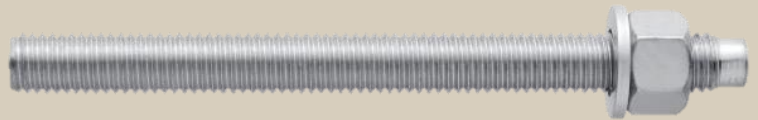




# HIT-ICE INJECTION MORTAR

Technical Datasheet

Update: Jun-18





# HIT-ICE injection mortar

Anchor design (ETAG 001) / Rods&Sleeves / Concrete

## Injection mortar system



Hilti HIT-ICE  
296 ml cartridge

Anchor rod:  
HIT-V  
HIT-V-F  
HIT-V-R  
HIT-V-HCR rods  
(M8-M24)

Anchor rod:  
HAS-(E)  
HAS-(E)-R  
HAS-(E)-HCR rods  
(M8-M24)

Internally threaded  
sleeve:  
HIS-N  
HIS-R-N sleeves  
(M8-M20)

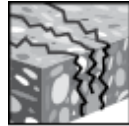
## Benefits

- Suitable for cracked <sup>a)</sup> and non-cracked concrete C 20/25 to C 50/60
- High loading capacity
- Suitable for dry and water saturated concrete
- High corrosion <sup>a)</sup> / corrosion resistant
- Odourless resin
- Low installation temperature

## Base material



Concrete (non-cracked)



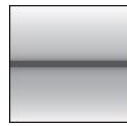
Concrete <sup>a)</sup> (cracked)



Dry concrete



Wet concrete



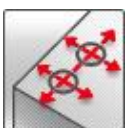
Static/  
quasi-static

## Load conditions

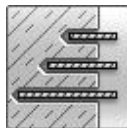
## Installation conditions



Hammer drilled holes



Small edge distance and spacing

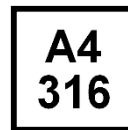


Variable embedment depth

## Other information



PROFIS  
Anchor design software



Corrosion resistance



High corrosion resistance <sup>a)</sup>

a) Applications only for HIT-V rods.

## Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
Hilti Technical Data <sup>a)</sup>	Hilti	2017-11-28

a) All data given in this section according to Hilti Technical Data.

## Basic loading data (for a single anchor)

### All data in this section applies to

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Steel failure
- Base material thickness, as specified in the table
- One typical embedment depth, as specified in the table
- One anchor material, as specified in the tables
- Concrete C 20/25,  $f_{ck,cube} = 25 \text{ N/mm}^2$

### Embedment depth and base material thickness

Anchor size		M8	M10	M12	M16	M20	M24
<b>HIT-V</b>							
Typical embedment depth	[mm]	80	90	110	125	170	210
Base material thickness	[mm]	110	120	140	165	220	270
<b>HIS-N</b>							
Typical embedment depth	[mm]	90	110	125	170	205	-
Base material thickness	[mm]	120	150	170	230	270	-

### Mean ultimate resistance

Anchor size		M8	M10	M12	M16	M20	M24
<b>Non-cracked concrete</b>							
Tension $N_{Ru,m}$	HIT-V 5.8	18,9	30,5	44,1	83,0	127,6	185,9
	HIS-N 8.8	26,3	48,3	70,4	117,1	118,0	-
Shear $V_{Ru,m}$	HIT-V 5.8	9,5	15,8	22,1	41,0	64,1	92,4
	HIS-N 8.8	13,7	24,2	35,7	66,2	60,9	-
<b>Cracked concrete</b>							
Tension $N_{Ru,m}$	HIT-V 5.8	-	-	27,5	33,4	42,5	-
Shear $V_{Ru,m}$	HIT-V 5.8	-	-	22,1	41,0	64,1	-

### Characteristic resistance

Anchor size		M8	M10	M12	M16	M20	M24
<b>Non-cracked concrete</b>							
Tension $N_{Rk}$	HIT-V 5.8	17,6	29,0	42,0	66,0	96,1	142,5
	HIS-N 8.8	25,0	42,8	56,4	88,2	88,9	-
Shear $V_{Rk}$	HIT-V 5.8	9,0	15,0	21,0	39,0	61,0	88,0
	HIS-N 8.8	13,0	23,0	34,0	63,0	58,0	-
<b>Cracked concrete</b>							
Tension $N_{Rk}$	HIT-V 5.8	-	-	20,7	25,1	32,0	-
Shear $V_{Rk}$	HIT-V 5.8	-	-	21,0	39,0	61,0	-

