HIT-RE 100
INJECTION MORTAR

Technical Datasheet

Update: Jan-23

HIT-RE 100 injection mortar

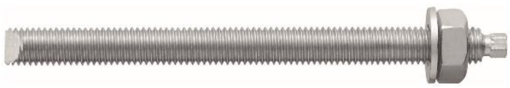
Anchor design (EN 1992-4) / Rods and Sleeves / Concrete

Injection mortar system

Hilti HIT-RE 100

500 ml foil pack

(also available as 330 ml foil pack)



Anchor rods:
HAS-U
HAS-U HDG
HAS-U A4
HAS-U HCR
(M8-M30)

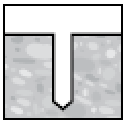
Benefits

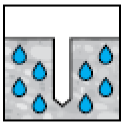
- Suitable for cracked and non-cracked concrete C 20/25 to C 50/60
- High loading capacity
- Suitable for dry and water saturated concrete
- Large diameter applications
- Long working time at elevated temperatures
- Odourless epoxy

Base material

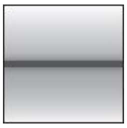

Concrete (non-cracked)


Concrete (cracked)

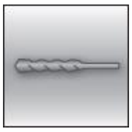

Dry concrete

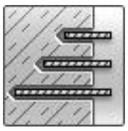

Wet concrete

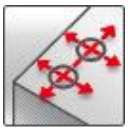
Load conditions


Static/ quasi-static

Installation conditions


Hammer drilling


Variable embedment depth


Small edge distance and spacing

Other informations


European Technical Assessment


CE conformity

Corrosion resistance

High corrosion resistance

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment [a)]	DIBt, Berlin	ETA-15/0882 / 2019-08-30

a) All data given in this section according to ETA-15/0882 issue 2017-12-11.

Static and quasi-static loading (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
- Embedment depth, as specified in the table
- Anchor material, as specified in the tables
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²
- In-service temperate range I
  (min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C)

Embedment depth [a] and base material thickness

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Embedment depth	h_{ef}	[mm]	80	90	110	125	170	210	240	270
Base material thickness	h	[mm]	110	120	140	165	220	270	300	340

a) The allowed range of embedment depth is shown in the setting details

Characteristic resistance

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete											
Tension	HAS-U 5.8	N_{Rk}	[kN]	18,3	29,0	42,2	68,8	109,0	149,7	182,9	218,2
	HAS-U 8.8			29,3	42,0	56,8	68,8	109,0	149,7	182,9	218,2
	HAS-U A4			25,6	40,6	56,8	68,8	109,0	149,7	182,9	218,2
	HAS-U HCR			29,3	42,0	56,8	68,8	109,0	149,7	182,9	218,2
Shear	HAS-U 5.8	V_{Rk}	[kN]	9,2	14,5	21,1	39,3	61,3	88,3	114,8	140,3
	HAS-U 8.8			14,6	23,2	33,7	62,8	98,0	141,2	183,6	224,4
	HAS-U A4			12,8	20,3	29,5	55,0	85,8	123,6	114,8	140,3
	HAS-U HCR			14,6	23,2	33,7	62,8	98,0	123,6	160,7	196,4
Cracked concrete											
Tension	HAS-U 5.8	N_{Rk}	[kN]	-	19,8	29,0	40,8	64,1	95,0	111,9	139,9
	HAS-U 8.8			-	19,8	29,0	40,8	64,1	95,0	111,9	139,9
	HAS-U A4			-	19,8	29,0	40,8	64,1	95,0	111,9	139,9
	HAS-U HCR			-	19,8	29,0	40,8	64,1	95,0	111,9	139,9
Shear	HAS-U 5.8	V_{Rk}	[kN]	-	14,5	21,1	39,3	61,3	88,3	114,8	140,3
	HAS-U 8.8			-	23,2	33,7	62,8	98,0	141,2	183,6	224,4
	HAS-U A4			-	20,3	29,5	55,0	85,8	123,6	114,8	140,3
	HAS-U HCR			-	23,2	33,7	62,8	98,0	123,6	160,7	196,4

Design resistance

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete											
Tension	HAS-U 5.8	N_{Rd}	[kN]	12,2	19,3	27,0	32,7	51,9	71,3	87,1	103,9
	HAS-U 8.8			14,4	20,0	27,0	32,7	51,9	71,3	87,1	103,9
	HAS-U A4			13,7	20,0	27,0	32,7	51,9	71,3	80,2	98,1
	HAS-U HCR			14,4	20,0	27,0	32,7	51,9	71,3	87,1	103,9
Shear	HAS-U 5.8	V_{Rd}	[kN]	7,3	11,6	16,9	31,4	49,0	70,6	91,8	112,2
	HAS-U 8.8			11,7	18,6	27,0	50,2	78,4	113,0	146,9	179,5
	HAS-U A4			8,2	13,0	18,9	35,2	55,0	79,2	48,2	58,9
	HAS-U HCR			11,7	18,6	27,0	50,2	78,4	70,6	91,8	112,2
Cracked concrete											
Tension	HAS-U 5.8	N_{Rd}	[kN]	-	9,4	13,8	19,4	30,5	45,2	53,3	66,6
	HAS-U 8.8			-	9,4	13,8	19,4	30,5	45,2	53,3	66,6
	HAS-U A4			-	9,4	13,8	19,4	30,5	45,2	53,3	66,6
	HAS-U HCR			-	9,4	13,8	19,4	30,5	45,2	53,3	66,6
Shear	HAS-U 5.8	V_{Rd}	[kN]	-	11,6	16,9	31,4	49,0	70,6	91,8	112,2
	HAS-U 8.8			-	18,6	27,0	50,2	78,4	113,0	146,9	179,5
	HAS-U A4			-	13,0	18,9	35,2	55,0	79,2	48,2	58,9
	HAS-U HCR			-	18,6	27,0	50,2	78,4	70,6	91,8	112,2

Recommended loads [a)]

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete											
Tension	HAS-U 5.8	N_{Rec}	[kN]	8,7	13,8	19,3	23,4	37,1	50,9	62,2	74,2
	HAS-U 8.8			10,3	14,3	19,3	23,4	37,1	50,9	62,2	74,2
	HAS-U A4			9,8	14,3	19,3	23,4	37,1	50,9	57,3	70,1
	HAS-U HCR			10,3	14,3	19,3	23,4	37,1	50,9	62,2	74,2
Shear	HAS-U 5.8	V_{Rec}	[kN]	5,2	8,3	12,0	22,4	35,0	50,4	65,6	80,1
	HAS-U 8.8			8,4	13,3	19,3	35,9	56,0	80,7	104,9	128,2
	HAS-U A4			5,9	9,3	13,5	25,2	39,3	56,6	34,4	42,1
	HAS-U HCR			8,4	13,3	19,3	35,9	56,0	50,4	65,6	80,1
Cracked concrete											
Tension	HAS-U 5.8	N_{Rec}	[kN]	-	6,7	9,9	13,9	21,8	32,3	38,1	47,6
	HAS-U 8.8			-	6,7	9,9	13,9	21,8	32,3	38,1	47,6
	HAS-U A4			-	6,7	9,9	13,9	21,8	32,3	38,1	47,6
	HAS-U HCR			-	6,7	9,9	13,9	21,8	32,3	38,1	47,6
Shear	HAS-U 5.8	V_{Rec}	[kN]	-	8,3	12,0	22,4	35,0	50,4	65,6	80,1
	HAS-U 8.8			-	13,3	19,3	35,9	56,0	80,7	104,9	128,2
	HAS-U A4			-	9,3	13,5	25,2	39,3	56,6	34,4	42,1
	HAS-U HCR			-	13,3	19,3	35,9	56,0	50,4	65,6	80,1

a) With overall partial safety factor for action $\gamma=1,4$. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

Materials

Mechanical properties

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Nominal tensile strength	HAS-U 5.8	f_{uk}	[N/mm²]	500	500	500	500	500	500	500	500
	HAS-U 8.8			800	800	800	800	800	800	800	800
	HAS-U A4			700	700	700	700	700	700	500	500
	HAS-U HCR			800	800	800	800	800	700	700	700
Yield strength	HAS-U 5.8	f_{yk}	[N/mm²]	400	400	400	400	400	400	400	400
	HAS-U 8.8			640	640	640	640	640	640	640	640
	HAS-U A4			450	450	450	450	450	450	210	210
	HAS-U HCR			640	640	640	640	640	400	400	400
Stressed cross-section	HAS-U	A_s	[mm²]	36,6	58,0	84,3	157	245	353	459	561
Moment of resistance	HAS-U	W	[mm³]	31,2	62,3	109	277	541	935	1387	1874

Material quality for HAS-U

Part	Material
Zinc coated steel	
Threaded rod, HAS-U 5.8 (HDG)	Strength class 5.8; Elongation at fracture A5 > 8% ductile Electroplated zinc coated ≥ 5µm; (HDG) hot dip galvanized ≥ 45 µm
Threaded rod, HAS-U 8.8 (HDG)	Strength class 8.8; Elongation at fracture A5 > 12% ductile Electroplated zinc coated ≥ 5µm; (HDG) hot dip galvanized ≥ 45 µm
Washer	Electroplated zinc coated ≥ 5 µm, hot dip galvanized ≥ 45 µm
Nut	Strength class of nut adapted to strength class of threaded rod. Electroplated zinc coated ≥ 5µm, hot dip galvanized ≥ 45 µm
Stainless Steel	
Threaded rod, HAS-U A4	Strength class 70 for ≤ M24 and strength class 50 for > M24; 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
High corrosion resistant steel	
Threaded rod, HAS-U HCR	Strength class 80 for ≤ M20 and class 70 for > M20, 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

Setting information

Installation temperature range:
+5°C to +40°C

Service temperature range
Hilti HIT-RE 100 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 + 58 °C	+ 35 °C	+ 58 °C
Temperature range III	-40 °C to + 70 °C	+ 43 °C	+ 70 °C

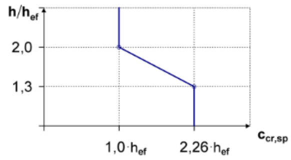
Maximum short term base material temperature
Short term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.
Maximum long term base material temperature
Long term elevated base material temperatures are roughly constant over significant periods of time.

