moment of resistance W	HAS	[mm³]	27.0	54.1	93.8	244	474	809	1706
	HIT-V	[mm³]	31.2	62.3	109	277	541	935	1874

Material quality

Part	Material
Threaded rod HIT-V(-F), HAS(-E)(-F) 5.8: M8 – M24	Strength class 5.8, A5 > 8% ductile steel galvanized ≥ 5 µm, (F) hot dipped galvanized ≥ 45 µm,
Threaded rod HIT-V(-F), HAS(-E) 8.8: M27 – M30	Strength class 8.8, A5 > 8% ductile steel galvanized ≥ 5 µm, (F) hot dipped galvanized ≥ 45 µm,
Threaded rod HIT-V-R, HAS-R	Stainless steel grade A4, A5 > 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, HAS-HCR	High corrosion resistant steel, 1.4529; 1.4565 strength ≤ M20: Rm = 800 N/mm², Rp 0.2 = 640 N/mm², A5 > 8% ductile M24 to M30: Rm = 700 N/mm², Rp 0.2 = 400 N/mm², A5 > 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	M30
Anchor rod HAS, HAS-E, HAS-R, HAS-ER HAS-HCR	M8x80	M10x90	M12x110	M16x125	M20x170	M24x210	M30x270
Anchor embedment depth [mm]	80	90	110	125	170	210	270
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	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						

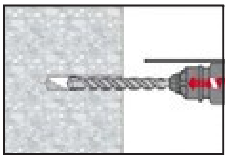
Working time, Curing time

Temperature of the base material T_{BM}	Working time t_{gel}	Curing time t_{cure}
-5 °C to -1 °C	90 min	9 h
0 °C to 4 °C	45 min	4.5 h
5 °C to 9 °C	20 min	2 h
10 °C to 19 °C	6 min	90 min
20 °C to 29 °C	4 min	50 min
30 °C to 39 °C	2 min	40 min

a) The curing time data are valid for dry anchorage base only. For water saturated anchorage bases the curing times must be doubled.

Setting instructions

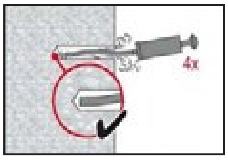
Bore hole drilling



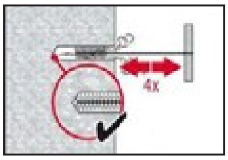
Drill Hole to the required embedment depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit.

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

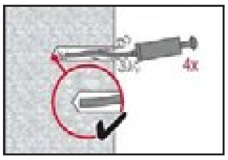
a) Manual Cleaning (MC) for bore hole diameters d_0 ≤ 18mm and bore hole depth h_0 ≤ 10d



The Hilti manual pump may be used for blowing out bore holes up to diameters d_0 ≤ 18 mm and embedment depths up to h_0 ≤ 10d or h_0 ≤ 160 mm. Blow out at least 4 times from the back of the bore hole until return air stream is free of noticeable dust

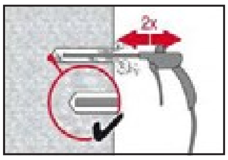


Brush 4 times with the specified brush size (brush Ø ≥ bore hole Ø) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole -- if not the brush is too small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

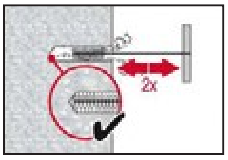


Blow out again with manual pump at least 4 times until return air stream is free of noticeable dust.

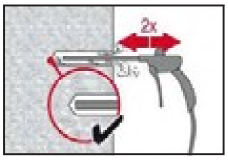
b) Compressed air cleaning (CAC) for all bore hole diameters d_0 and all bore hole depth h_0



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.



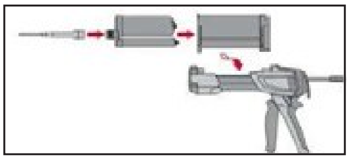
Brush 2 times with the specified brush size (brush Ø ≥ bore hole Ø) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole -- if not the brush is too small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



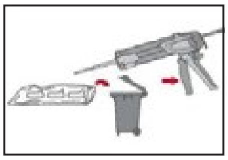
Blow again with compressed air 2 times until return air stream is free of noticeable dust.

