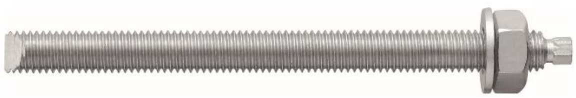
HIT-CT 1
INJECTION MORTAR

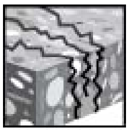
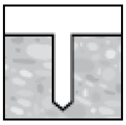
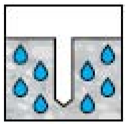
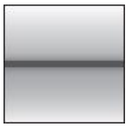
Technical Datasheet

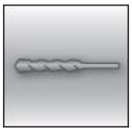
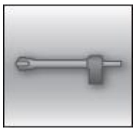
Update: Nov-20

HIT-CT 1 injection mortar

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

Injection mortar system		Benefits
	Hilti HIT- CT 1 330 ml foil pack (also available as 500 ml foil pack)	- Suitable for non-cracked and cracked a) concrete C 20/25 to C 50/60. - **SafeSet** technology: Hilti hollow drill bit for hammer drilling - Suitable for non-cracked concrete C20/25 to C50/60 - Suitable for dry and water saturated concrete
	Anchor rods: HAS-U HAS-U HDG HAS-U A4 HAS-U HCR (M8 - M24)	- High loading capacity and fast curing - Hybrid chemistry - Good load capacity at elevated temperatures, and suitable for applications down to -5°C

Base material				Load condition
				
Concrete (non-cracked)	Concrete (cracked) [a)]	Dry concrete	Wet concrete	Static/ quasi-static

Installation conditions			Other information		
		SAFESET			
Hammer drilling	Hollow drill-bit drilling	Hilti **SafeSet** technology	European Technical Assessment	CE conformity	PROFIS Engineering Design Software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment [a)]	CSTB, Marne la Vallée	ETA-11/0354 / 2020-09-01

a) All data given in this section according to ETA-11/0354 issue 2020-09-01.

Static and quasi-static loading (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
- Anchor material, as specified in the tables
-Concrete C 20/25
-Temperate range I
(min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C)

Embedment depth and base material thickness

Anchor- size			M8	M10	M12	M16	M20	M24
Typical embedment depth	h_{ef}	[mm]	80	90	110	130	170	210
Base material thickness	h_{min}	[mm]	110	120	140	160	220	270

For hammer drilled holes and Hilti hollow drill bit [a] :

Characteristic resistance

Anchor size			M8	M10	M12	M16	M20	M24
Non-cracked concrete								
Tension N_{Rk}	HAS-U 5.8	[kN]	*18,0*	*29,0*	*42,0*	65,3	101,5	142,5
	HAS-U 8.8		24,1	31,1	45,6	65,3	101,5	142,5
	HAS-U A4		24,1	31,1	45,6	65,3	101,5	142,5
	HAS-U HCR		24,1	31,1	45,6	65,3	101,5	142,5
Shear V_{Rk}	HAS-U 5.8	[kN]	*9,0*	*15,0*	*21,0*	*39,0*	*61,0*	*88,0*
	HAS-U 8.8		*15,0*	*23,0*	*34,0*	*63,0*	*98,0*	*141,0*
	HAS-U A4		*13,0*	*20,0*	*30,0*	*55,0*	*86,0*	*124,0*
	HAS-U HCR		*15,0*	*23,0*	*34,0*	*63,0*	*98,0*	*124,0*
Cracked concrete								
Tension N_{Rk}	HAS-U 5.8	[kN]	-	7,1	10,4	16,3	-	-
	HAS-U 8.8		-	7,1	10,4	16,3	-	-
	HAS-U A4		-	7,1	10,4	16,3	-	-
	HAS-U HCR		-	7,1	10,4	16,3	-	-
Shear V_{Rk}	HAS-U 5.8	[kN]	-	14,1	20,7	32,6	-	-
	HAS-U 8.8		-	14,1	20,7	32,6	-	-
	HAS-U A4		-	14,1	20,7	32,6	-	-
	HAS-U HCR		-	14,1	20,7	32,6	-	-

a) Hilti hollow drill bit available for element size M12-M24.

Design resistance

Anchor size			M8	M10	M12	M16	M20	M24
Non-cracked concrete								
Tension N_{Rd}	HAS-U 5.8	[kN]	*12,0*	17,3	25,3	36,3	56,4	79,2
	HAS-U 8.8		13,4	17,3	25,3	36,3	56,4	79,2
	HAS-U A4		13,4	17,3	25,3	36,3	56,4	79,2
	HAS-U HCR		13,4	17,3	25,3	36,3	56,4	79,2
Shear V_{Rd}	HAS-U 5.8	[kN]	*7,2*	*12,0*	*16,8*	*31,2*	*48,8*	*70,4*
	HAS-U 8.8		*12,0*	*18,4*	*27,2*	*50,4*	*78,4*	*112,8*
	HAS-U A4		*8,3*	*12,8*	*19,2*	*35,3*	*55,1*	*79,5*
	HAS-U HCR		*12,0*	*18,4*	*27,2*	*50,4*	*78,4*	*70,9*

Cracked concrete								
Tension N_{Rd}	HAS-U 5.8	[kN]	-	3,9	5,8	9,0	-	-
	HAS-U 8.8		-	3,9	5,8	9,0	-	-
	HAS-U A4		-	3,9	5,8	9,0	-	-
	HAS-U HCR		-	3,9	5,8	8,7	-	-
Shear V_{Rd}	HAS-U 5.8	[kN]	-	9,4	13,8	21,7	-	-
	HAS-U 8.8		-	9,4	13,8	21,7	-	-
	HAS-U A4		-	9,4	13,8	21,7	-	-
	HAS-U HCR		-	9,4	13,8	21,7	-	-

a) Hilti hollow drill bit available for element size M12-M24.