Working time and curing time [a)]

Temperature of the base material	Maximum working time	Minimum curing time
T_{BM}	t_{work}	t_{cure} [a)]
5 °C ≤ T_{BM} < 10 °C	2 h	72 h
10 °C ≤ T_{BM} < 15 °C	1,5 h	48 h
15 °C ≤ T_{BM} < 20 °C	30 min	24 h
20 °C ≤ T_{BM} < 30 °C	20 min	12 h
30 °C ≤ T_{BM} < 40 °C	12 min	8 h
40 °C	12 min	4 h

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

Setting details

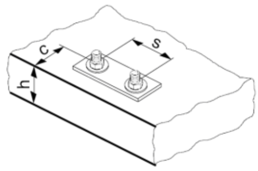
Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	22	28	30	35
Diameter of element	d	[mm]	8	10	12	16	20	24	27	30
Effective anchorage depth (=drill hole depth) a)	$h_{ef,min} = h_0$	[mm]	60	60	70	80	90	96	108	120
	$h_{ef,max} = h_0$	[mm]	160	200	240	320	400	480	540	600
Minimum base material thickness a)	h_{min}	[mm]	h_{ef} + 30 ≥ 100 mm			h_{ef} + 2 d_0				
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26	30	33
Minimum spacing	s_{min}	[mm]	40	50	60	80	100	120	135	150
Minimum edge distance	c_{min}	[mm]	40	50	60	80	100	120	135	150
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	2 $c_{cr,sp}$							
Critical edge distance for splitting failure	$c_{cr,sp}$	[mm]	**1,0 · h_{ef}**	for h / h_{ef} ≥ 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} ≤ 1,3						
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	2 $c_{cr,N}$							
Critical edge distance for concrete cone failure b)	$c_{cr,N}$	[mm]	1,5 h_{ef}							
Maximum torque moment c)	T_{max}	[Nm]	10	20	40	80	150	200	270	300

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

a) $h_{ef,min} \le h_{ef} \le h_{ef,max}$ (h_{ef}: embedment depth) h: base material thickness ($h \ge h_{min}$)

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 save side.

c) This is the maximun recommended torque moment to avoid splitting failure during installation for anchors with minimun spacing and/or edge distance.



Installation equipment

Anchor size	M8	M10	M12	M16	M20	M24	M27	M30
Rotary hammer	TE 2– TE 16				TE 40 – TE 80			
Other tools	Blow out pump (h_{ef} ≤ 10 · d, d_0 ≤ 20 mm), compressed air gun, Set of cleaning brushes, dispenser, piston plug							

Drilling and cleaning parameters

HAS-U	Drilling and cleaning			Installation
	Hammer drill (HD)	Hollow Drill Bit (HDB)	Brush HIT-RB	Piston plug HIT-SZ
	d0 [mm]		size [mm]	size [mm]
				
M8	10	-	10	-
M10	12	12	12	12
M12	14	14	14	14
M16	18	18	18	18
M20	22	22	22	22
M24	28	28	28	28
M27	30	-	30	30
M30	35	35	35	35

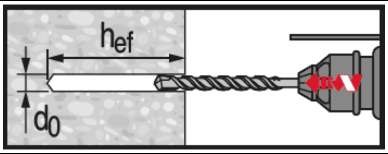
Setting instructions

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

Safety regulations.

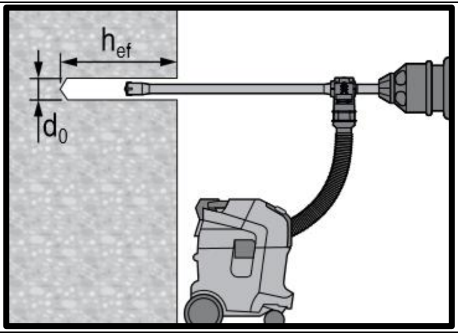
Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HIT-RE 100.

Drilling



Hammer drilled hole

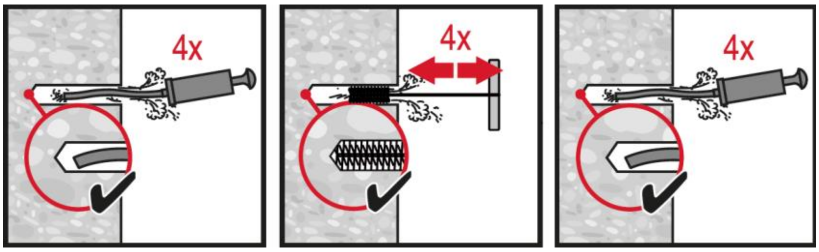
For dry and wet concrete.



Hammer drilled hole with Hollow Drilled Bit (HDB)

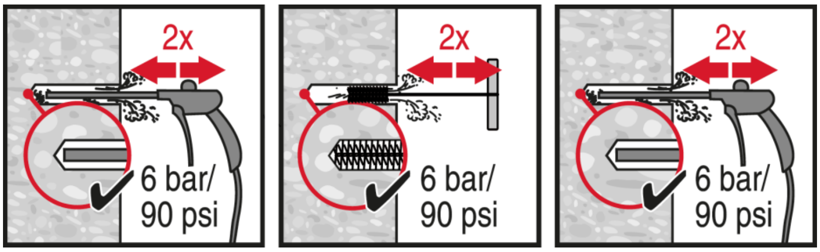
No cleaning required.

Cleaning

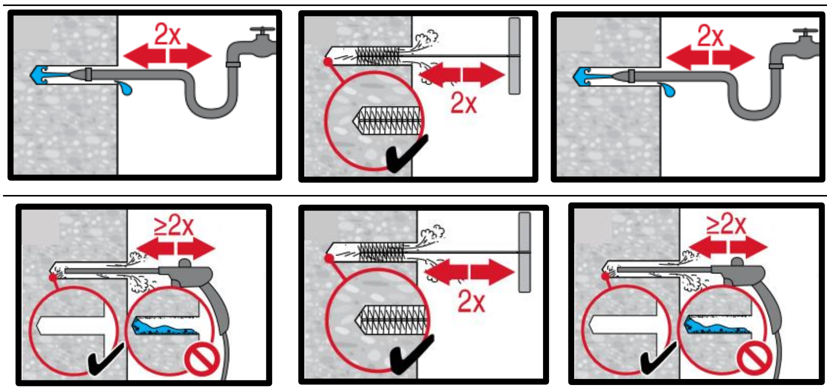


Manual cleaning (MC)
Non-cracked concrete only

for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$.



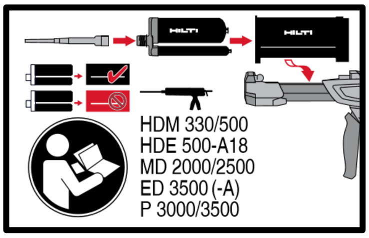
Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d$.

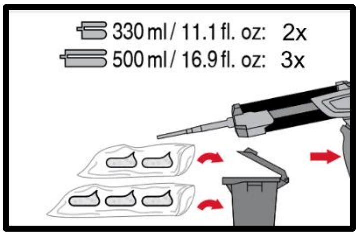


Compressed air cleaning (CAC)
cleaning of flooded holes

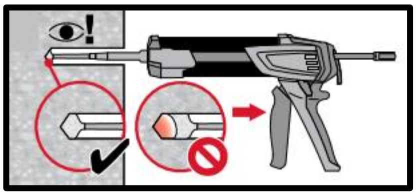
for all drill hole diameters d_0 and drill hole depths h_0 .

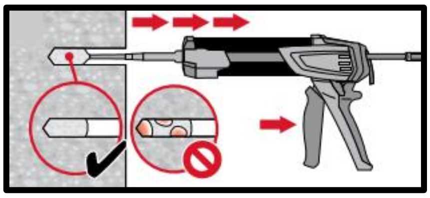
Injection system



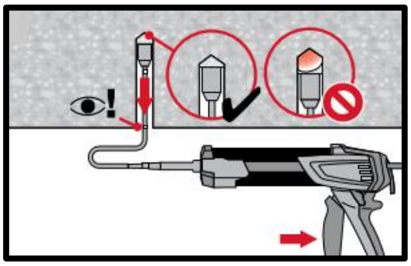


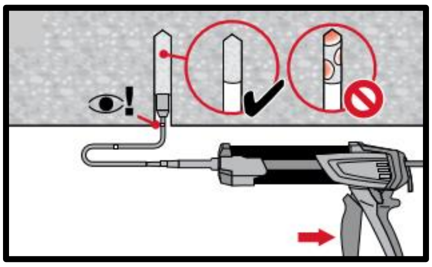
Injection system preparation.





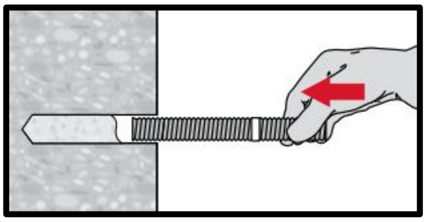
Injection method for drill hole depth h_{ef} ≤ 250 mm.



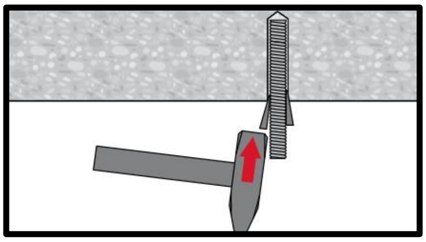


Injection method for overhead application and/or installation with embedment depth h_{ef} > 250 mm.

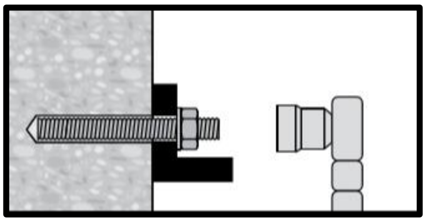
Setting the element



Setting element, observe working time "t_{work}",



Setting element for overhead applications, observe working time "t_{work}",



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

HIT-RE 100 injection mortar

Anchor design (EN 1992-4) / Rebar elements / Concrete

Injection mortar system

Hilti HIT-RE 100
330 ml foil pack

(also available as 500 ml and 1400 ml foil pack)

Rebar B500B

(ϕ8-ϕ32)

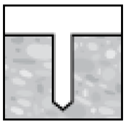
Benefits

- Suitable for cracked and non-cracked concrete C 20/25 to C 50/60
- High loading capacity
- Suitable for dry and water saturated concrete
- Large diameter applications
- Long working time at elevated temperatures
- Odourless epoxy

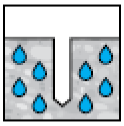
Base material

Concrete (non-cracked)

Concrete (cracked)

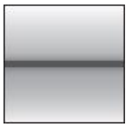


Dry concrete



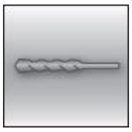
Wet concrete

Load conditions

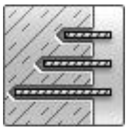


Static/ quasi-static

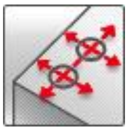
Installation conditions



Hammer drilling



Variable embedment depth



Small edge distance and spacing

Other informations

European Technical Assessment

CE conformity

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment a)	CSTB, Marne la Vallée	ETA-15/0882 / 2019-08-30

b) All data given in this section according to ETA-15/0882 issue 2019-08-30.