Setting instructions

Injection preparation

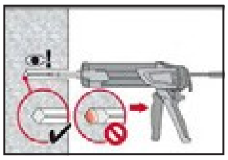


Tightly attach new Hilti mixing nozzle HIT-M1 to foil pack manifold (snug fit). Do not modify the mixing nozzle. Observe the instruction for use of the dispenser and the mortar. Check foil pack holder for proper function. Do not use damaged foil packs / holders. Insert foil pack into foil pack holder and put holder into HIT dispenser.

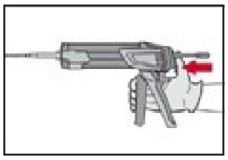


The foil pack opens automatically as dispensing is initiated. Discard initial adhesive. Depending on the size of the foil pack an initial amount of adhesive has to be discarded.
Discard quantities are:
2 strokes for 330 ml foil pack,
3 strokes for 500 ml foil pack,
45 ml for 1400 ml foil pack

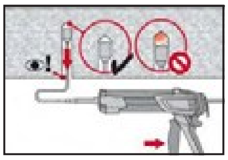
Inject adhesive **from the back of the borehole without forming air voids**



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

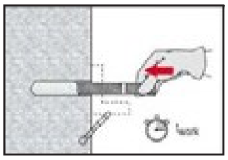


After injection is completed, depressurise the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

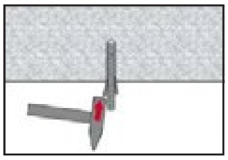


Overhead installation and/or installation with embedment depth h_{ef} > 250mm. For overhead installation the injection is only possible with the aid of extensions and piston plugs. Assemble HIT-M1 mixer, extension(s) and appropriately sized piston plug HIT-SZ. Insert piston plug to back of the hole and inject adhesive. During injection the piston plug will be naturally extruded out of the bore hole by the adhesive pressure.

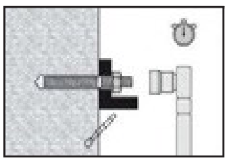
Setting the element



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 Hilti HIT-OHW



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.

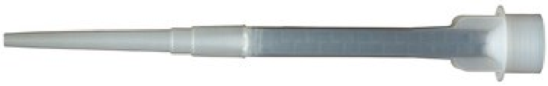
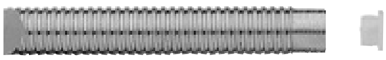
Setting details

Anchor size			M8	M10	M12	M16	M20	M24	M30
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	24	28	35
Effective embedment and drill hole depth range [a)] **FOR HIT-V**	$h_{ef,min}$	[mm]	60	60	70	80	90	100	120
	$h_{ef,max}$	[mm]	160	200	240	320	400	480	600
Effective anchorage and drill hole depth **FOR HAS**	h_{ef}	[mm]	80	90	110	125	170	210	270
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	33
Torque moment b)	T_{max} [b)]	[Nm]	10	20	40	80	150	200	300
Minimum spacing	s_{min}	[mm]	40	50	60	80	100	120	150
Minimum edge distance	c_{min}	[mm]	40	50	60	80	100	120	150

a) hef,min ≤ hef ≤ hef,max (hef: embedment depth)

b) This is the maximum recommended torque moment to avoid splitting during installation for anchors with minimum spacing and/or edge distance.

Hilti HIT-HY 110 with HIS-(R)N

Injection Mortar System		Benefits
	Hilti-HY 110 available in 330ml and 500ml foil packs. (also 1400ml subject to lead time)	■ suitable for non-cracked concrete C 20/25 to C 50/60 ■ suitable for dry and water saturated concrete ■ 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 drill hole sizes ≤ 18 mm
	Static mixer	
	Internal threaded sleeve HIS-N HIS-RN	

Concrete | Small edge distance & spacing | Corrosion resistance | European Technical Approval | CE conformity

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval a)	DIBt, Berlin	ETA-08/0341 / 2013-03-18

a) All data given in this section according ETA-08/0341 issue 2013-03-18.