### Design resistance

Anchor size		M8	M10	M12	M16	M20	M24
<b>Non-cracked concrete</b>							
Tension $N_{Rd}$	HIT-V 5.8	11,7	16,5	24,2	36,7	53,4	79,2
	HIS-N 8.8	16,7	28,5	37,6	58,8	59,3	-
Shear $V_{Rd}$	HIT-V 5.8	7,2	12,0	16,8	31,2	48,8	70,4
	HIS-N 8.8	10,4	18,4	27,2	50,4	46,4	-
<b>Cracked concrete</b>							
Tension $N_{Rd}$	HIT-V 5.8	-	-	11,5	14,0	17,8	-
Shear $V_{Rd}$	HIT-V 5.8	-	-	16,8	31,2	42,7	-

**Recommended loads <sup>a)</sup>**

Anchor size		M8	M10	M12	M16	M20	M24
<b>Non-cracked concrete</b>							
Tension $N_{Rec}$	HIT-V 5.8	8,4	11,8	17,3	26,2	38,1	56,5
	HIS-N 8.8	11,9	20,4	26,8	42,0	42,3	-
Shear $V_{Rec}$	HIT-V 5.8	5,1	8,6	12,0	22,3	34,9	50,3
	HIS-N 8.8	7,4	13,1	19,4	36,0	33,1	-
<b>Cracked concrete</b>							
Tension $N_{Rec}$	HIT-V 5.8	-	-	8,2	10,0	12,7	-
Shear $V_{Rec}$	HIT-V 5.8	-	-	12,0	22,3	30,5	-

a) With overall partial safety factor for action  $\gamma=1,2$ . The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

**Materials**
**Mechanical properties for HIT-V / HAS**

Anchor size		M8	M10	M12	M16	M20	M24
Nominal tensile strength $f_{uk}$	HIT-V 5.8	500	500	500	500	500	500
	HAS-(E) 5.8	800	800	800	800	800	800
	HIT-V 8.8	700	700	700	700	700	700
	HIT-V-R HAS-(E)R	800	800	800	800	800	700
Yield strength $f_{yk}$	HIT-V 5.8	400	400	400	400	400	400
	HAS-(E) 5.8	640	640	640	640	640	640
	HIT-V 8.8	450	450	450	450	450	450
	HIT-V-R HAS-(E)R	600	600	600	600	600	400
Stressed cross-section $A_s$	HIT-V	36,6	58,0	84,3	157	245	353
	HAS-(E)	32,8	52,3	76,2	144,0	225,0	324,0
Moment of resistance $W$	HIT-V	31,2	62,3	109,0	277,0	541,0	935,0
	HAS-(E)	27,0	54,1	93,8	244,0	474,0	809,0

**Mechanical properties for HIS-N**

Anchor size		M8	M10	M12	M16	M20
Nominal tensile strength $f_{uk}$	HIS-N	490	490	460	460	460
	Screw 8.8	800	800	800	800	800
	HIS-RN	700	700	700	700	700
	Screw A4-70	700	700	700	700	700
Yield strength $f_{yk}$	HIS-N	410	410	375	375	375
	Screw 8.8	640	640	640	640	640
	HIS-RN	350	350	350	350	350
	Screw A4-70	450	450	450	450	450
Stressed cross-section $A_s$	HIS-(R)N	51,5	108,0	169,1	256,1	237,6
	Screw	36,6	58	84,3	157	245
Moment of resistance $W$	HIS-(R)N	145	430	840	1595	1543
	Screw	31,2	62,3	109	277	541