Static and quasi-static loading (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
- Embedment depth, as specified in the table
- Anchor material, as specified in the tables
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²
- in-service temperate range I

(min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C)

Embedment depth a) and base material thickness

Anchor size			ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Embedment depth	h_{ef}	[mm]	80	90	110	125	125	170	210	230	270	285	300
Base material thickness	h	[mm]	110	120	140	161	165	220	274	294	340	359	380

a) The allowed range of embedment depth is shown in setting details

Characteristic resistance

Anchor size				ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Non-cracked concrete														
Tensile	Rebar B500B	N_{Rk}	[kN]	28,0	39,6	56,8	65,9	68,8	109,0	149,7	171,6	218,2	236,7	255,6
Shear	Rebar B500B	V_{Rk}	[kN]	14,0	22,0	31,0	42,0	55,0	86,0	135,0	146,0	169,0	194,0	221,0
Cracked concrete														
Tensile	Rebar B500B	N_{Rk}	[kN]	-	19,8	29,0	35,7	40,8	64,1	98,9	103,3	130,6	147,7	165,8
Shear	Rebar B500B	V_{Rk}	[kN]	-	22,0	31,0	42,0	55,0	86,0	135,0	146,0	169,0	194,0	221,0

Design resistance

Anchor size				ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Non-cracked concrete														
Tensile	Rebar B500B	N_{Rd}	[kN]	13,4	18,8	27,0	31,4	32,7	51,9	71,3	81,7	103,9	112,7	121,7
Shear	Rebar B500B	V_{Rd}	[kN]	11,2	14,7	20,7	28,0	36,7	57,3	90,0	97,3	129,3	129,3	147,3
Cracked concrete														
Tensile	Rebar B500B		[kN]	-	9,4	13,8	17,0	19,4	30,5	47,1	49,2	62,2	70,3	78,9
Shear	Rebar B500B		[kN]	-	14,7	20,7	28,0	36,7	57,3	90,0	97,3	129,3	129,3	147,3

Recommended loads a)

Anchor size				ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Non-cracked concrete														
Tensile	Rebar B500B	N_{Rec}	[kN]	9,6	13,5	19,3	22,4	23,4	37,1	50,9	58,4	74,2	80,5	86,9
Shear	Rebar B500B	V_{Rec}	[kN]	8,0	10,5	14,8	20,0	26,2	41,0	64,3	69,5	80,5	92,4	105,2
Cracked concrete														
Tensile	Rebar B500B	N_{Rec}	[kN]	-	6,7	9,9	12,2	13,9	21,8	33,6	35,1	44,4	50,2	56,4
Shear	Rebar B500B	V_{Rec}	[kN]	-	10,5	14,8	20,0	26,2	41,0	64,3	69,5	80,5	92,4	105,2

a) With 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,

Materials

Mechanical properties

Anchor size			ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Nominal tensile strength	f_{uk}	[N/mm²]	550	550	550	550	550	550	550	550	550	550	550
Yield strength	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500	500	500
Stressed cross- section	A_s	[mm²]	50,3	78,5	113,1	153,9	201,1	314,2	490,9	531	615,8	707	804,2
Moment of resistance	W	[mm³]	50,3	98,2	169,6	269,4	402,1	785,4	1534	1726	2155	2651	3217

Material quality

Part	Material
Rebar EN 1992-1-1:2004	Bars and de-coiled rods class B or C II according to NDP or NCL of EN 1992-1-1/NA:2013

Setting information

Installation temperature
+ 5°C to + 40°C

Service temperature range
Hilti HIT-RE 100 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 + 58 °C	+ 35 °C	+ 58 °C
Temperature range III	-40 °C to + 70 °C	+ 43 °C	+ 70 °C

Maximum 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,
Maximum long term base material temperature
Long term elevated base material temperatures are roughly constant over significant periods of time,

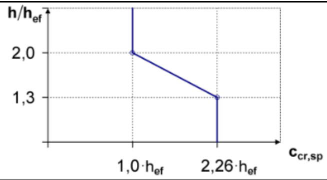
Working time and curing time [a)]

Temperature of the base material	Maximum working time	Minimum curing time
T_{BM}	t_{work}	t_{cure} [a)]
5 °C ≤ T_{BM} < 10 °C	2 h	72 h
10 °C ≤ T_{BM} < 15 °C	1,5 h	48 h
15 °C ≤ T_{BM} < 20 °C	30 min	24 h
20 °C ≤ T_{BM} < 30 °C	20 min	12 h
30 °C ≤ T_{BM} < 40 °C	12 min	8 h
40 °C	12 min	4 h

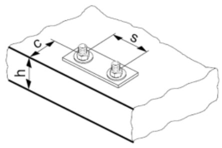
a) The curing time data are valid for dry base material only, In wet base material the curing times must be doubled,

Setting details

Anchor size			Ø8	Ø10	Ø12		Ø14	Ø16	Ø20	Ø25	Ø26	Ø28	Ø30	Ø32
Nominal diameter of element	d	[mm]	8	10	12		14	16	20	25	26	28	30	32
Nominal diameter of drill bit	d_0	[mm]	10 / 12 a)	12 / 14 a)	14 a)	16 a)	18	20	24 / 25 a)	30 / 32 a)	32	35	37	40
Effective anchorage depth (= drill hole depth) b)	$h_{ef,min} = h_0$	[mm]	60	60	70	70	75	80	90	100	104	112	120	128
	$h_{ef,max} = h_0$	[mm]	160	200	240	240	280	320	400	500	520	560	600	640
Minimum base material thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm			$h_{ef} + 2\ d_0$								
Minimum spacing	s_{min}	[mm]	40	50	60	60	70	80	100	125	130	140	150	160
Minimum edge distance	c_{min}	[mm]	40	50	60	60	70	80	100	125	130	140	150	160
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$											
Critical edge distance for splitting failure c)	$c_{cr,sp}$	[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 d)	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$											



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



a) Both given values for drill bit diameter can be used
b) $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ (h_{ef}: embedment depth)
c) h: base material thickness ($h \geq h_{min}$)
d) 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 save side,

Installation equipment

Anchor size	ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Rotary hammer	TE 2– TE 16					TE 40 – TE 80					
Other tools	Blow out pump ($h_{ef} \leq 10 \cdot d$, $d_0 \leq 20$ mm), compressed air gun, Set of cleaning brushes, dispenser, piston plug										

Drilling and cleaning parameters

Rebar [mm]	Drilling and cleaning			Installation
	Hammer drill (HD)	**Hollow Drill Bit (HDB)**	**Brush HIT-RB**	**Piston plug HIT-SZ**
	diameter d_0 [mm]		**size [mm]**	
				
ϕ8	10 / 12 a)	12 a)	10 / 12 a)	- / 12 a)
ϕ10	12 / 14 a)	12 / 14 a)	12 / 14 a)	12 / 14 a)
ϕ12	14 / 16 a)	14 / 16 a)	14 / 16 a)	14 / 16 a)
ϕ14	18	18	18	18
ϕ16	20	20	20	20
ϕ20	24 / 25 a)	24 / 25 a)	24 / 25 a)	24 / 25 a)
ϕ25	30 / 32 a)	32 a)	30 / 32 a)	30 / 32 a)
ϕ26	32	32	32	32
ϕ28	35	-	35	35
ϕ30	37	-	37	37
ϕ32	40	-	40	40

a) Both of the two given values can be used

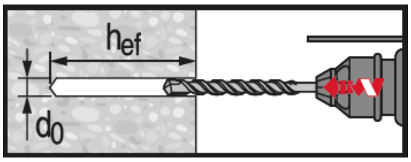
Setting instructions

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

Safety regulations,

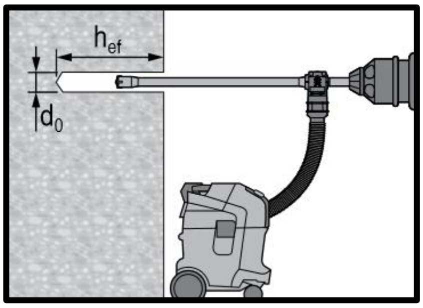
Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HIT-RE 100

Drilling



Hammer drilled hole

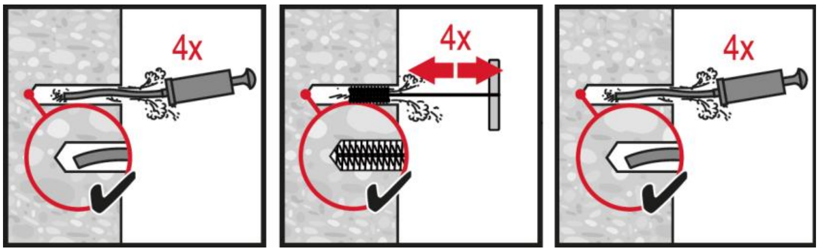
For dry and wet concrete,



Hammer drilled hole with Hollow Drilled Bit (HDB)

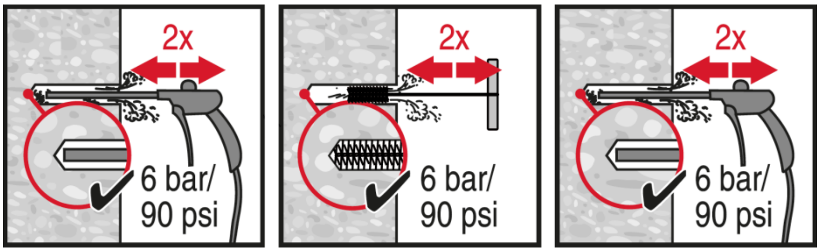
No cleaning required,

Cleaning



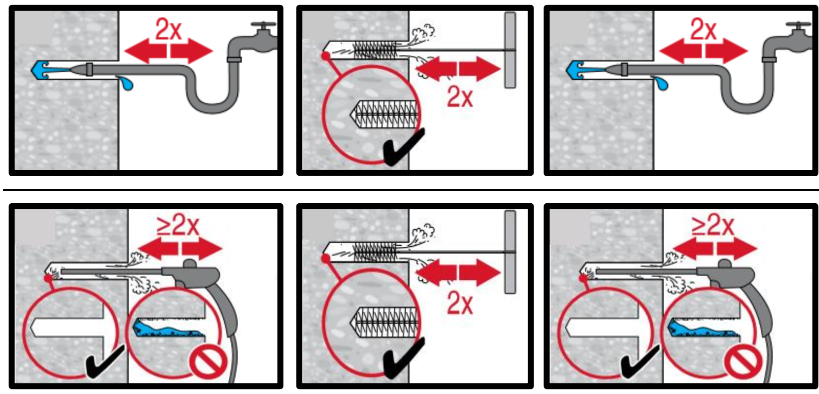
Manual cleaning (MC)
Non-cracked concrete only

for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$,



Hammer Drilling:

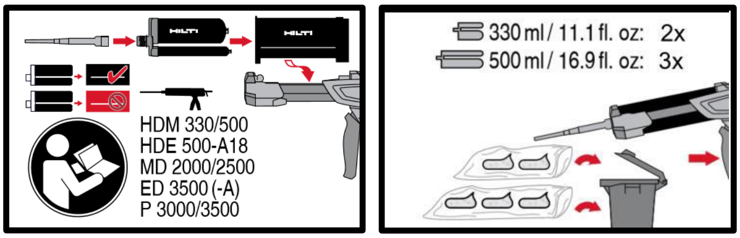
Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d$,



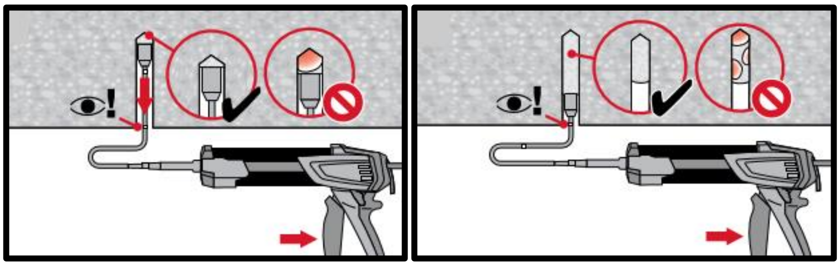
Compressed air cleaning (CAC)
cleaning of flooded holes

for all drill hole diameters d_0 and drill hole depths h_0,

Injection system

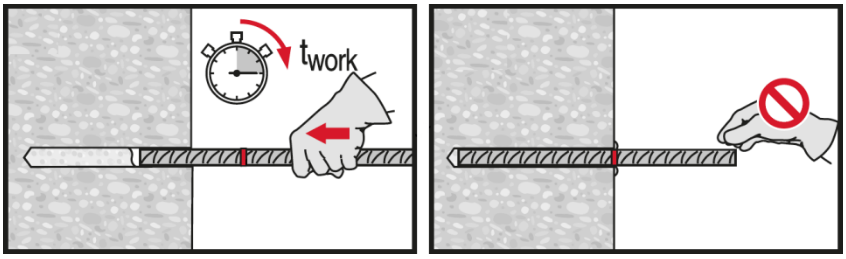


Injection system preparation,

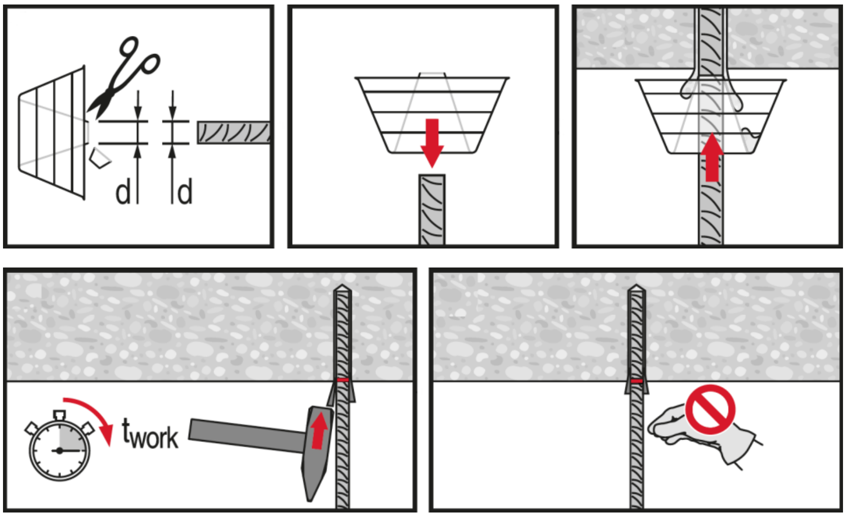


Injection method for overhead application and/or installation with embedment depth $h_{ef} \le 250$ mm

Setting the element



Setting element, observe working time "t_{work}",



Setting element for overhead applications, observe working time "t_{work}",

HIT-RE 100 injection mortar

Rebar design (EN 1992-1) / Rebar elements / Concrete

Injection mortar system

Hilti HIT-RE 100 330 ml foil pack

(also available as 500 ml and 1400 ml foil pack)

Rebar B500 B

(ϕ8 - ϕ40)

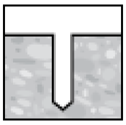
Benefits

- Suitable for concrete C 12/15 to C 50/60
- High loading capacity
- Suitable for dry and water saturated concrete
- For rebar diameters up to 40 mm
- Non corrosive to rebar elements
- Long working time at elevated temperatures
- Suitable for embedment length till 3200 mm

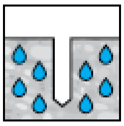
Base material

Concrete (non-cracked)

Concrete (cracked)

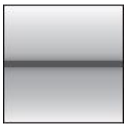


Dry concrete



Wet concrete

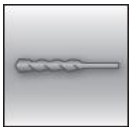
Load conditions



Static/ quasi-static

Fire resistance

Installation conditions



Hammer drilling

Diamond coring

Other information

European Technical Assessment

CE conformity

Approvals / certificates

Description	Authority / Laboratory	No, / date of issue
European technical assessment [a)]	DIBt, Berlin	ETA – 15/0883 / 2017-12-06
Fire report	MFPA, Liepzig	GS 3,2/15-431-4 / 2016-04-29

c) All data given in this section according to the approvals mentioned above ETA-15/0883 issue 2017-12-06,

Basic design data

Static EC2 design

Design bond strength in N/mm² according to ETA 15/0883 for good bond conditions

Rebar-size	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
All allowed hammer drilling methods									
ϕ8 - ϕ32	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
ϕ34	1,6	2,0	2,3	2,6	2,9	3,3	3,6	3,9	4,2
ϕ36	1,5	1,9	2,2	2,6	2,9	3,3	3,6	3,8	4,1
ϕ40	1,5	1,8	2,1	2,5	2,8	3,1	3,4	3,7	4,0
Diamond coring wet									
ϕ8 - ϕ32	1,6	2,0	2,3	2,7					
ϕ34	1,6	2,0	2,3	2,6					
ϕ36	1,5	1,9	2,2	2,6					
ϕ40	1,5	1,8	2,1	2,5					

For poor bond conditions multiply the values by 0,7, Values valid for non-cracked and cracked concrete

Minimum anchorage length and minimum lap length

The minimum anchorage length $\ell_{b,min}$ and the minimum overlap length $\ell_{0,min}$ according to EN 1992-1-1 shall be multiplied by the relevant **Amplification factor** in the table below,

Amplification factor α_{lb} for the min, anchorage length and min, lap length according to EN 1992-1-1 for:

Rebar - size	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
All allowed hammer drilling methods									
ϕ8 -ϕ40	1,0								
Diamond coring dry and wet									
ϕ8 -ϕ40	1,5								

Pre-calculated values[1] – anchorage length

Rebar yield strength f_{yk}=500 N/mm², concrete C25/30, good bond conditions

Rebar-size	Anchorage length l_{bd} [mm]	Design value N_{Rd} [KN]	Mortar volume[2] V_M [ml]	Anchorage length l_{bd} [mm]	Design value N_{Rd} [KN]	Mortar volume[2] V_M [ml]
	$\alpha_1=\alpha_2=\alpha_3=\alpha_4=\alpha_5=1,0$			$\alpha_1=\alpha_3=\alpha_4=1,0$ α_2 or $\alpha_5=0,7$		
ϕ8	100	6,8	8	100	9,7	8
	170	11,5	13	140	13,6	11
	250	17,0	19	180	17,4	14
	322,1	21,9	24	**225,4**	21,9	17
ϕ10	121	10,3	11	121	14,7	11
	220	18,7	20	170	20,6	15
	310	26,3	28	230	27,9	21
	402,6	34,1	36	**281,8**	34,1	25
ϕ12	145	14,8	15	145	21,1	15
	260	26,5	27	210	30,5	22
	370	37,7	39	270	39,3	29
	483,1	49,2	51	**338,2**	49,2	36
ϕ14	169	20,1	20	169	28,7	20
	300	35,6	36	240	40,7	29
	430	51,1	52	320	54,3	39
	563,6	66,9	68	**394,5**	66,9	48

Pre-calculated values[1] – anchorage length

Rebar yield strength f_{yk}=500 N/mm², concrete C25/30, good bond conditions

Rebar-size	Anchorage length l_{bd} [mm]	Design value N_{Rd} [KN]	Mortar volume[2] V_M [ml]	Anchorage length l_{bd} [mm]	Design value N_{Rd} [KN]	Mortar volume[2] V_M [ml]
	$\alpha_1=\alpha_2=\alpha_3=\alpha_4=\alpha_5=1{,}0$			$\alpha_1=\alpha_3=\alpha_4=1{,}0$ α_2 or $\alpha_5=0{,}7$		
ϕ16	193	26,2	26	193	37,4	26
	340	46,1	46	280	54,3	38
	490	66,5	67	370	71,7	50
	644	87,4	87	**450,9**	87,4	61
ϕ18	217	33,1	33	217	47,3	33
	380	58	57	310	67,6	47
	540	82,4	81	410	89,4	62
	724,6	110,6	109	**507,2**	110,6	76
ϕ20	242	41,1	51	242	58,6	51
	390	66,2	83	350	84,8	74
	550	93,3	117	460	111,5	98
	805,2	136,6	171	**563,6**	136,6	120
ϕ22	266	49,6	75	266	70,9	75
	410	76,5	116	380	101,3	107
	560	104,5	158	500	133,3	141
	885,7	165,3	250	**620**	165,3	175
ϕ24	290	59	122	290	84,3	122
	430	87,5	182	420	122,1	177
	560	114	236	550	160	232
	966,2	196,7	408	**676,3**	196,7	286
ϕ25	302	64	114	302	91,5	114
	430	91,2	162	430	130,3	162
	570	120,9	214	570	172,7	214
	1006,4	213,4	378	**704,5**	213,4	265
ϕ28	350	83,1	145	338	114,7	140
	595	141,3	247	480	162,9	200
	875	207,8	364	635	215,5	264
	1127,2	267,7	469	**789**	267,7	328
ϕ30	374	95,2	165	374	136	165
	635	161,6	281	528	191,9	233
	935	237,9	413	700	254,5	309
	1207,7	307,3	534	**845,4**	307,3	374
ϕ32	400	108,6	217	400	155,1	217
	680	184,6	369	580	224,9	315
	1000	271,4	543	800	310,2	434
	1288,2	349,7	699	**901,8**	349,7	490
ϕ36	450	132,3	387	440	184,8	379
	765	225	658	640	268,8	551
	1125	330,8	968	900	378,1	774
	1505,0	442,6	1295	**1053,5**	442,6	907
ϕ40	500	157,1	520	485	217,7	505
	850	267	884	700	314,2	728
	1000	314,2	1040	990	444,3	1030
	1739,1	546,4	1810	**1217,4**	546,4	1267