Service temperature range

Hilti HIT-HY 110 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 V2.4.7 in compliance with the design method according to EOTA TR 029. Design resistance according to data given in ETA-08/0341, issue 2013-03-18.

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

The design method is based on the following simplification:

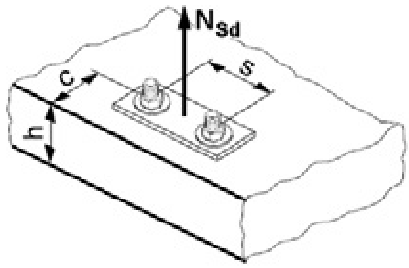
- No different loads are acting on individual anchors (no eccentricity)

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
$f_{B,p}$	0.95	0.97	1.00	1.02	1.04

- **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

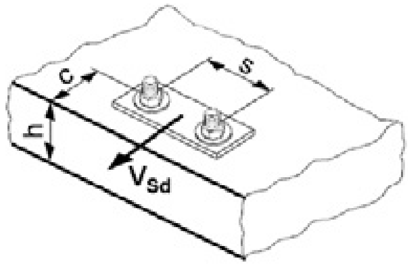
Note: Designer needs to check the bolt tensile resistance.

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

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

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.

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

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

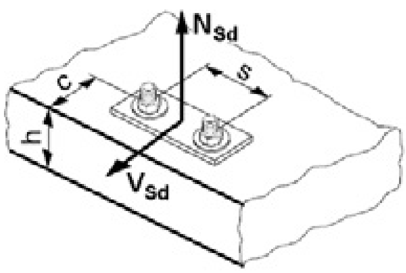
STEP 3: COMBINED TENSION AND SHEAR LOADING

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

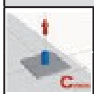
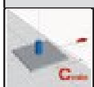
Anchor size	M8x90	M10x110	M12x125	M16x170	M20x205
Typical embedment depth h_{ef} [mm]	90	110	125	170	205
Base material thickness h [mm]	120	150	170	230	270

Design resistance: concrete 32 MPa

Anchor size			M8	M10	M12	M16	M20
Non-cracked concrete							
Tensile	Pull-out	$N^*_{Rd,p}$ [kN]	25.0	28.6	42.9	68.5	83.5
	Concrete	$N^*_{Rd,c}$ [kN]	36.4	49.1	59.5	78.6	104.1
Shear		$V_{Rd,s}$ [kN]	Steel governed refer $V_{Rd,s}$ table				

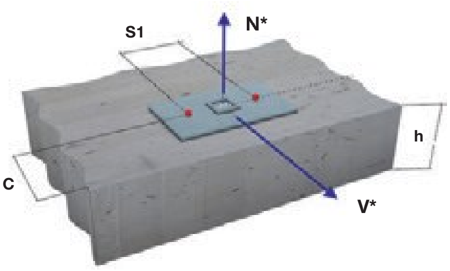
Basic loading data (for a single anchor) – with minimum edge distance

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	170	230	270
Tensile NRd							
	Pull-out	$N^*_{Rd,p}$ [kN]	12.8	14.4	21.8	33.4	43.7
	Concrete	$N^*_{Rd,c}$ [kN]	16.6	22.1	27.3	34.8	47.3
Shear VRd							
	Shear (without lever arm)	$V^*_{Rd,c}$	5.3	7.0	9.7	13.7	21.7

Two anchors

Table 1: One edge influence – non cracked concrete



Design Data: f_c=32 MPa

Anchor size	M8	M10	M12	M16	M20
Embedment Depth	90	110	125	170	205
Min Slab depth	120	150	170	230	270

ANCHOR M8	Edge E (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	16.3	18.3	7.1	22.2	23.1	15.1	25.6	25.6	17.5	31.8	32.0	23.6	31.8	40.0	29.6
80	17.9	20.0	8.9	24.5	25.2	17.2	28.1	28.0	19.6	35.0	35.6	25.6	35.0	43.7	31.5
100	18.7	20.8	9.8	25.6	26.3	18.3	29.4	29.2	20.6	36.7	37.1	26.5	36.7	45.5	32.4
150	20.8	22.9	10.7	28.4	28.9	21.0	32.7	32.1	23.2	40.7	40.8	28.9	40.7	50.1	34.7
200	22.8	25.0	10.7	31.2	31.5	23.7	35.8	35.1	25.8	44.6	44.6	31.4	44.6	54.7	37.0