### Material quality for HIT-V

Part	Material
<b>Zinc coated steel</b>	
Threaded rod, HIT-V 5.8 (F) HAS-(E) 5.8	Strength class 5.8; Elongation at fracture A5 > 8% ductile Electroplated zinc coated $\geq 5\mu\text{m}$ ; (F) hot dip galvanized $\geq 45\mu\text{m}$
Threaded rod, HIT-V 8.8 (F) HAS-(E) 8.8	Strength class 8.8; Elongation at fracture A5 > 12% ductile Electroplated zinc coated $\geq 5\mu\text{m}$ ; (F) hot dip galvanized $\geq 45\mu\text{m}$
Washer	Electroplated zinc coated $\geq 5\mu\text{m}$ , hot dip galvanized $\geq 45\mu\text{m}$
Nut	Strength class of nut adapted to strength class of threaded rod. Electroplated zinc coated $\geq 5\mu\text{m}$ , hot dip galvanized $\geq 45\mu\text{m}$
<b>Stainless Steel</b>	
Threaded rod, HIT-V-R HAS-(E)-R	Strength class 70 for $\leq \text{M}24$ and strength class 50 for $> \text{M}24$ ; Elongation at fracture A5 > 8% ductile Stainless steel 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
Washer	Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2014
Nut	Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2014
<b>High corrosion resistant steel</b>	
Threaded rod, HIT-V-HCR HAS-(E)-HCR	Strength class 80 for $\leq \text{M}20$ and class 70 for $> \text{M}20$ , Elongation at fracture A5 > 8% ductile High corrosion resistance steel 1.4529; 1.4565;
Washer	High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2014
Nut	High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2014

### Material quality for HIS-N

Part	Material	
HIS-N	Internally threaded sleeves	C-steel 1.0781 Steel galvanized $\geq 5\mu\text{m}$
	Screw 8.8	Strength class 8.8, A5 > 8% ductile Steel galvanized $\geq 5\mu\text{m}$
HIS-RN	Internally threaded sleeves	Stainless steel 1.4401 and 1.4571
	Screw A4-70	Strength 70, A5 > 8% ductile Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362

### Anchor dimension

Anchor size	M8	M10	M12	M16	M20	M24
HAS-(E), HAS-(E)-R, HAS-(E)-HCR	M8x80	M10x90	M12x110	M16x125	M20x170	M24x210
HIT-V, HIT-V-R, HIT-V-HCR	Anchor rods HIT-V (-R/-HCR) are available in variable length					
HIS-(R)N	M8x90	M10x90	M12x110	M16x125	M20x170	-

### Setting information

#### Installation temperature range:

-23°C to +32°C

#### In service temperature range

Hilti HIT-ICE 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 in base material

Temperature range	Base material temperature	Max. long term base material temperature	Max. short term base material temperature
Temperature range I	-40 °C to + 40 °C	+ 24 °C	+ 40 °C
Temperature range II	-40 °C to + 54 °C	+ 43 °C	+ 54 °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.

### Working time and curing time

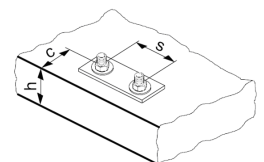
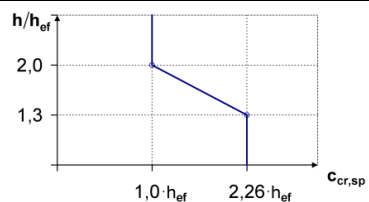
Temperature of the base material	Curing time before anchor can be fully loaded $t_{cure}$	Working time in which anchor can be inserted and adjusted $t_{work}$
32 °C	35 min	1 min
21 °C	45 min	2,5 min
16 °C	1 h	5 min
4 °C	1,5 h	15 min
-7 °C	6 h	1 h
-18 °C	24 h	1,5 h
-23 °C	36 h	1,5 h

### Setting details

Anchor size	M8	M10	M12	M16	M20	M24
Nominal diameter of drill bit $d_0$ [mm]	10	12	14	18	24	28
Effective anchorage and drill hole depth $h_{ef}$ [mm]	60 to 160	60 to 200	70 to 240	80 to 320	90 to 400	96 to 480
Min. base material thickness <sup>a)</sup> $h_{min}$ [mm]	$h_{ef} + 30 \geq 100$ mm			$h_{ef} + 2 d_0$		
Diameter of clearance hole in the fixture $d_f$ [mm]	9	12	14	18	22	26
Minimum spacing $s_{min}$ [mm]	40	50	60	80	100	120
Minimum edge distance $c_{min}$ [mm]	40	45	45	50	55	60
Critical spacing for splitting failure $s_{cr,sp}$ [mm]	$2 C_{cr,sp}$					
Critical edge distance for splitting failure <sup>b)</sup> $c_{cr,sp}$ [mm]	$1,0 \cdot h_{ef}$ for $h / h_{ef} \geq 2,0$					
	$4,6 h_{ef} - 1,8 h$ for $2,0 > h / h_{ef} > 1,3$					
	$2,26 h_{ef}$ for $h / h_{ef} \leq 1,3$					
Critical spacing for concrete cone failure $s_{cr,N}$ [mm]	$2 C_{cr,N}$					
Critical edge distance for concrete cone failure <sup>b)</sup> $c_{cr,N}$ [mm]	$1,5 h_{ef}$					
Torque moment <sup>c)</sup> $T_{max}$ [Nm]	10	20	40	80	150	200