Recommended loads [b)]

Anchor size			M8	M10	M12	M16	M20	M24
Non-cracked concrete								
Tension N_{Rec}	HAS-U 5.8	[kN]	*8,6*	12,3	18,1	25,9	40,3	56,5
	HAS-U 8.8		9,6	12,3	18,1	25,9	40,3	56,5
	HAS-U A4		9,6	12,3	18,1	25,9	40,3	56,5
	HAS-U HCR		9,6	12,3	18,1	25,9	40,3	56,5
Shear V_{Rec}	HAS-U 5.8	[kN]	*5,1*	*8,6*	*12,0*	*22,3*	*34,9*	*50,3*
	HAS-U 8.8		*8,6*	*13,1*	*19,4*	*36,0*	*56,0*	*80,6*
	HAS-U A4		*6,0*	*9,2*	*13,7*	*25,2*	*39,4*	*56,8*
	HAS-U HCR		*8,6*	*13,1*	*19,4*	*36,0*	*56,0*	*50,6*
Cracked concrete								
Tension N_{Rec}	HAS-U 5.8	[kN]	-	2,8	4,1	6,4	-	-
	HAS-U 8.8		-	2,8	4,1	6,4	-	-
	HAS-U A4		-	2,8	4,1	6,4	-	-
	HAS-U HCR		-	2,8	4,1	6,4	-	-
Shear V_{Rec}	HAS-U 5.8	[kN]	-	6,7	9,9	15,5	-	-
	HAS-U 8.8		-	6,7	9,9	15,5	-	-
	HAS-U A4		-	6,7	9,9	15,5	-	-
	HAS-U HCR		-	6,7	9,9	15,5	-	-

a) Hilti hollow drill bit available for element size M12-M24.
b) 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			M8	M10	M12	M16	M20	M24
Nominal tensile strength f_{uk}	HAS-U 5.8	[N/mm²]	500	500	500	500	500	500
	HAS-U 8.8		800	800	800	800	800	800
	HAS-U A4		700	700	700	700	700	700
	HAS-U HCR		800	800	800	800	800	700
Yield strength f_{yk}	HAS-U 5.8	[N/mm²]	400	400	400	400	400	400
	HAS-U 8.8		640	640	640	640	640	640
	HAS-U A4		450	450	450	450	450	450
	HAS-U HCR		600	600	600	600	600	400
Stressed cross-section A_s	HAS-U	[mm²]	36,6	58,0	84,3	157	245	353
Moment of resistance W	HAS-U	[mm³]	31,2	62,3	109	277	541	935

Material quality for HAS-U

Part	Material
Zinc coated steel	
Threaded rod, HAS-U 5.8 (HDG)	Strength class 5.8; Elongation at fracture A_5 > 8% ductile Electroplated zinc coated ≥ 5µm; (F) hot dip galvanized ≥ 45 µm
Threaded rod, HAS-U 8.8 (HDG)	Strength class 8.8; Elongation at fracture A_5 > 12% ductile Electroplated zinc coated ≥ 5µm; (F) hot dip galvanized ≥ 45 µm
Hilti Meter rod, AM 8.8 (HDG)	Strength class 8.8; Elongation at fracture A_5 > 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 A_5 > 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:
-5°C to +40°C

Service temperature range:
Hilti HIT-CT 1 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 + 80 °C	+ 50 °C	+ 80 °C

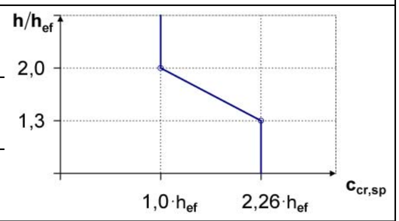
Max, short term base material temperature
Short term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.
Max, long term base material temperature
Long term elevated base material temperatures are roughly constant over significant periods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

Working time and curing time

Temperature of the base material	Max, working time in which anchor can be inserted and adjusted t_{work}	Min, curing time before anchor can be fully loaded t_{cure} 1)
-5 °C < t_{BM} < 0 °C	1 hour	6 hours
0 °C ≤ t_{BM} < 5 °C	40 min	3 hours
5 °C ≤ t_{BM} < 10 °C	25 min	2 hours
10 °C ≤ t_{BM} < 20 °C	10 min	90 min
20 °C ≤ t_{BM} < 30 °C	4 min	75 min
30 °C ≤ t_{BM} < 40 °C	2 min	60 min

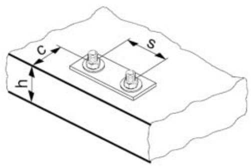
1) The curing time data are valid for dry base material only. In wet material the curing times must be doubled.