1) Values corresponding to the minimum anchorage length, The maximum permissible load is valid for "good bond conditions" as described in EN 1992-1-1, For all other conditions multiply by the value by 0,7,

2) The volume of mortar corresponds to the formula "$1{,}2*(d_0^2-d_s^2)*\pi*lb/4$" for hammer drilling

Pre-calculated values – overlap length

Rebar yield strength f_{yk}=500 N/mm², concrete c25/30, good bond conditions

Rebar-size	Overlap length l_0[mm]	Design value N_{Rd} [KN]	Mortar volume[2)] V_M [ml]		Overlap length l_0 [mm]	Design value N_{Rd} [KN]	Mortar volume[2)] V_M [ml]
	$\alpha_1=\alpha_2=\alpha_3=\alpha_4=\alpha_5=1{,}0$				$\alpha_1=\alpha_3=\alpha_4=1{,}0$ α_2 or $\alpha_5=0{,}7$		
ϕ8	200	13,6	15		200	19,4	15
	240	16,3	18		210	20,4	16
	280	19	21		220	21,3	17
	322,1	21,9	24		**225,4**	21,9	17
ϕ10	200	17	18		200	24,2	18
	270	22,9	24		230	27,9	21
	340	28,8	31		250	30,3	23
	402,6	34,1	36		**281,8**	34,1	25
ϕ12	200	20,4	21		200	29,1	21
	290	29,5	31		250	36,4	26
	390	39,7	41		290	42,2	31
	483,1	49,2	51		**338,2**	49,2	36
ϕ14	210	24,9	25		210	35,6	25
	330	39,2	40		270	45,8	33
	450	53,4	54		330	56	40
	563,6	66,9	68		**394,5**	66,9	48
ϕ16	240	32,6	33		240	46,5	33
	370	50,2	50		310	60,1	42
	510	69,2	69		380	73,7	52
	644	87,4	87		**450,9**	87,4	61
ϕ18	270	41,2	41		270	58,9	41
	410	62,6	62		350	76,3	53
	560	85,5	84		430	93,8	65
	724,6	110,6	109		**507,2**	110,6	76
ϕ20	300	50,9	64		300	72,7	64
	430	72,9	91		390	94,5	83
	570	96,7	121		480	116,3	102
	805,2	136,6	171		**563,6**	136,6	120
ϕ22	330	61,6	93		330	88	93
	450	84	127		430	114,6	122
	580	108,2	164		520	138,6	147
	885,7	165,3	250		**620**	165,3	175
ϕ24	360	73,3	152		360	104,7	152
	470	95,7	198		470	136,7	198
	590	120,1	249		570	165,8	241
	966,2	196,7	408		**676,3**	196,7	286
ϕ25	375	79,5	141		375	113,6	141
	430	91,2	162		480	145,4	181
	570	120,9	214		590	178,7	222
	1006,4	213,4	378		**704,5**	213,4	265
ϕ28	420	99,8	175		420	142,5	175
	595	141,3	247		530	179,8	220
	875	207,8	364		635	215,5	264
	1127,2	267,7	469		**789**	267,7	328

Pre-calculated values – overlap length

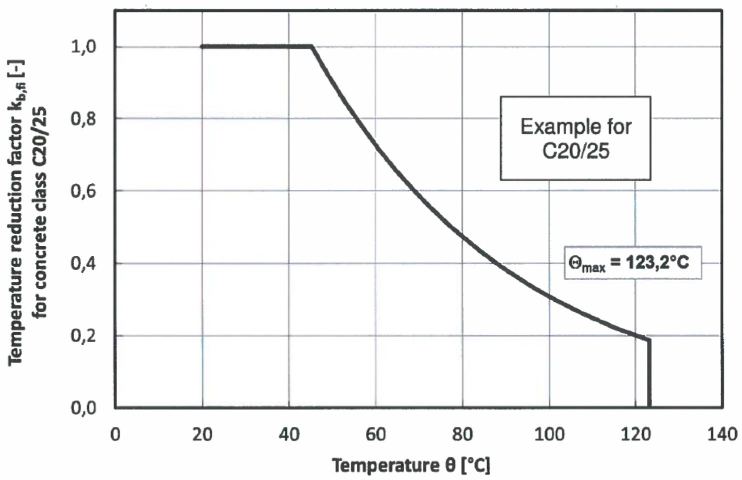
Rebar yield strength f_{yk}=500 N/mm², concrete c25/30, good bond conditions

Rebar-size	Overlap length l_0[mm]	Design value N_{Rd} [KN]	Mortar volume[2)] V_M [ml]	Overlap length l_0 [mm]	Design value N_{Rd} [KN]	Mortar volume[2)] V_M [ml]
	$\alpha_1=\alpha_2=\alpha_3=\alpha_4=\alpha_5=1{,}0$			$\alpha_1=\alpha_3=\alpha_4=1{,}0$ α_2 or $\alpha_5=0{,}7$		
ϕ30	450	114,5	199	450	163,6	199
	635	161,6	281	528	191,9	233
	935	237,9	413	700	254,5	309
	1207,7	307,3	534	**845,4**	307,3	374
ϕ32	480	130,3	261	480	186,1	261
	680	184,6	369	650	252	353
	1000	271,4	543	800	310,2	434
	1288,2	349,7	699	**901,8**	349,7	490
ϕ36	540	158,8	465	540	218,1	465
	765	225,0	658	720	290,0	620
	1125	330,8	968	900	363,5	774
	1505,0	442,6	1295	**1053,5**	442,6	907
ϕ40	600	188,5	624	600	269,3	624
	850	267,0	884	750	336,6	780
	1000	314,2	1040	990	444,3	1030
	1739,1	505,9	1676	**1217,4**	546,4	1267

1) Values corresponding to the minimum anchorage length, The maximum permissible load is valid for “good bond conditions” as described in EN 1992-1-1, For all other conditions multiply by the value by 0,7,

2) The volume of mortar corresponds to the formula “$1{,}2*(d_0^2-d_s^2)*\pi*lb/4$” for hammer drilling

Fire resistance



The design value of the bond strength $f_{bd,fi}$ under fire exposure has to be calculated by the following equation:

$$f_{bd,fi} = k_{b,fi}(\theta) \cdot f_{bd} \cdot \gamma_c / \gamma_{M,fi}$$

With: θ ≤ 123,2ºC: $k_{b,fi}(\theta) = 26{,}424 \cdot e^{-0{,}0215 \cdot e} / f_{bd} \cdot 4{,}3 \ \leq 1{,}0$

θ > 123,2ºC: $k_{b,fi}(\theta) = 0{,}0$

$f_{bd,fi}$ design value of the ultimate bond stress in case of fire in N/mm²

θ temperature in ºC in the mortar layer

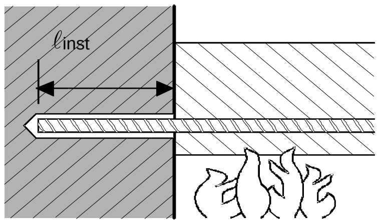
$k_{b,fi}(\theta)$ reduction factor under fire exposure

f_{bd} design values of the ultimate bond stress in N/mm₂ in cold condition

γ_c partially safety factor according to EN 1992-1-1

$\gamma_{M,fi}$ partially safety factor according to EN 1992-1-2

a) **Anchoring application**



Anchoring application beam-wall connections with a concrete cover of 20 mm

Maximum force ($F_{s,T,max}$) in rebar in conjunction with HIT-RE 100 as a function of embedment depth (ℓ_{inst}) for the fire resistance classes R30 to R240 according to EC2,