For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

- a)  $h$ : base material thickness ( $h \geq h_{min}$ )
- b) The critical edge distance for concrete cone failure depends on the embedment depth  $h_{ef}$  and the design bond resistance. The simplified formula given in this table is on the safe side.
- c) This is the maximum recommended torque moment to avoid splitting failure during installation for anchors with minimum spacing and / or edge distance.



### Installation equipment

Anchor size		M8	M10	M12	M16	M20	M24
Rotary hammer	HIT-V	TE 2 – TE 30			TE 40 – TE 70		
	HIS-N	TE 2 – TE 30		TE 40 – TE 70		-	
Other tools		Compressed air gun or blow out pump					
		Set of cleaning brushes, dispenser					

### Drilling and cleaning parameters

HIT-V HAS	HIS-N	Hammer drill (HD)	Brush HIT-RB
		$d_0$ [mm]	size [mm]
M8	-	10	10
M10	-	12	12
M12	M8	14	14
M16	M10	18	18
-	M12	22	22
M20	-	24	24
M24	M16	28	28
M27	-	30	30
-	M20	32	32

### Setting instructions

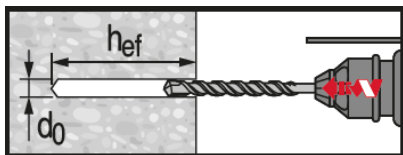
\*For detailed information on installation see instruction for use given with the package of the product.



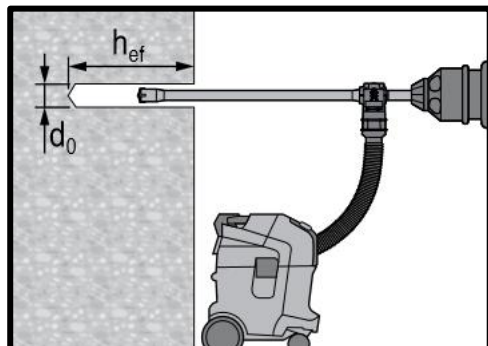
#### Safety regulations.

Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HIT-ICE.

### Drilling



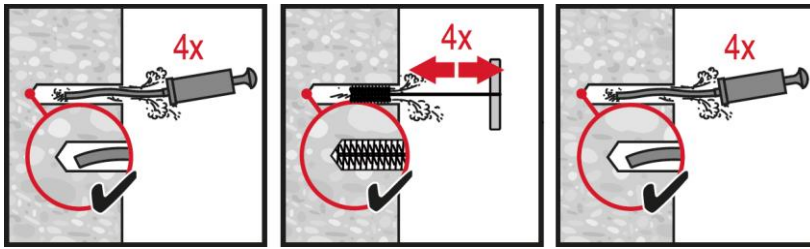
Hammer drilled hole (HD)



Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required.  
For dry and wet concrete, only.

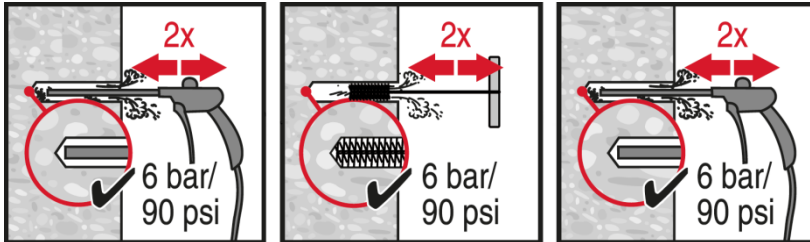
## Cleaning



### Hammer Drilling:

#### Manual cleaning (MC)

for drill diameters  $d_0 \leq 16$  mm and drill hole depth  $h_0 \leq 10 \cdot d$ .