ANCHOR M10	Edge E (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	18.8	24.3	9.3	23.8	28.9	16.8	27.0	31.7	21.7	35.6	39.2	28.7	37.3	47.4	35.6
80	20.0	25.9	11.1	25.5	30.8	18.9	28.8	33.8	23.9	38.0	41.9	30.8	39.9	50.6	37.6
100	20.8	26.8	12.1	26.4	32.0	20.1	29.9	35.1	25.1	39.4	43.4	31.9	41.4	52.5	38.7
150	22.7	29.2	13.9	28.8	34.7	23.0	32.6	38.1	28.3	43.0	47.2	34.8	45.1	57.1	41.4
200	24.5	31.5	13.9	31.1	37.5	26.0	35.2	41.2	31.4	46.5	51.0	37.7	48.8	61.6	44.2
250	26.4	33.9	13.9	33.4	40.3	28.3	37.8	44.3	34.6	49.9	54.7	40.6	52.4	66.2	47.0

ANCHOR M12	Edge E (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	27.5	30.1	12.9	31.9	33.6	18.8	35.6	36.5	23.9	45.7	44.3	33.0	54.0	52.8	40.6
100	29.8	32.4	15.5	34.6	36.1	21.6	38.6	39.3	26.9	49.5	47.7	36.0	58.5	56.8	43.3
150	32.4	34.9	18.5	37.5	39.0	24.8	41.9	42.4	30.2	53.8	51.4	39.3	63.4	61.2	46.4
200	35.0	37.4	19.4	40.5	41.8	28.0	45.2	45.4	33.6	58.0	55.1	42.5	68.6	65.7	49.5
250	37.5	40.0	19.4	43.5	44.6	30.5	48.5	48.5	37.0	62.2	58.9	45.8	73.6	70.1	52.6
300	40.0	42.5	19.4	46.3	47.5	30.5	51.8	51.6	40.3	66.4	62.6	49.1	78.5	74.6	55.7

ANCHOR M16	Edge E (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	39.5	37.9	18.3	46.1	42.5	27.7	56.4	49.5	43.0	67.6	57.0	52.6	79.8	65.0	61.5
100	41.6	39.6	20.7	48.6	44.4	30.4	59.5	51.7	46.0	71.3	59.5	55.3	84.1	67.8	64.2
150	44.7	41.9	24.2	52.2	47.1	34.2	63.9	54.8	50.1	76.5	63.1	59.3	90.3	71.9	67.9
200	47.8	44.3	27.4	55.8	49.7	38.0	68.3	57.9	54.3	81.9	66.6	63.2	96.6	75.9	71.7
250	50.9	46.7	27.4	59.5	52.4	41.8	72.7	61.0	58.5	87.2	70.2	67.2	102.8	80.0	75.5
300	54.0	49.0	27.4	63.1	55.0	45.6	77.1	64.1	62.7	92.5	73.7	71.1	109.1	84.0	79.3

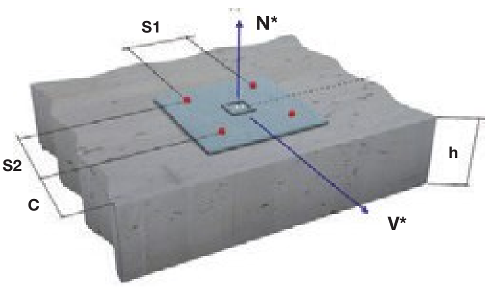
ANCHOR M20	Edge E (mm)														
	90			150			200			250			300		
spacing	tension		shear	tension		shear	tension		shear	tension		shear	tension		shear
s1 (mm)	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$	$N^*_{Rd,p}$	$N^*_{Rd,c}$	$V^*_{Rrd,c}$
90	54.2	52.0	28.9	68.0	60.7	48.1	80.5	68.4	62.5	94.0	76.5	72.3	103.5	85.0	82.0
150	58.5	55.1	33.8	73.3	64.3	53.4	86.8	72.5	67.9	101.4	81.0	77.5	111.5	90.1	87.0
200	62.0	57.7	37.8	77.7	67.3	57.8	92.1	75.9	72.5	107.5	84.9	81.8	118.3	94.3	91.1
250	65.5	60.3	41.8	82.2	70.3	62.3	97.3	79.3	77.0	113.6	88.7	86.1	125.0	98.5	95.3
300	69.1	62.8	43.4	86.6	73.4	66.7	102.6	82.7	81.5	119.8	92.5	90.4	131.8	102.8	99.4
350	72.6	65.4	43.4	91.0	76.4	71.2	107.8	86.1	86.1	125.9	96.3	94.7	138.5	107.0	103.5