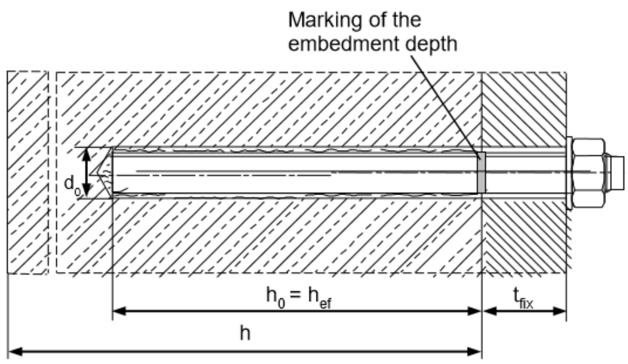
Setting details / Design parameters

Anchor size			M8	M10	M12	M16	M20	M24
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	22	28
Effective anchorage and drill hole depth range a)	$h_{ef,min}$	[mm]	64	80	96	128	160	192
	$h_{ef,max}$	[mm]	96	120	144	192	240	288
Min. base material thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm			h_{ef} + 2 d_0		
Min. spacing	s_{min}	[mm]	40	50	60	80	100	120
Min. edge distance	c_{min}	[mm]	40	45	45	50	55	60
Max. diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26
Max. torque moment b)	T_{max}	[Nm]	10	20	40	80	150	200
Critical spacing for splitting failure	$s_{cr,sp}$		2 $c_{cr,sp}$					
Critical edge distance for splitting failure c)	$c_{cr,sp}$	[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	$s_{cr,N}$		2 $c_{cr,N}$					
Critical edge distance for concrete cone failure c)	$c_{cr,N}$		1,5 h_{ef}					

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

a) $h_{ef,min}$ ≤ h_{ef} ≤ $h_{ef,max}$ (h_{ef}: embedment depth)
b) Max. recommended torque moment to avoid splitting failure during installation with min. spacing and/or edge distance
c) h: base material thickness (h ≥ h_{min})





Installation equipment

Anchor size	M8	M10	M12	M16	M20	M24
Rotary hammer	TE 2 (-A) – TE 16 (-A)				TE 40 – TE 80	
Other tools	Compressed air gun, blow out pump Set of cleaning brushes, dispenser					

Drilling and cleaning parameters

HAS-U	Hammer drill (HD)	Hollow Drill Bit (HDB)	Brush HIT-RB	Air nozzle HIT-RB
	d_0 [mm]		size [mm]	
				
M8	10	-	10	-
M10	12	-	12	12
M12	14	14	14	14
M16	18	18	18	18
M20	22	22	22	22
M24	28	28	28	28

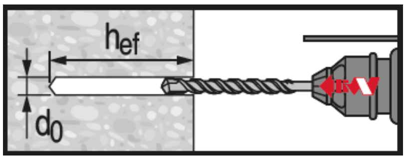
Setting instructions

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

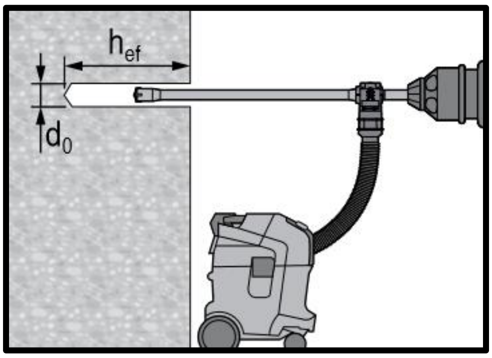
Safety regulations,

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-CT 1.

Drilling



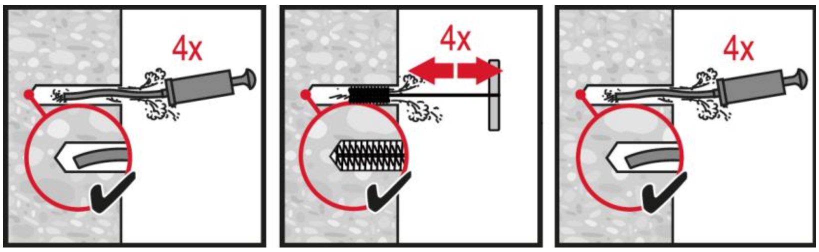
Hammer drilled hole (HD)



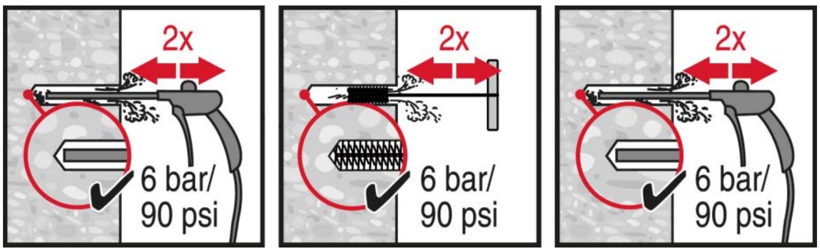
Hammer drilled hole with Hollow drill bit (HDB)

No cleaning required

Cleaning

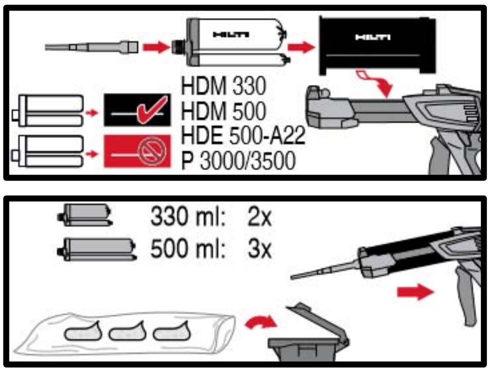


Manual cleaning (MC)
for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$ in uncracked concrete

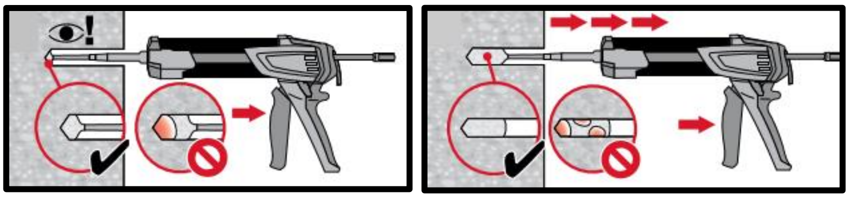


Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 12 \cdot d$.