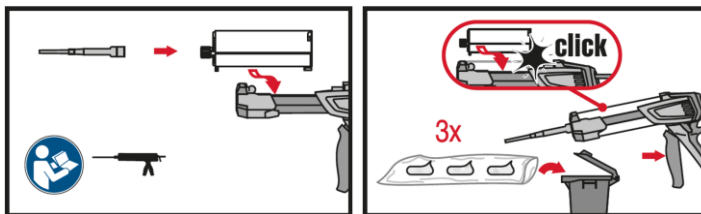


### Hammer Drilling:

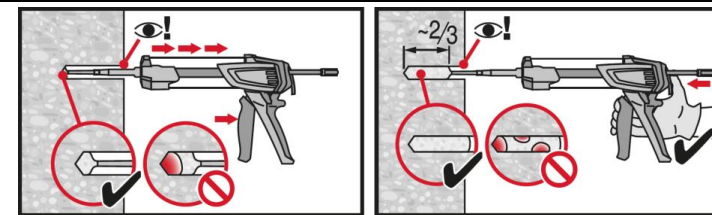
#### Compressed air cleaning (CAC)

For all drill hole diameters  $d_0$  and all drill hole depths  $h_0$ .

## Injection system

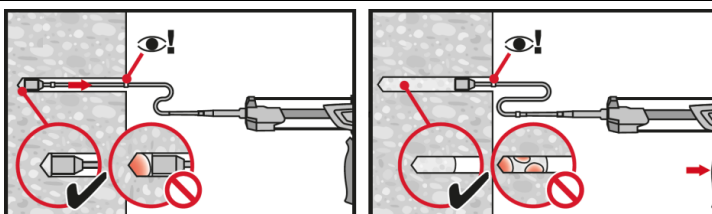


### Injection system preparation.



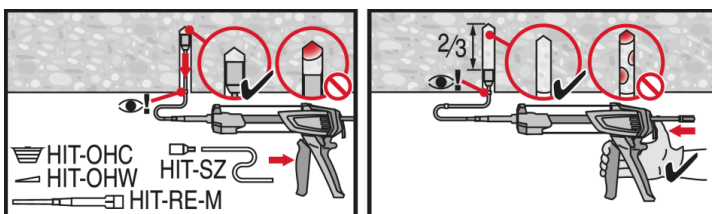
### Injection method for drill hole depth

$h_{ef} \leq 250$  mm.



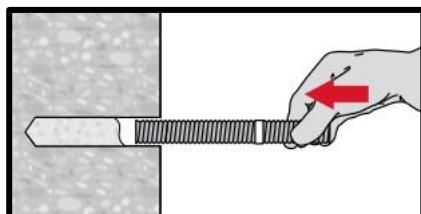
### Injection method for drill hole depth

$h_{ef} > 250$  mm.

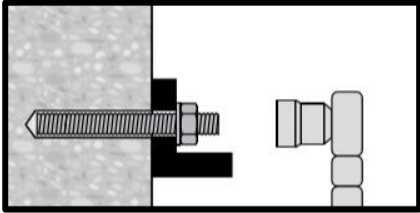


### Injection method for overhead application.

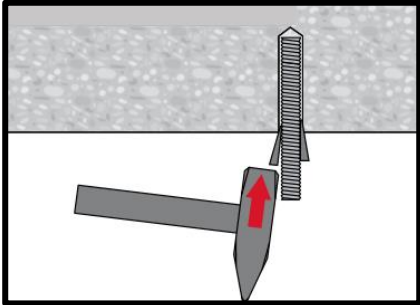
## Setting the element



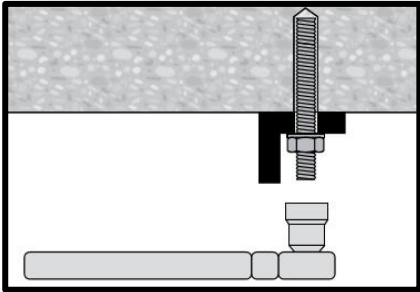
### Setting element, observe working time "t<sub>work</sub>".