Four anchors

Table 2: One edge influence – non cracked concrete

Design Data: fc=32 MPa

Anchor size	M8	M10	M12	M16	M20
Embedment Depth	90	110	125	170	205
Min Slab depth	120	150	170	230	270



ANCHOR M8	Edge E (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	22.7	21.4	14.2	30.0	26.4	20.0	34.0	29.1	22.4	41.6	36.4	28.4	41.6	44.1	34.3
80	28.9	26.7	17.8	37.1	32.4	26.8	41.7	35.5	29.1	50.2	43.8	35.0	50.2	52.5	40.8
100	32.1	29.6	19.6	41.0	35.7	30.1	45.8	39.0	32.4	54.8	47.8	38.2	54.8	57.0	44.0
150	40.9	37.4	21.4	51.2	44.5	38.2	56.7	48.3	40.5	67.1	58.5	46.2	67.1	69.1	51.8
200	50.6	46.0	21.4	62.3	54.2	46.1	68.6	58.6	48.4	80.3	70.2	54.0	80.3	82.4	59.6

ANCHOR M10	Edge E (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	27.0	28.1	18.6	33.3	33.0	25.2	37.2	35.9	28.0	47.9	43.8	35.0	50.1	52.3	41.8
80	32.0	33.3	22.2	38.9	38.6	32.1	43.1	41.9	34.8	54.7	50.5	41.6	57.1	59.9	48.3
100	35.0	36.4	24.2	42.3	42.1	36.0	46.8	45.5	38.7	58.9	54.6	45.4	61.4	64.5	52.0
150	43.0	44.8	27.8	51.2	51.2	45.4	56.3	55.1	48.0	69.8	65.5	54.6	72.6	76.7	61.1
200	51.6	54.0	27.8	60.8	61.3	52.0	66.3	65.7	57.2	81.4	77.3	63.7	84.4	89.9	70.1
250	60.7	64.0	27.8	70.8	72.2	56.7	77.0	77.2	66.2	93.5	90.2	72.6	96.8	104.2	79.0

ANCHOR M12	Edge E (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	38.0	35.2	25.8	43.3	38.9	30.7	47.8	42.0	33.8	59.9	50.1	41.3	69.8	59.0	48.7
100	46.4	42.3	31.0	52.3	46.5	40.4	57.3	49.9	43.3	70.7	59.0	50.6	81.6	68.9	57.9
150	56.5	51.1	37.0	63.2	55.7	49.6	68.8	59.6	53.6	83.7	69.8	60.8	95.9	80.8	67.9
200	67.5	60.5	38.8	74.9	65.7	56.0	81.2	70.1	63.7	97.8	81.5	70.7	111.3	93.7	77.7
250	79.2	70.8	38.8	87.5	76.6	61.0	94.4	81.4	73.5	112.7	94.0	80.5	127.6	107.5	87.4
300	91.6	81.8	38.8	100.7	88.3	61.0	108.3	93.5	80.6	128.4	107.4	90.1	144.6	122.3	97.0

Shear design: The concrete edge resistance value in this table uses all 4 anchors in shear. You will need to ensure the gap between anchor and the plate is filled. This can be achieved using the Hilti Dynamic Set. (Refer page 41 for further details)

The concrete edge resistance values have been obtained by taking the lesser of:

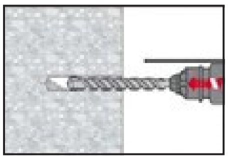
1. First row resistance multiplied by number of rows and
2. The concrete edge resistance of the furthest row.