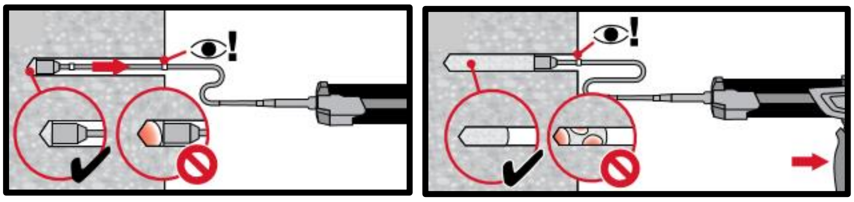
Injection



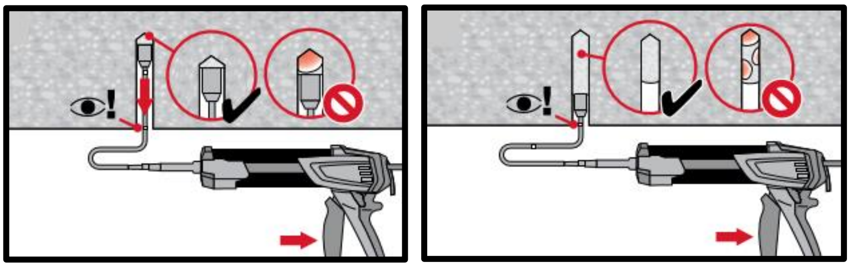
Injection system preparation



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

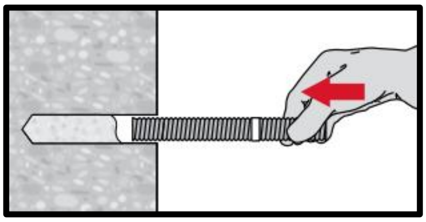


Injection method for drill hole depth $h_{ef} > 250$mm.

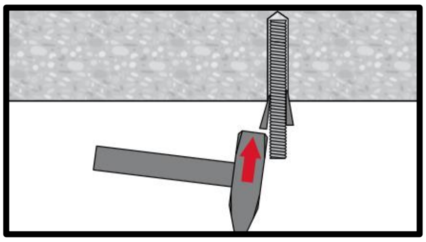


Injection method for overhead application

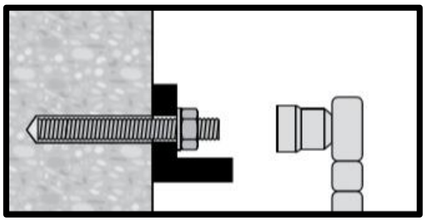
Setting the element



Setting element, observe working time "t_{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.

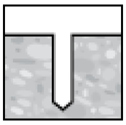
HIT-CT 1 injection mortar

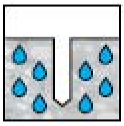
Anchor design (EN 1992-4) / Rebar elements / Concrete

Injection mortar system		Benefits
	Hilti HIT- CT 1 330 ml foil pack (also available as 500 ml foil pack)	- **SafeSet** technology: Hilti hollow drill bit for hammer drilling - Suitable for non-cracked concrete C20/25 to C50/60 - Suitable for dry and water saturated concrete - High loading capacity and fast curing - Hybrid chemistry - Good load capacity at elevated temperatures, and suitable for applications down to -5°C
	Rebar B500 B (ϕ8-ϕ25)	

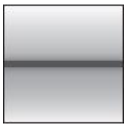
Base material


Concrete (non-cracked)

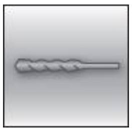

Dry concrete

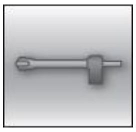

Wet concrete

Load condition


Static/ quasi-static

Installation conditions


Hammer drilling


Hollow drill-bit drilling

Hilti **SafeSet** technology

Other information

European Technical Assessment

CE conformity

PROFIS Engineering Design Software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment a)	CSTB, Marne la Vallée	ETA-11/0354 / 2020-09-01

b) All data given in this section according to ETA-11/0354 issue 2020-09-01.

Static and quasi-static loading (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
- Anchor material: rebar B500 B
- Concrete C 20/25
- Temperate range I
  (min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C)

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

Anchor- size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25
Typical embedment depth	[mm]	80	90	110	125	130	170	210
Base material thickness	[mm]	110	120	145	160	170	220	274

For hammer drilled holes and Hilti hollow drill bit[a)]:

Characteristic resistance

Anchor- size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25
Tensile N_{Rk}	[kN]	14,1	21,2	31,1	41,2	49,0	85,5	132
Shear V_{Rk}	[kN]	*14,0*	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135*

a) Hilti hollow drill bit available for element size ϕ8 - ϕ25.

Design resistance

Anchor- size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25
Tensile N_{Rd}	[kN]	7,8	11,8	17,3	22,9	27,2	47,5	73,3
Shear V_{Rd}	[kN]	9,3	14,7	20,7	28,0	36,7	57,3	90,0

a) Hilti hollow drill bit available for element size ϕ8 - ϕ25.