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



**Setting element for overhead applications,** observe working time " $t_{\text{work}}$ ".


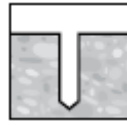

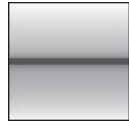


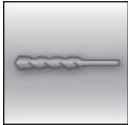
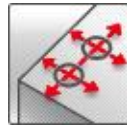
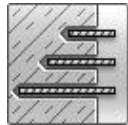

**Loading the anchor** after required curing time  $t_{\text{cure}}$  the anchor can be loaded.

# HIT-ICE injection mortar

Anchor design (ETAG 001) / Rebar elements / Concrete

Injection mortar system	Benefits
 <p>Hilti HIT-ICE 296 ml cartridge</p>	<ul style="list-style-type: none"> <li>- Suitable for non-cracked concrete C20/25 to C50/60</li> <li>- Suitable for dry and water saturated concrete</li> <li>- High loading capacity</li> <li>- High corrosion resistant</li> <li>- Odourless resin</li> <li>- Low installation temperature</li> </ul>
 <p>Rebar B500 B (<math>\phi 8</math> - <math>\phi 25</math>)</p>	

Base material	Load condition
 <p>Concrete (non-cracked)</p>  <p>Dry concrete</p>  <p>Wet concrete</p>	 <p>Static/ quasi-static</p>

Installation conditions	Other information
 <p>Hammer drilling</p>  <p>Small edge distance and spacing</p>  <p>Variable embedment depth</p>	 <p>PROFIS Rebar design Software</p>

**Approvals / certificates**

Description	Authority / Laboratory	No. / date of issue
Hilti Technical Data <sup>a)</sup>	Hilti	2017-11-28

a) All data given in this section according to Hilti Technical Data.

**Basic loading data (for a single anchor)**

- All data in this section applies to
- Correct setting
  - No edge distance and spacing influence
  - Steel failure
  - Base material thickness, as specified in the table
  - One typical embedment depth, as specified in the table
  - One anchor material, as specified in the tables
  - Concrete C20/25,  $f_{ck,cube} = 25 \text{ N/mm}^2$

**Embedment depth and base material thickness for static and quasi-static loading data**

Anchor- size		$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Typical embedment depth	$h_{ef}$ [mm]	80	90	110	125	125	170	210
Base material thickness	$h_{min}$ [mm]	110	120	145	165	165	220	275

### Mean ultimate resistance for rebar B500 B

Anchor- size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Tensile $N_{Ru,m}$ [kN]	22,7	31,9	46,8	62,0	70,9	113,4	175,2
Shear $V_{Ru,m}$ [kN]	14,7	23,1	32,6	44,1	57,8	90,3	141,8

### Characteristic resistance for rebar B500 B

Anchor- size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Tensile $N_{Rk}$ [kN]	17,1	24,0	35,2	46,7	53,4	85,5	131,9
Shear $V_{Rk}$ [kN]	14,0	22,0	31,0	42,0	55,0	86,0	135,0

### Design resistance for rebar B500 B

Anchor- size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Tensile $N_{Rd}$ [kN]	9,5	13,4	19,6	26,0	29,7	47,5	73,3
Shear $V_{Rd}$ [kN]	9,3	14,7	20,7	28,0	36,7	57,3	90,0

### Recommended loads <sup>a)</sup> for rebar B500 B

Anchor- size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Tensile $N_{Rec}$ [kN]	6,8	9,5	14,0	18,5	21,2	33,9	52,4
Shear $V_{Rec}$ [kN]	6,7	10,5	14,8	20,0	26,2	41,0	64,3

a) With overall partial safety factor for action  $\gamma=1,2$ . The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

## Materials

### Mechanical properties for rebar B500 B

Anchor size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Nominal tensile strength $f_{uk}$ [N/mm <sup>2</sup> ]	550	550	550	550	550	550	550
Yield strength $f_{yk}$ [N/mm <sup>2</sup> ]	500	500	500	500	500	500	500
Stressed cross-section $A_s$ [mm <sup>2</sup> ]	50,3	78,5	113,1	153,9	201,1	314,2	490,9
Moment of resistance $W$ [mm <sup>3</sup> ]	50,3	98,2	169,6	269,4	402,1	785,4	1534

### Material quality

Part	Material
Rebar B500 B	Geometry and mechanical properties according to DIN 488-2:1986 or DIN 488-2

## Setting information

### Installation temperature range:

-23°C to +32°C

### Service temperature range

Hilti HIT-ICE 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	Max. long term base material temperature	Max. short term base material temperature
Temperature range I	-40 °C to + 40 °C	+ 24 °C	+ 40 °C
Temperature range II	-40 °C to + 40 °C	+ 43 °C	+ 54 °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.