<table>
<tr><th rowspan="2">Rebar-size</th><th rowspan="2">$F_{s,T,max}$ [kN]</th><th rowspan="2">ℓ_{inst} [mm]</th><th colspan="6">Fire resistance of bar [kN]</th></tr>
<tr><th>R30</th><th>R60</th><th>R90</th><th>R120</th><th>R180</th><th>R240</th></tr>
<tr><td rowspan="10">ϕ8</td><td rowspan="10">16,8</td><td>100</td><td>3,4</td><td>1,0</td><td>0,2</td><td rowspan="2">-</td><td rowspan="3">-</td><td rowspan="4">-</td></tr>
<tr><td>110</td><td>4,3</td><td>1,7</td><td>0,5</td></tr>
<tr><td>140</td><td>6,9</td><td>4,2</td><td>2,2</td><td>0,9</td></tr>
<tr><td>160</td><td>8,6</td><td>6,0</td><td>3,9</td><td>2,1</td><td>0,5</td></tr>
<tr><td>260</td><td rowspan="6">16,8</td><td>14,6</td><td>12,5</td><td>10,7</td><td>7,7</td><td>5,3</td></tr>
<tr><td>290</td><td rowspan="5">16,8</td><td>15,1</td><td>13,3</td><td>10,3</td><td>7,9</td></tr>
<tr><td>310</td><td rowspan="4">16,8</td><td>15,1</td><td>12,1</td><td>9,6</td></tr>
<tr><td>330</td><td rowspan="3">16,8</td><td>13,8</td><td>11,4</td></tr>
<tr><td>370</td><td rowspan="2">16,8</td><td>14,8</td></tr>
<tr><td>400</td><td>16,8</td></tr>
<tr><td rowspan="10">ϕ10</td><td rowspan="10">26,2</td><td>110</td><td>5,3</td><td>2,1</td><td>0,6</td><td>-</td><td rowspan="2">-</td><td rowspan="3">-</td></tr>
<tr><td>140</td><td>8,6</td><td>5,3</td><td>2,7</td><td>1,2</td></tr>
<tr><td>160</td><td>10,8</td><td>7,4</td><td>4,8</td><td>2,7</td><td>0,6</td></tr>
<tr><td>260</td><td>21,6</td><td>18,3</td><td>15,7</td><td>13,4</td><td>9,7</td><td>6,6</td></tr>
<tr><td>290</td><td>24,8</td><td>21,5</td><td>18,9</td><td>16,7</td><td>12,9</td><td>9,9</td></tr>
<tr><td>310</td><td rowspan="5">26,2</td><td>23,7</td><td>21,1</td><td>18,8</td><td>15,1</td><td>12,0</td></tr>
<tr><td>340</td><td rowspan="4">26,2</td><td>24,3</td><td>22,1</td><td>18,3</td><td>15,3</td></tr>
<tr><td>360</td><td rowspan="3">26,2</td><td>24,2</td><td>20,5</td><td>17,5</td></tr>
<tr><td>380</td><td rowspan="2">26,2</td><td>22,7</td><td>19,6</td></tr>
<tr><td>450</td><td>26,2</td><td>26,2</td></tr>
<tr><td rowspan="8">ϕ12</td><td rowspan="8">37,7</td><td>130</td><td>9,0</td><td>5,0</td><td>2,2</td><td>0,8</td><td rowspan="2">-</td><td rowspan="3">-</td></tr>
<tr><td>140</td><td>10,3</td><td>6,3</td><td>3,2</td><td>1,4</td></tr>
<tr><td>160</td><td>12,9</td><td>8,9</td><td>5,8</td><td>3,2</td><td>0,8</td></tr>
<tr><td>260</td><td>25,9</td><td>21,9</td><td>18,8</td><td>16,1</td><td>11,6</td><td>7,9</td></tr>
<tr><td>360</td><td rowspan="4">37,7</td><td>35,0</td><td>31,8</td><td>29,1</td><td>24,6</td><td>20,9</td></tr>
<tr><td>390</td><td rowspan="3">37,7</td><td>35,7</td><td>33,0</td><td>28,5</td><td>24,8</td></tr>
<tr><td>450</td><td rowspan="2">37,7</td><td rowspan="2">37,7</td><td>36,3</td><td>32,6</td></tr>
<tr><td>500</td><td>37,7</td><td>37,7</td></tr>
<tr><td rowspan="7">ϕ14</td><td rowspan="7">51,3</td><td>160</td><td>15,1</td><td>10,4</td><td>6,8</td><td>3,7</td><td>0,9</td><td>-</td></tr>
<tr><td>260</td><td>30,2</td><td>25,6</td><td>21,9</td><td>18,8</td><td>13,5</td><td>9,3</td></tr>
<tr><td>360</td><td>45,4</td><td>40,8</td><td>37,1</td><td>33,9</td><td>28,7</td><td>24,4</td></tr>
<tr><td>400</td><td rowspan="4">51,3</td><td>46,8</td><td>43,2</td><td>40,0</td><td>34,8</td><td>30,5</td></tr>
<tr><td>450</td><td rowspan="3">51,3</td><td>50,8</td><td>47,6</td><td>42,4</td><td>38,1</td></tr>
<tr><td>500</td><td rowspan="2">51,3</td><td rowspan="2">51,3</td><td>50,0</td><td>45,7</td></tr>
<tr><td>550</td><td>51,3</td><td>51,3</td></tr>
</table>

Maximum force ($F_{s,T,max}$) in rebar in conjunction with HIT-RE 100 as a function of embedment depth (ℓ_{inst}) for the fire resistance classes R30 to R240 according to EC2,

Rebar-size	$F_{s,T,max}$ [kN]	ℓ_{inst} [mm]	Fire resistance of bar [kN]					
			R30	R60	R90	R120	R180	R240
ϕ16	67,0	180	20,7	15,4	11,2	7,6	2,7	0,9
		260	34,5	29,3	25,1	21,5	15,5	10,6
		360	51,9	46,6	42,4	38,8	32,8	27,9
		450	67,0	62,2	58,0	54,4	48,4	43,5
		500		67,0	66,7	63,1	57,1	52,2
		550			67,0	67,0	65,8	60,9
		600					67,0	67,0
ϕ18	84,8	200	27,2	21,2	16,5	12,4	5,9	2,6
		260	38,9	32,9	28,2	24,1	17,4	11,9
		360	58,4	52,4	47,7	43,6	36,9	31,4
		500	84,8	79,7	75,0	71,0	64,2	58,7
		550		84,8	84,8	80,7	74,0	68,5
		600				84,8	83,8	78,2
		650					84,8	84,8
ϕ20	104,7	220	34,5	27,9	22,7	18,2	10,7	5,5
		260	43,2	36,6	31,3	26,8	19,4	13,2
		360	64,9	58,3	53,0	48,5	41,0	34,9
		550	104,7	99,4	94,2	89,7	82,2	76,1
		600		104,7	104,7	100,5	93,1	86,9
		650			104,7	104,7	103,9	97,8
		700					104,7	104,7
ϕ22	126,7	240	42,7	35,5	29,7	24,7	16,5	9,9
		360	71,3	64,1	58,3	53,3	45,1	38,4
		500	104,7	97,5	91,7	86,7	78,5	71,8
		600	126,7	121,3	115,5	110,6	102,4	95,6
		650		126,7	126,7	122,5	114,3	107,5
		700				126,7	126,2	119,5
		750					126,7	126,7
ϕ24	150,8	270	54,4	46,5	40,2	34,8	25,8	18,5
		360	77,8	69,9	63,6	58,2	49,2	41,9
		650	150,8	145,3	139,1	133,6	124,7	117,3
		700		150,8	150,8	146,6	137,7	130,3
		750				150,8	150,7	143,3
		800					150,8	150,8
ϕ25	163,6	280	59,4	51,1	44,6	38,9	29,6	22,0
		360	81,1	72,8	66,3	60,6	51,3	43,6
		700	163,6	163,6	158,4	152,8	143,4	135,8
		750			163,6	163,6	157,0	149,3
		800					163,6	162,9
		850						163,6
ϕ26	177,0	290	64,6	56,0	49,2	43,3	33,6	25,6
		360	84,3	75,7	68,9	63,0	53,3	45,4
		700	177,0	171,5	164,7	158,9	149,2	141,2
		750		177,0	177,0	173,0	163,2	155,3
		800				177,0	177,0	169,4
		850						177,0
ϕ27	190,9	300	70,0	61,1	54,0	47,9	37,8	29,6
		500	128,5	119,6	112,5	106,4	96,4	88,1
		750	190,9	190,9	185,7	179,6	169,5	161,2
		800			190,9	190,9	184,2	175,9
		850					190,9	190,5
		900						190,9
ϕ28	205,3	300	75,6	66,4	59,0	52,7	42,3	33,7
		500	133,3	124,0	116,7	110,4	99,9	91,3
		750	205,3	199,9	192,6	186,3	175,8	167,2
		800		205,3	205,3	201,4	191,0	182,4
		850				205,3	205,3	197,6
		900						205,3

Maximum force ($F_{s,T,max}$) in rebar in conjunction with HIT-RE 100 as a function of embedment depth (ℓ_{inst}) for the fire resistance classes R30 to R240 according to EC2,

<table>
<tr><th rowspan="2">Rebar-size</th><th rowspan="2">$F_{s,T,max}$ [kN]</th><th rowspan="2">ℓ_{inst} [mm]</th><th colspan="6">Fire resistance of bar [kN]</th></tr>
<tr><th>R30</th><th>R60</th><th>R90</th><th>R120</th><th>R180</th><th>R240</th></tr>
<tr><td rowspan="6">**ϕ30**</td><td rowspan="6">**235,6**</td><td>330</td><td>87,5</td><td>77,6</td><td>69,8</td><td>63,0</td><td>51,8</td><td>42,6</td></tr>
<tr><td>500</td><td>142,8</td><td>132,9</td><td>125,0</td><td>118,3</td><td>107,1</td><td>97,9</td></tr>
<tr><td>800</td><td rowspan="4">235,6</td><td>230,4</td><td>222,6</td><td>215,8</td><td>204,6</td><td>195,4</td></tr>
<tr><td>850</td><td rowspan="3">235,6</td><td rowspan="3">235,6</td><td>232,1</td><td>220,9</td><td>211,7</td></tr>
<tr><td>900</td><td rowspan="2">235,6</td><td rowspan="2">235,6</td><td>227,9</td></tr>
<tr><td>950</td><td>235,6</td></tr>
<tr><td rowspan="5">**ϕ32**</td><td rowspan="5">**268,1**</td><td>350</td><td>100,3</td><td>89,7</td><td>81,4</td><td>74,1</td><td>62,2</td><td></td></tr>
<tr><td>500</td><td>152,3</td><td>141,8</td><td>133,4</td><td>126,2</td><td>114,2</td><td>104,4</td></tr>
<tr><td>850</td><td rowspan="3">268,1</td><td>263,2</td><td>254,8</td><td>247,5</td><td>235,6</td><td>225,8</td></tr>
<tr><td>900</td><td rowspan="2">268,1</td><td rowspan="2">268,1</td><td>264,9</td><td>252,9</td><td>243,1</td></tr>
<tr><td>950</td><td>268,1</td><td>268,1</td><td>260,5</td></tr>
<tr><td rowspan="4">**ϕ34**</td><td rowspan="4">**302,6**</td><td>370</td><td>113,9</td><td>102,7</td><td>93,8</td><td>86,1</td><td>73,4</td><td>63,0</td></tr>
<tr><td>500</td><td>161,8</td><td>150,6</td><td>141,7</td><td>134,0</td><td>121,3</td><td>110,9</td></tr>
<tr><td>900</td><td rowspan="2">302,6</td><td>298,0</td><td>289,1</td><td>281,4</td><td>268,8</td><td>258,3</td></tr>
<tr><td>950</td><td>302,6</td><td>302,6</td><td>299,9</td><td>287,2</td><td>276,8</td></tr>
<tr><td rowspan="4">**ϕ36**</td><td rowspan="4">**339,3**</td><td>400</td><td>132,3</td><td>120,5</td><td>111,0</td><td>102,9</td><td>89,5</td><td>78,4</td></tr>
<tr><td>600</td><td>210,4</td><td>198,5</td><td>189,1</td><td>180,9</td><td>167,5</td><td>156,5</td></tr>
<tr><td>800</td><td>288,4</td><td>276,5</td><td>267,1</td><td>259,0</td><td>245,5</td><td>234,5</td></tr>
<tr><td>950</td><td>339,3</td><td>335,1</td><td>325,6</td><td>317,5</td><td>304,1</td><td>293,0</td></tr>
<tr><td rowspan="4">**ϕ40**</td><td rowspan="4">**385,5**</td><td>450</td><td>168,7</td><td>155,5</td><td>145,1</td><td>136,0</td><td>121,1</td><td>108,8</td></tr>
<tr><td>600</td><td>233,8</td><td>220,6</td><td>210,1</td><td>201,0</td><td>186,1</td><td>173,9</td></tr>
<tr><td>800</td><td>320,5</td><td>307,3</td><td>296,8</td><td>287,8</td><td>272,8</td><td>260,6</td></tr>
<tr><td>950</td><td>385,5</td><td>372,3</td><td>361,8</td><td>352,8</td><td>337,9</td><td>325,6</td></tr>
</table>