Recommended loads[b)]

Anchor- size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25
Tensile N_{Rec}	[kN]	5,6	8,4	12,3	16,4	19,4	33,9	52,4
Shear V_{Rec}	[kN]	6,7	10,5	14,8	20,0	26,2	41,0	64,3

a) Hilti hollow drill bit available for element size ϕ8 - ϕ25.
b) 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
Nominal tensile strength f_{uk}	[N/mm²]	550	550	550	550	550	550	550
Yield strength f_{yk}	[N/mm²]	500	500	500	500	500	500	500
Stressed cross-section A_s	[mm²]	50,3	78,5	113	1534	201	314	491
Moment of resistance W	[mm³]	50,3	98,2	170	269	402	785	1534

Material quality

Part	Material
Rebar B500 B	EN 1992-1-1:2004 and AC:2010, Annex C 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

Setting information

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

Service temperature range:
Hilti HIT-CT 1 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 + 80 °C	+ 50 °C	+ 80 °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.

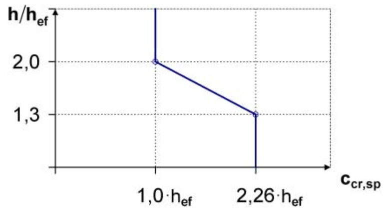
Working time and curing time

Temperature of the base material	Max, working time in which anchor can be inserted and adjusted t_{work}	Min, curing time before anchor can be fully loaded t_{cure} 1)
-5 °C < t_{BM} < 0 °C	1 hour	6 hours
0 °C ≤ t_{BM} < 5 °C	40 min	3 hours
5 °C ≤ t_{BM} < 10 °C	25 min	2 hours
10 °C ≤ t_{BM} < 20 °C	10 min	90 min
20 °C ≤ t_{BM} < 30 °C	4 min	75 min
30 °C ≤ t_{BM} < 40 °C	2 min	60 min

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

Setting details / Design parameters

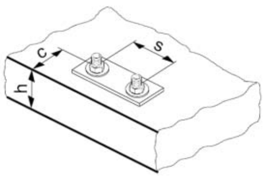
Anchor size			ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25
Nominal diameter of drill bit	d_0	[mm]	10 / 12 [a)]	12 / 14 [a)]	14 [a)] | 16 [a)]	18	20	25	30 / 32 [a)]
Effective anchorage and drill hole depth range	$h_{ef,min}$	[mm]	64	80	96	112	128	160	200
	$h_{ef,max}$	[mm]	96	120	144	168	192	240	300
Minimum base material thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm			$h_{ef} + 2\ d_0$			
Min. spacing	s_{min}	[mm]	40	50	60	70	80	100	125
Min. edge distance	c_{min}	[mm]	40	45	45	50	50	65	70
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$						
Critical edge distance for splitting failure [b)]	$c_{cr,sp}$	[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]	$3{,}0\ h_{ef}$						
Critical edge distance for concrete cone failure	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$						

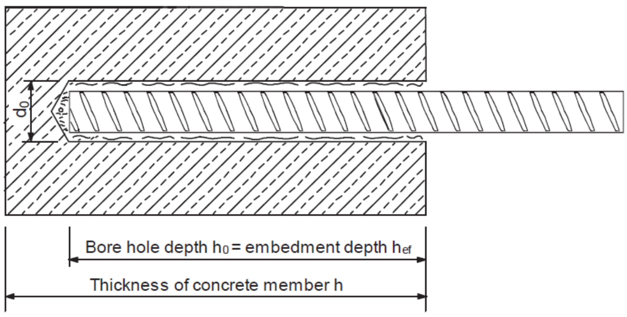


For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

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

b) h: base material thickness ($h \geq h_{min}$), h_{ef}: embedment depth





Installation equipment

Anchor size	ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25
Rotary hammer	TE 2 – TE 30					TE 40 – TE 80	
Other tools	compressed air gun or blow out pump set of cleaning brushes, dispenser						

Drilling and cleaning parameters

Rebar	Hammer drilling (HD)	Hollow Drill Bit (HDB)	Brush HIT-RB	Piston plug HIT-SZ
	d_0 [mm]		size [mm]	
				
ϕ8	10 / 12 [a)]	-	10 / 12 [a)]	- / 12
ϕ10	12 / 14 [a)]	14	12 / 14 [a)]	12 / 14 [a)]
ϕ12	14 / 16 [a)]	16 (14 [a)])	14 / 16 [a)]	14 / 16 [a)]
ϕ14	18	18	18	18
ϕ16	20	20	20	20
ϕ20	25	25	25	25
ϕ25	32	32	32	32

a) Each of the two given values can be used

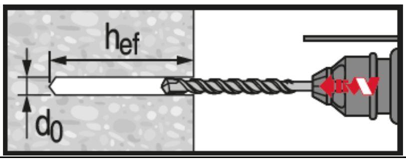
Setting instructions

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

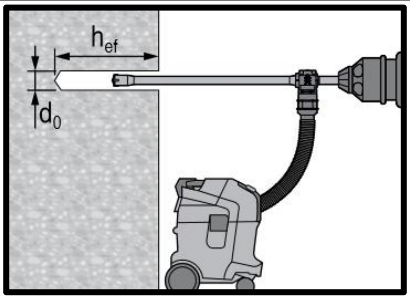
Safety regulations,

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-CT 1.