### Working time and curing time

Temperature of the base material	Curing time before anchor can be fully loaded $t_{\text{cure}}^{1)}$	Working time in which anchor can be inserted and adjusted $t_{\text{work}}$
32 °C	35 min	1 min
21 °C	45 min	2,5 min
16 °C	1 h	5 min
4 °C	1,5 h	15 min
-7 °C	6 h	1 h
-18 °C	24 h	1,5 h
-23 °C	36 h	1,5 h

1) The curing time data are valid for dry base material only. In wet material the curing times must be doubled.

### Installation equipment

Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Rotary hammer	TE 2 – TE 16					TE 40 – TE 80	
Other tools	Compressed air gun, blow out pump Set of cleaning brushes, dispenser						

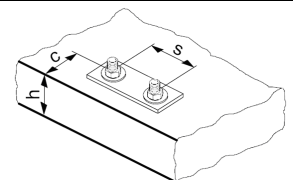
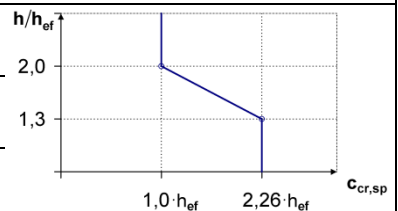
### Setting details

Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Nominal diameter of drill bit $d_0$ [mm]	12	14	16	18	20	25	32
Effective anchorage and drill hole depth range <sup>a)</sup> $h_{\text{ef}}$ [mm]	60 to 160	60 to 200	70 to 240	75 to 280	80 to 320	90 to 400	100 to 500
Minimum base material thickness $h_{\text{min}}$ [mm]	$h_{\text{ef}} + 30 \text{ mm}$ $\geq 100 \text{ mm}$		$h_{\text{ef}} + 2 d_0$				
Minimum spacing $s_{\text{min}}$ [mm]	40	50	60	70	80	100	125
Minimum edge distance $c_{\text{min}}$ [mm]	40	50	60	70	80	100	125
Critical spacing for splitting failure $s_{\text{cr,sp}}$ [mm]	$2 C_{\text{cr,sp}}$						
Critical edge distance for splitting failure <sup>b)</sup> $c_{\text{cr,sp}}$ [mm]	$1,0 \cdot h_{\text{ef}}$ for $h / h_{\text{ef}} \geq 2,0$						
	$4,6 h_{\text{ef}} - 1,8 h$ for $2,0 > h / h_{\text{ef}} > 1,3$						
	$2,26 h_{\text{ef}}$ for $h / h_{\text{ef}} \leq 1,3$						
Critical spacing for concrete cone failure $s_{\text{cr,N}}$ [mm]	$2 C_{\text{cr,N}}$						
Critical edge distance for concrete cone failure $c_{\text{cr,N}}$ [mm]	$1,5 h_{\text{ef}}$						

For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

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

b) The critical edge distance for concrete cone failure depends on the embedment depth  $h_{\text{ef}}$  and the design bond resistance. The simplified formula given in this table is on the safe side.



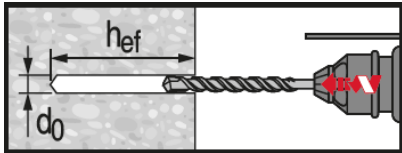
## Setting instructions

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

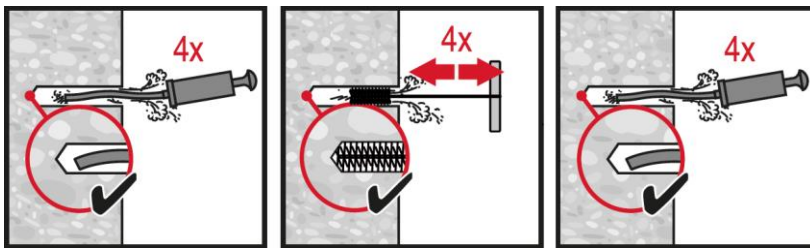


### Safety regulations.

Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HIT-ICE.