*For additional values please check GS 3,2/15-431-4 fire report,

Characteristic yield strength f_{yk} = 500 N/mm²

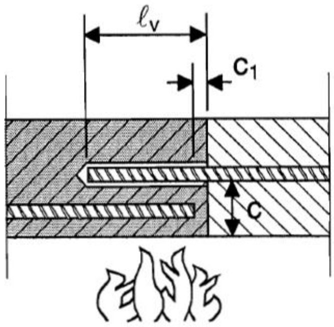
Steel failure

b) Overlap joint application

Max, bond stress, $f_{bd,FIRE}$, depending on actual clear concrete cover for classifying the fire resistance,

It must be verified that the actual force in the bar during a fire, $F_{s,T}$, can be taken up by the bar connection of the selected length, ℓ_{inst}, Note: Cold design for ULS is mandatory,

$F_{s,T} \leq (\ell_{inst} - c_f) \cdot \phi \cdot \pi \cdot f_{bd,FIRE}$ where: $(\ell_{inst} - c_f) \geq \ell_s$;



ℓ_s = lap length

ϕ = nominal diameter of bar

$\ell_{inst} - c_f$ = selected overlap joint length; this must be at least ℓ_s,
but may not be assumed to be more than 80 ϕ

$f_{bd,FIRE}$ = bond stress when exposed to fire

Critical temperature-dependent bond stress, $f_{bd,FIRE}$, concerning "overlap joint" for Hilti HIT-RE 100 injection adhesive in relation to fire resistance class and required minimum concrete coverage c,

<table>
<tr><th>Clear concrete cover c</th><th colspan="6">Max, bond stress, τ_c [N/mm²]</th></tr>
<tr><th>[mm]</th><th>R30</th><th>R60</th><th>R90</th><th>R120</th><th>R180</th><th>R240</th></tr>
<tr><td>50</td><td>0,9</td><td rowspan="3"></td><td rowspan="5"></td><td rowspan="6"></td><td rowspan="9"></td><td rowspan="12"></td></tr>
<tr><td>60</td><td>1,7</td></tr>
<tr><td>70</td><td>2,7</td></tr>
<tr><td>80</td><td rowspan="19">3,5</td><td>1,0</td></tr>
<tr><td>90</td><td>1,6</td></tr>
<tr><td>100</td><td>2,3</td><td>1,0</td></tr>
<tr><td>110</td><td>3,0</td><td>1,4</td><td>0,7</td></tr>
<tr><td>120</td><td rowspan="15">3,5</td><td>1,9</td><td>1,0</td></tr>
<tr><td>130</td><td>2,5</td><td>1,4</td></tr>
<tr><td>140</td><td>3,1</td><td>1,9</td><td>0,7</td></tr>
<tr><td>150</td><td rowspan="12">3,5</td><td>2,4</td><td>1,0</td></tr>
<tr><td>160</td><td>2,9</td><td>1,3</td></tr>
<tr><td>170</td><td>3,4</td><td>1,7</td><td>0,9</td></tr>
<tr><td>180</td><td rowspan="9">3,5</td><td>2,1</td><td>1,1</td></tr>
<tr><td>190</td><td>2,5</td><td>1,4</td></tr>
<tr><td>200</td><td>2,9</td><td>1,7</td></tr>
<tr><td>210</td><td>3,3</td><td>2,1</td></tr>
<tr><td>220</td><td rowspan="5">3,5</td><td>2,5</td></tr>
<tr><td>230</td><td>2,8</td></tr>
<tr><td>240</td><td>3,1</td></tr>
<tr><td>250</td><td rowspan="2">3,5</td></tr>
<tr><td>260</td></tr>
</table>

Materials

Material quality

Part	Material
Rebar EN 1992-1-1:2004+AC:2010	Bars and de-coiled rods class B or C with f_{yk} and k according to NDP or NCL of EN 1992-1-1/NA:2013 $f_{uk} = f_{tk} = k \cdot f_{yk}$

Fitness for use

Some creep tests have been conducted in accordance with ETAG guideline 001 part 5 and TR 023 in the following conditions: **in dry environment at 50 °C during 90 days,**
These tests show an excellent behaviour of the post-installed connection made with HIT-RE 100: low displacements with long term stability, failure load after exposure above reference load,

Resistance to chemical substances

Chemical	Resistance	Chemical	Resistance
Acetic acid 100%	o	Methanol 100%	o
Acetic acid 10%	+	Peroxide of hydrogen 30%	o
Hydrochloric Acid 20%	+	Solution of phenol (sat,)	-
Nitric Acid 40%	-	Sodium hydroxide pH=14	+
Phosphoric Acid 40%	+	Solution of chlorine (sat,)	+
Sulphuric acid 40%	+	Solution of hydrocarbons (60 % vol Toluene, 30 % vol Xylene,10 % vol Methyl naphtalene)	+
Ethyl acetate 100%	o		
Acetone 100%	-		
Ammoniac 5%	o	Salted solution 10%	+
Diesel 100%	+	sodium chloride	
Gasoline 100%	+	Suspension of concrete (sat,)	+
Ethanol 96%	o	Chloroform 100%	+
Machine oils 100%	+	Xylene 100%	+

+ resistant
o resistant in short term (max, 48h) contact
- not resistant

Electrical Conductivity

HIT-RE 100 in the hardened state **is not conductive electrically**, Its electric resistivity is $1{,}4 \cdot 10^{10}\ \Omega \cdot m$
(DIN IEC 93 – 12,93), It is adapted well to realize electrically insulating anchorings (ex: railway applications, subway),

Setting information

Installation temperature range:
+5°C to +40°C

Service temperature range
Hilti HIT-RE 100 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 +80 °C	+50 °C	+80 °C

Maximum 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,
Maximum long term base material temperature
Long-term elevated base material temperatures are roughly constant over significant periods of time,

Working time and curing time[a)]

Temperature of the base material	Maximum working time	Initial curing time	Minimum curing time
T_{BM}	t_{work}	$t_{cure,ini}$ [b)]	t_{cure}
5 °C ≤ T_{BM} < 9 °C	2 hours	18 hours	72 hours
10 °C ≤ T_{BM} < 14 °C	1,5 hours	12 hours	48 hours
15 °C ≤ T_{BM} < 19 °C	30 min	8 hours	24 hours
20 °C ≤ T_{BM} < 24 °C	25 min	6 hours	12 hours
25 °C ≤ T_{BM} < 29 °C	20 min	5 hours	10 hours
30 °C ≤ T_{BM} ≤ 39 °C	12 min	4 hours	8 hours
40 °C	12 min	2 hours	4 hours

a) The curing time data are valid for dry base material only, In wet base material the curing times must be doubled,
b) After $t_{cure,ini}$ has elapsed preparation work may continue

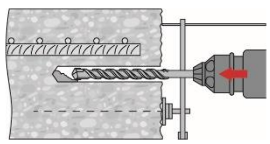
Installation equipment

Rebar – size	ϕ8-ϕ16	ϕ18-ϕ40
Rotary hammer	TE2(-A) – TE30(-A)	TE40 – TE80
Other tools	Blow out pump (h_{ef} ≤ 10·d)	-
	Compressed air gun[a)] Set of cleaning brushes[b)], dispenser, piston plug	

a) Compressed air gun with extension hose for all drill holes deeper than 250 mm (for ϕ 8 to ϕ 12) or deeper than 20·ϕ (for ϕ > 12 mm)
b) Automatic brushing with round brush for all drill holes deeper than 250 mm (for ϕ 8 to ϕ 12) or deeper than 20·ϕ (for ϕ > 12 mm)

Minimum concrete cover c_{min} of the post-installed rebar

Drilling method	Rebar – size [mm]	Minimum concrete cover c_{min} [mm]	
		Without drilling aid	With drilling aid
Hammer drilling **(HD)**	ϕ < 25	30 + 0,06 · l_v ≥ 2 · ϕ	30 + 0,02 · l_v ≥ 2 · ϕ
	ϕ ≥ 25	40 + 0,06 · l_v ≥ 2 · ϕ	40 + 0,02 · l_v ≥ 2 · ϕ
Compressed air drilling **(CA)**	ϕ < 25	50 + 0,08 · l_v	50 + 0,02 · l_v
	ϕ ≥ 25	60 + 0,08 · l_v ≥ 2 · ϕ	60 + 0,02 · l_v ≥ 2 · ϕ
Diamond coring dry **(PCC)** or wet **(DD)**	ϕ < 25	Drill stand is used as drilling aid	30 + 0,02 · l_v ≥ 2 · ϕ
	ϕ ≥ 25		40 + 0,02 · l_v ≥ 2 · ϕ