Drilling



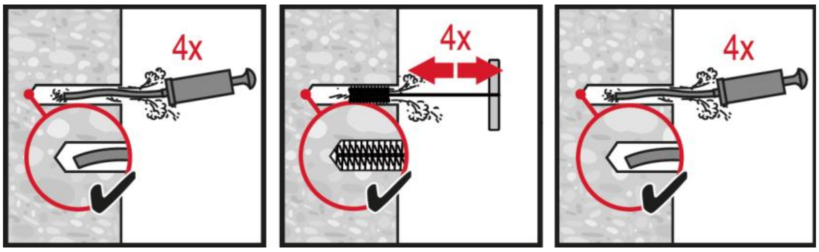
Hammer drilled hole (HD)



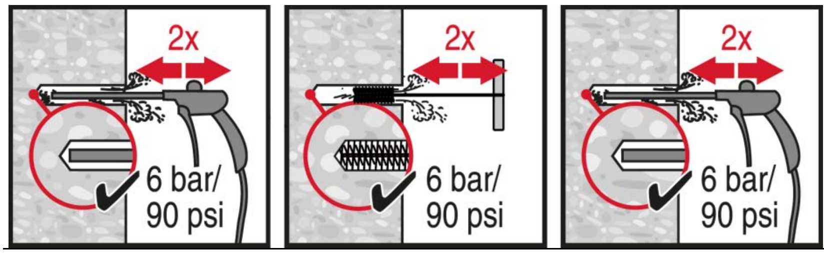
Hammer drilled hole with Hollow drill bit (HDB)

No cleaning required

Cleaning

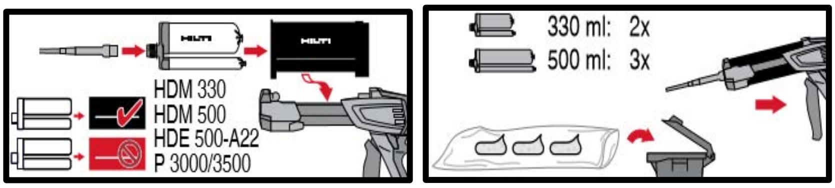


Manual cleaning (MC)
for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$ in uncracked concrete.

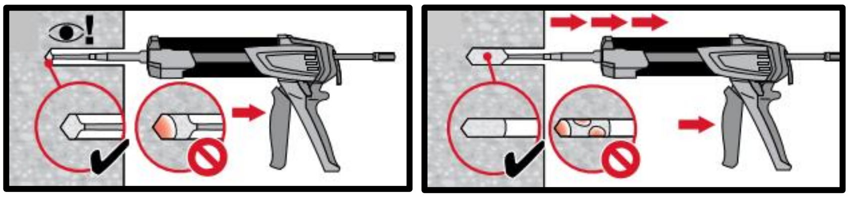


Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 12 \cdot d$.

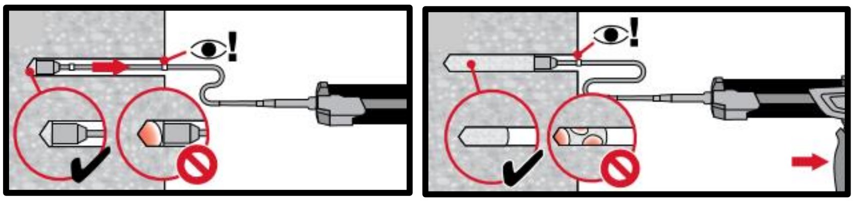
Injection



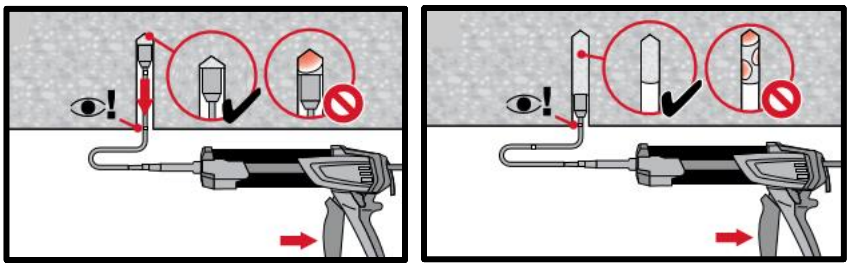
Injection system preparation



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

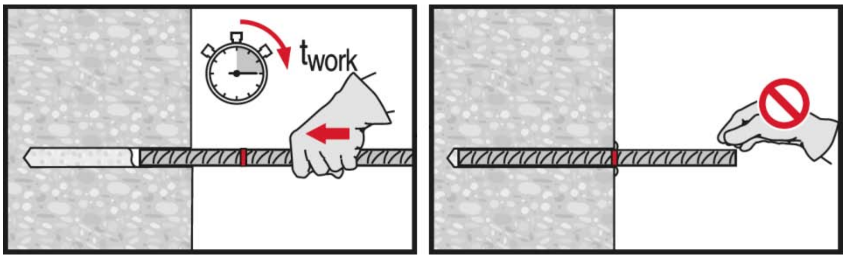


Injection method for drill hole depth $h_{ef} > 250$mm.