ANCHOR M16	Edge E (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	50.6	43.6	36.6	58.1	48.5	46.2	69.7	55.8	55.3	82.3	63.5	64.2	95.9	71.8	73.0
100	57.7	48.7	41.4	65.8	53.9	55.3	78.3	61.7	64.1	91.9	70.0	72.9	106.4	78.8	81.6
150	68.7	56.5	48.5	77.8	62.1	67.9	91.6	70.7	76.5	106.6	79.7	85.1	122.7	89.3	93.6
200	80.7	64.8	54.8	90.7	71.0	76.0	105.6	80.2	88.6	122.4	90.1	97.1	140.0	100.5	105.5
250	93.5	73.6	54.8	104.5	80.3	83.6	121.3	90.4	100.5	139.3	101.1	108.9	158.5	112.3	117.1
300	107.1	83.0	54.8	119.2	90.3	91.2	137.5	101.2	112.3	157.1	112.7	120.5	178.1	124.8	128.7

ANCHOR M20	Edge E (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	73.5	60.5	57.8	89.6	69.7	70.4	104.3	77.7	80.1	120.0	86.2	89.7	130.9	95.1	99.2
150	88.1	70.2	67.6	106.0	80.2	87.0	122.3	89.0	96.4	139.6	98.2	105.8	151.6	107.9	115.1
200	101.2	78.8	75.6	120.8	89.5	100.4	138.4	99.0	109.7	157.2	108.9	119.0	170.2	119.2	128.2
250	115.2	87.8	83.6	136.4	99.3	113.6	155.5	109.4	122.8	175.7	120.0	132.0	189.7	131.1	141.1
300	130.0	97.3	86.8	152.9	109.6	126.7	173.4	120.4	135.7	195.2	131.7	144.8	210.2	143.5	153.8
350	145.5	107.3	86.8	170.2	120.4	142.4	192.2	131.9	148.5	215.6	144.0	157.5	231.7	156.5	166.4

Setting instructions

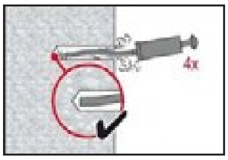
Bore hole drilling



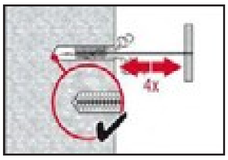
Drill Hole to the required embedment depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit.

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

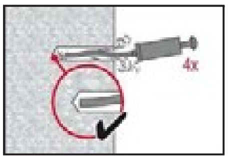
a) Manual Cleaning (MC) for bore hole diameters d_0 ≤ 18mm and bore hole depth h_0 ≤ 10d



The Hilti manual pump may be used for blowing out bore holes up to diameters d_0 ≤ 18 mm and embedment depths up to h_0 ≤ 10d or h_0 ≤ 160 mm. Blow out at least 4 times from the back of the bore hole until return air stream is free of noticeable dust

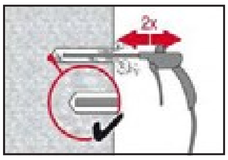


Brush 4 times with the specified brush size (brush Ø ≥ bore hole Ø) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole -- if not the brush is too small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

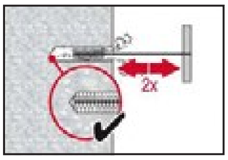


Blow out again with manual pump at least 4 times until return air stream is free of noticeable dust.

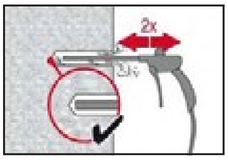
b) Compressed air cleaning (CAC) for all bore hole diameters d_0 and all bore hole depth h_0



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.



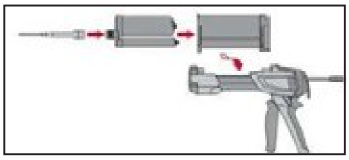
Brush 2 times with the specified brush size (brush Ø ≥ bore hole Ø) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the bore hole -- if not the brush is too small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



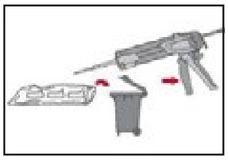
Blow again with compressed air 2 times until return air stream is free of noticeable dust.