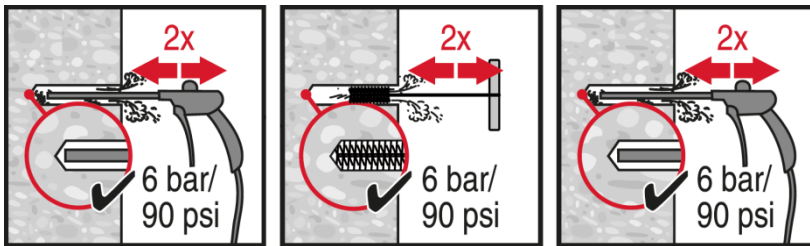
### Hammer drilled hole (HD)



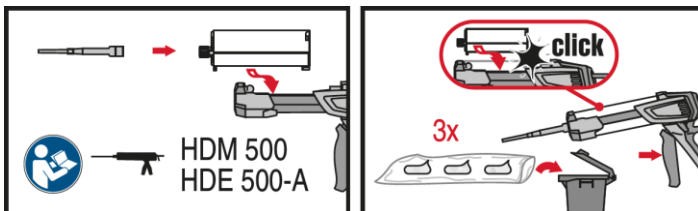
### Manual cleaning (MC)

For element sizes  $d \leq 16\text{mm}$  and embedment depth  $h_{ef} \leq 10d$  only.

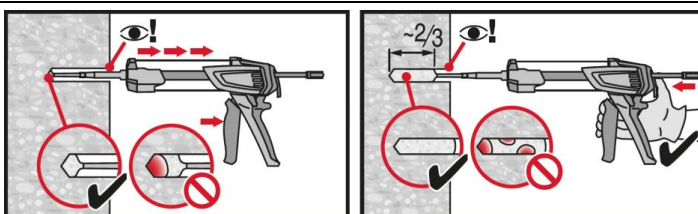
Brush bore hole with required steel brush HIT-RB.



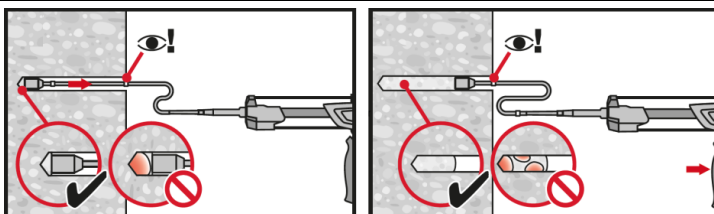
### Compressed air cleaning (CAC)



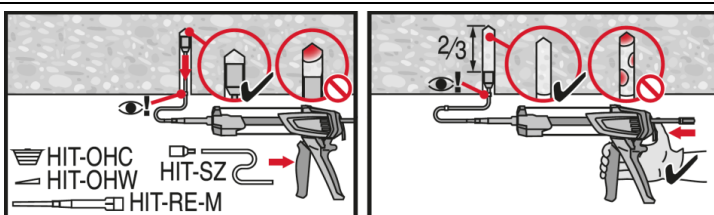
### Injection system preparation.



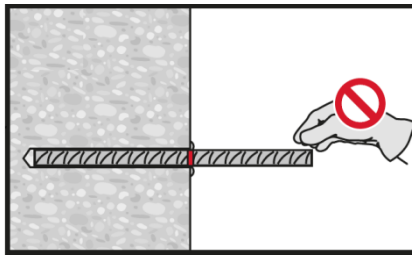
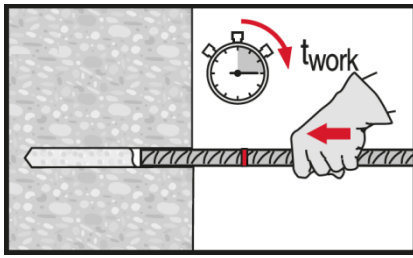
### Injection method for drill hole depth $h_{ef} > 250\text{mm}$



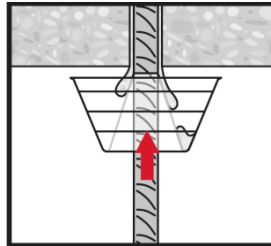
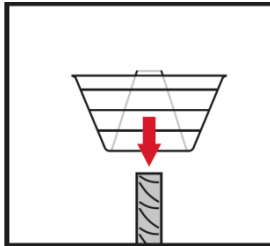
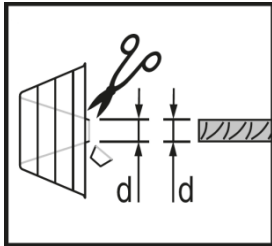
### Injection method for drill hole depth $h_{ef} > 250\text{mm}$ .



### Injection method for overhead application.



**Setting element**, observe working time "t<sub>work</sub>".



**Setting element** for overhead applications, observe working time "t<sub>work</sub>".