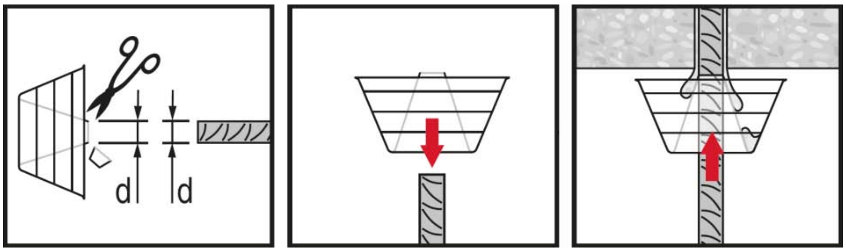


Injection method for overhead application

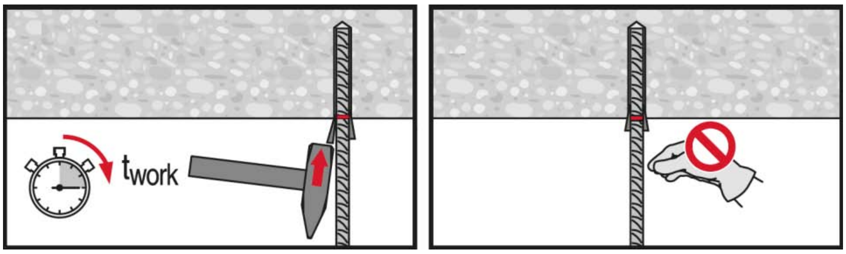
Setting the element



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



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

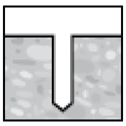
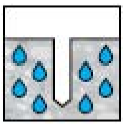
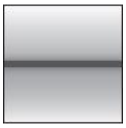


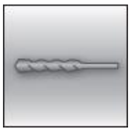
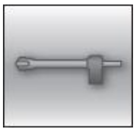
Loading the anchor: After required curing time t_{cure} the anchor can be loaded.

HIT-CT 1 injection mortar

Rebar design (EOTA TR023) / Rebar elements / Concrete

Injection mortar system		Benefits
	Hilti HIT- CT 1 330 ml foil pack (also available as 500 ml foil pack)	- **SafeSet** technology: Hilti hollow drill bit for hammer drilling - Suitable for concrete C12/15 to C50/60 - Suitable for dry or wet concrete - High loading capacity and fast curing - Hybrid chemistry - Suitable for dry and water saturated concrete
	Rebar B500 B (ϕ8 - ϕ25)	- For rebar diameters up to 25 mm - Non-corrosive to rebar elements

Base material			Load conditions	
				
Concrete (non-cracked)	Dry concrete	Wet concrete	Static/ quasi-static	Fire resistance

Installation conditions		Other information			
		SAFESET		CE	
Hammer drilled holes	Hollow drill-bit drilling	Hilti SafeSet technology with hollow drill bit	European Technical Assessment	CE conformity	PROFIS Engineering Design Software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment [a)]	CSTB, Marne la Vallèe	ETA-11/0390 / 2019-10-16
Fire report	CSTB, Marne la Vallèe	n° 26059386 / 2015-10-23

c) All data given in this section according to the approvals mentioned above ETA-11/0390 issue 2019-10-16

Static and quasi-static loading

Static EC2 design

Design bond strength in N/mm² accord. to ETA 11/0390 for good bond conditions

All allowed drilling methods									
Rebar - size	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
ϕ8 - ϕ25	1,6	2,0	2,3	2,7	3,0	3,0	3,0	3,0	3,0

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 lap length $\ell_{0,min}$ according to EN 1992-1-1 shall be multiplied by relevant **Amplification factor α_{lb}** in the table below.

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

All allowed drilling methods									
Rebar - size	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
ϕ8 - ϕ25	1,0			1,2	1,4				

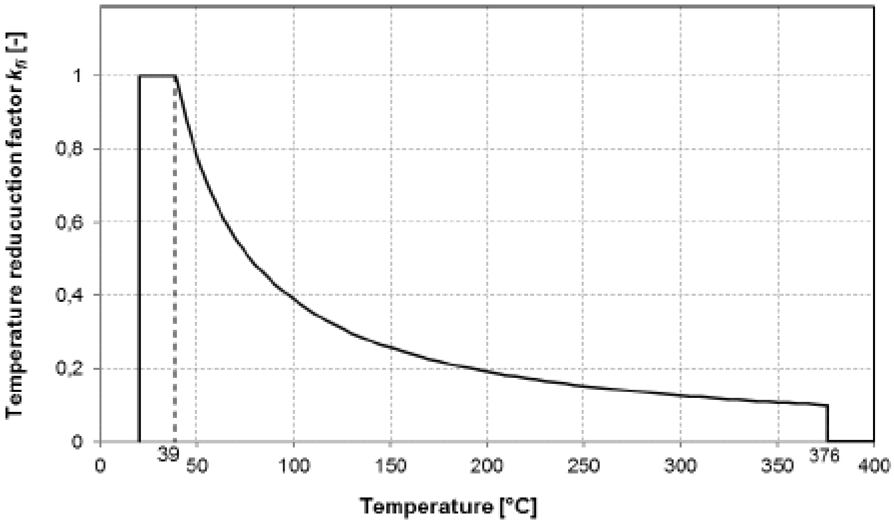
Anchorage length for characteristic steel strength f_{yk}=500 N/mm² for good conditions

All allowed drilling methods								
Size	$f_{y,k}$ [N/mm²]	$l_{b,min}$* [mm]			$l_{0,min}$ * [mm]			l_{max} [mm]
		C20/25	C25/30	C30/37-C50/60	C20/25	C25/30	C30/37-C50/60	
ϕ8	500	113	120	140	200	240	280	700
ϕ10	500	142	145	152	200	240	280	700
ϕ12	500	170	174	183	200	240	280	700
ϕ14	500	199	203	213	210	252	294	700
ϕ16	500	227	232	244	240	288	336	700
ϕ18	500	255	261	274	270	324	378	500
ϕ20	500	284	290	305	300	360	420	500
ϕ22	500	312	319	335	330	396	462	500
ϕ24	500	340	348	365	360	432	-	500
ϕ25	500	355	363	381	375	450	-	500

According to EN 1992-1-1 $l_{b,min}$ (8.6) are calculated for good bond conditions with maximum yield strength f_{yk}=1,15 and α_6 = 1,0