Setting instructions

Injection preparation



Tightly attach new Hilti mixing nozzle HIT-M1 to foil pack manifold (snug fit). Do not modify the mixing nozzle. Observe the instruction for use of the dispenser and the mortar. Check foil pack holder for proper function. Do not use damaged foil packs / holders. Insert foil pack into foil pack holder and put holder into HIT dispenser.



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

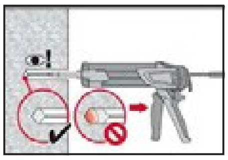
Discard quantities are:

2 strokes for 330 ml foil pack,

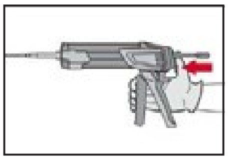
3 strokes for 500 ml foil pack,

45 ml for 1400 ml foil pack

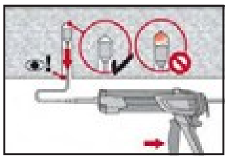
Inject adhesive **from the back of the borehole without forming air voids**



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

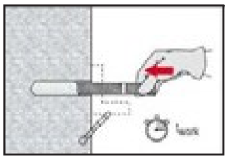


After injection is completed, depressurise the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.



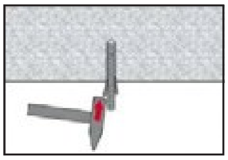
For overhead installation the injection is only possible with the aid of extensions and piston plugs. Assemble HIT-M1 mixer, extension(s) and appropriately sized piston plug HIT-SZ. Insert piston plug to back of the hole and inject adhesive. During injection the piston plug will be naturally extruded out of the bore hole by the adhesive pressure.

Setting the element

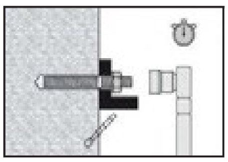


Before use, verify that the element is dry and free of oil and other contaminants.

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 Hilti HIT-OHW



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

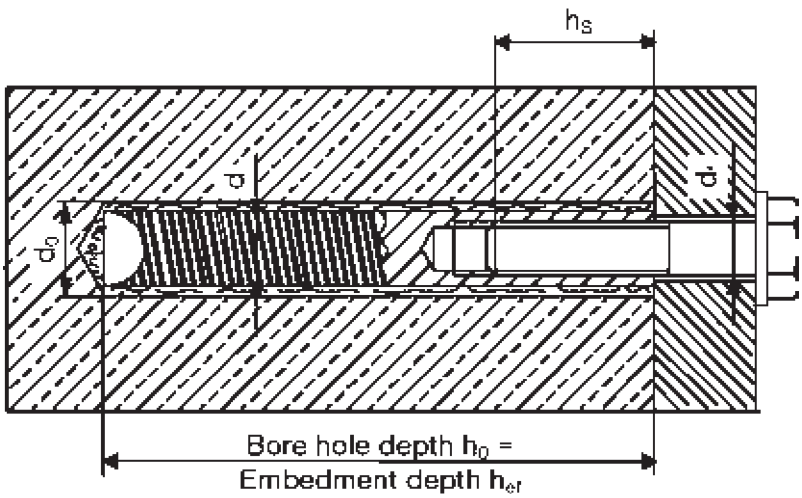
Anchor size	M8x90	M10x110	M12x125	M16x170	M20x205
Rotary hammer	TE 2 – TE 30		TE 40 – TE 70		
Other tools	compressed air gun or blow out pump, set of cleaning brushes, dispenser				

Working time, Curing time

Temperature of the base material T_{BM}	Working time t_{gel}	Curing time t_{cure}
-5 °C to -1 °C	90 min	9 h
0 °C to 4 °C	45 min	4.5 h
5 °C to 9 °C	20 min	2 h
10 °C to 19 °C	6 min	90 min
20 °C to 29 °C	4 min	50 min
30 °C to 39 °C	2 min	40 min

a) The curing time data are valid for dry anchorage base only. For water saturated anchorage bases the curing times must be doubled.

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.