Drilling and cleaning diameters

Rebar [mm]	Drilling					Cleaning	
	Hammer drill (HD)	Compressed air drill (CA)	Hollow Drill Bit (HDB)	Wet (DD)	Dry (PCC)[b]	Brush HIT-RB	Air nozzle HIT-RB
	d_0 [mm]					size [mm]	
ϕ8	12 (10[a])	-	-	12 (10[a])	-	12 (10[a])	12 (10[a])
ϕ10	14 (12[a])	-	-	14 (12[a])	-	14 (12[a])	14 (12[a])
ϕ12	16 (14[a])	-	-	16 (14[a])	-	16 (14[a])	16 (14[a])
	-	17	-	-	-	18	16
ϕ14	18	17	-	18	-	18	18
ϕ16	20	-	-	20	-	20	20
	-	20	-	-	-	22	20
ϕ18	22	22	-	22	-	22	22
ϕ20	25 (24[a])	-	-	25	-	25 (24[a])	25 (24[a])
	-	26	-	-	-	28	25
ϕ22	28	28	-	28	-	28	28
ϕ24	32	32		32	-	32	32
	-	-	35	-	35	-	
ϕ25	32 (30[a])	32 (30[a])	-	32 (30[a])	-	32 (30[a])	
	-	-	35	-	35	-	
ϕ26	35	35	35	35	35	35	
ϕ28	35	35	35	35	35	35	
ϕ30	-	35	35	35	35	35	
	37	-	-	-		37	
ϕ32	40	40	47	40	47	40	
ϕ34	-	42		42	47	42	
	45	-	47	-		45	
ϕ36	45	45		-	47	45	
	-	-	47	47		47	
ϕ40	-	-	52	52	52	52	
	55	57		-		55	

a) Both of a given values can be used,
b) No cleaning required,

Dispenser and corresponding maximum embedment depth $\ell_{v,max}$

Rebar	Dispenser	
	HDM 330, HDM 500	HDE 500
	$\ell_{v,max}$ [mm]	
ϕ8 to ϕ10	1000	1000
ϕ12 to ϕ14		1200
ϕ16		1500
ϕ18 to ϕ20	700	1300
ϕ22 to ϕ25		1000
ϕ26 to ϕ28	500	700
ϕ30 to ϕ32	-	
ϕ34 to ϕ40		500

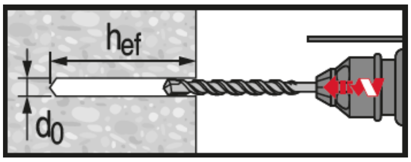
Setting instructions

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

Safety regulations,

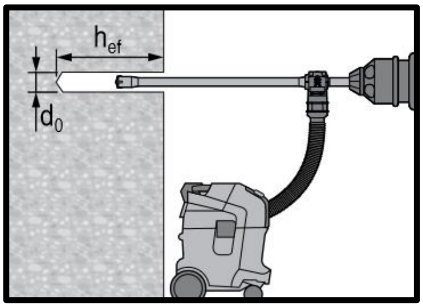
Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HIT-RE 100,

Drilling



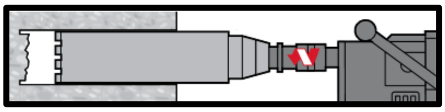
Hammer drilled hole

For dry and wet concrete,



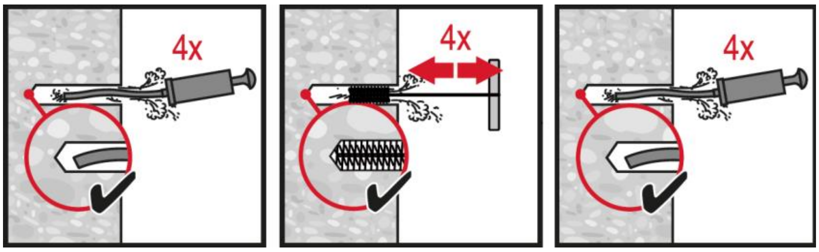
Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required,



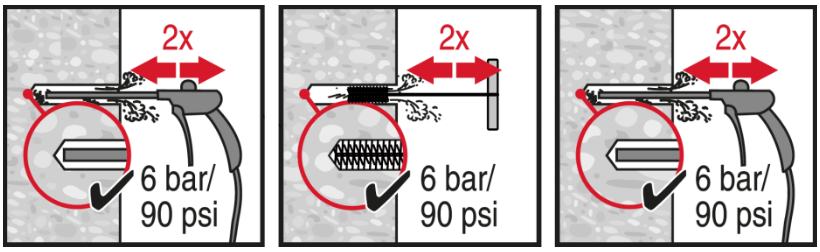
Diamond Drilling (DD)

Cleaning



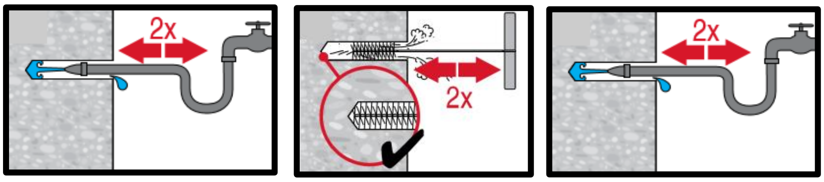
Hammer Drilling:

Manual cleaning (MC)
for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$,



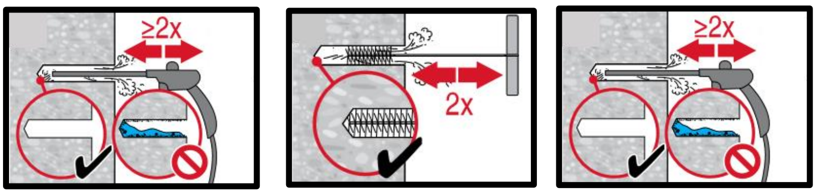
Hammer Drilling:

Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d$,



Wet diamond coring:

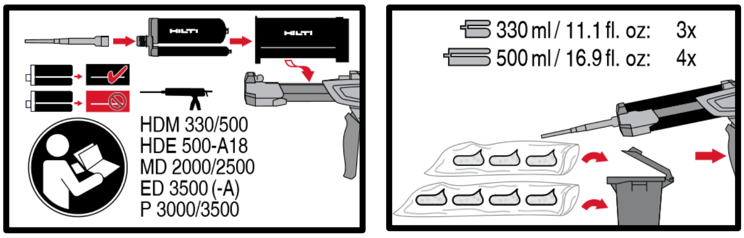
Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths h_0 ,



Dry diamond coring:

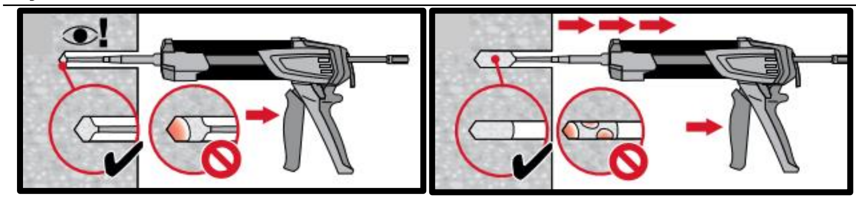
Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths h_0 ,

System preparation

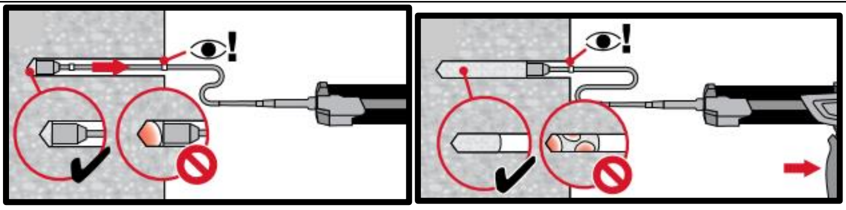


Injection system preparation,

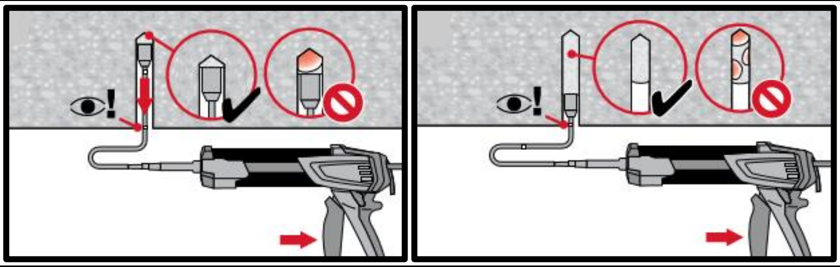
Inject adhesive



Injection method for drill hole depth $h_{ef} \leq 250$ mm,

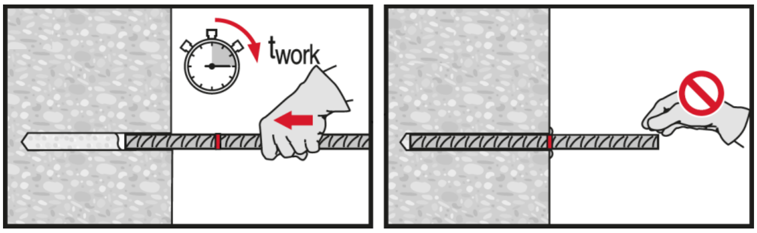


Injection method for drill hole depth $h_{ef} > 250$mm,

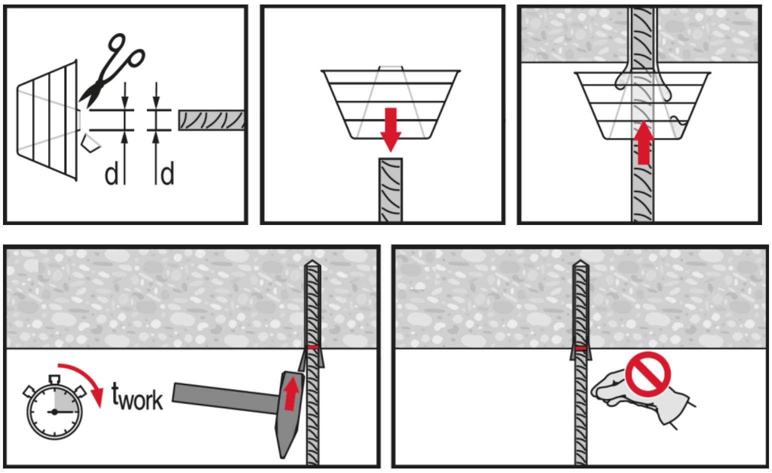


Injection method for overhead application,

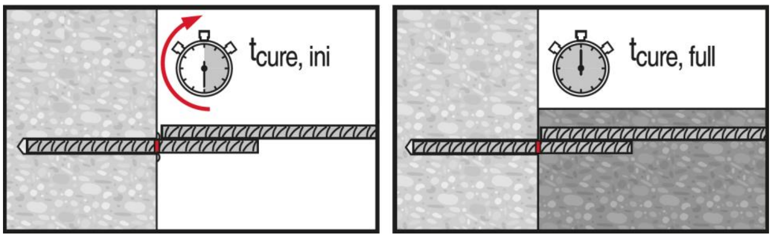
Setting the element



Setting element, observe working time "t_{work}",



Setting element for overhead applications, observe working time "t_{work}",



Apply full load only after curing time "t_{cure}"