Fire resistance

Temperature reduction factor $k_{fi}(\theta)$



The analytic equation that describe the variation of $k_{fi}(\theta)$ with temperature is given by the following function:

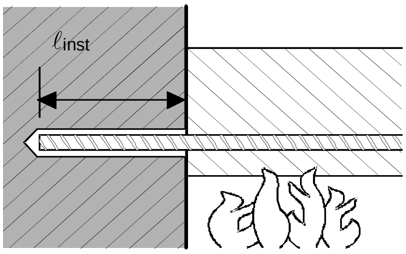
If 39ºC ≤ θ ≤ 376ºC: $k_{fi}(\theta) = 41{,}001 \times \theta^{-1{,}012} \leq 1{,}0$ θ in ºC
If θ < 39ºC $k_{fi}(\theta) = 1.0$
If θ > 376ºC $k_{fi}(\theta) = 0.0$

The design value of ultimate bond strength $f_{bd,fi}$ under fire exposure is calculated according to following equation:

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

With:
- $k_{fi}(\theta)$ temperature reduction factor under fire exposure.
- f_{bd} design values of the ultimate bond resistance according to amplification factor α_{lb}
- $\gamma_c = 1{,}5$ recommended safety factor according to EN 1992-1-1.
- $\gamma_{M,fi}$ safety factor according to EN 1992-1-2 under fire exposure.

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-CT 1 as a function of embedment depth (ℓ_{inst}) for the fire resistance classes F30 to F240 according to EC2.

Rebar-size	$F_{s,T,max}$ [kN]	ℓ_{inst} [mm]	Fire resistance of bar [kN]					
			R30	R60	R90	R120	R180	R240
ϕ8	**16,8**	100	4,0	2,0	1,2	0,9	0,5	0,3
		140	7,4	4,7	3,0	2,3	1,5	1,1
		180	10,9	8,2	6,1	4,6	3,0	2,2
		220	14,4	11,7	9,5	7,9	5,3	3,9
		250	*16,8*	14,3	12,1	10,5	7,6	5,6
		280		*16,8*	14,7	13,1	10,2	7,9
		310			*16,8*	15,7	12,8	10,4
		330				*16,8*	14,5	12,2
		360					*16,8*	14,8
		390						*16,8*

Maximum force ($F_{s,T,max}$) in rebar in conjunction with HIT-CT 1 as a function of embedment depth (ℓ_{inst}) for the fire resistance classes F30 to F240 according to EC2.

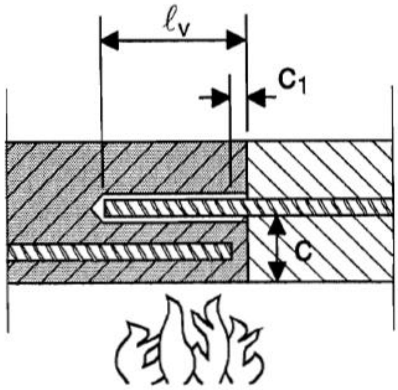
Rebar-size	$F_{s,T,max}$ [kN]	ℓ_{inst} [mm]	Fire resistance of bar [kN]					
			R30	R60	R90	R120	R180	R240
f10	26,2	110	6,0	3,1	2,0	1,5	0,9	0,6
		150	10,4	7,0	4,6	3,5	2,2	1,6
		190	14,7	11,3	8,7	6,7	4,3	3,2
		230	19,0	15,7	13,0	10,9	7,5	5,6
		300	*26,2*	23,3	20,6	18,5	14,9	12,0
		330		*26,2*	23,8	21,8	18,2	15,2
		360			*26,2*	25,0	21,4	18,5
		380				*26,2*	23,6	20,6
		410					*26,2*	23,9
		440						*26,2*
ϕ12	37,7	140	11,1	7,1	4,5	3,5	2,2	1,6
		200	18,9	14,9	11,7	9,2	6,0	4,5
		260	26,7	22,7	19,5	17,0	12,7	9,5
		320	34,6	30,5	27,3	24,8	20,5	17,0
		350	*37,7*	34,4	31,2	28,7	24,4	20,9
		380		*37,7*	35,1	32,6	28,3	24,8
		400			*37,7*	35,3	30,9	27,4
		420				*37,7*	33,5	30,0
		460					*37,7*	35,2
		480						*37,7*
ϕ14	51,3	160	16,0	11,3	7,7	5,8	3,7	2,8
		220	25,1	20,4	16,7	13,8	9,2	6,9
		280	34,2	29,5	25,8	22,9	17,9	13,8
		340	43,3	38,6	34,9	32,0	27,0	22,8
		400	*51,3*	47,7	44,0	41,1	36,1	31,9
		430		*51,3*	48,5	45,7	40,6	36,5
		450			*51,3*	48,7	43,7	39,5
		470				*51,3*	46,7	42,6
		510					*51,3*	48,6
		530						*51,3*
ϕ16	67,0	180	21,8	16,4	12,1	9,1	6,0	4,4
		240	32,2	26,8	22,5	19,3	13,5	10,0
		300	42,6	37,2	32,9	29,7	23,9	19,2
		360	53,0	47,6	43,3	40,1	34,3	29,6
		450	*67,0*	63,2	58,9	55,7	49,9	45,2
		480		*67,0*	64,1	60,9	55,1	50,4
		500			*67,0*	64,3	58,6	53,8
		520				*67,0*	62,0	57,3
		550					*67,0*	62,5
		580						*67,0*
ϕ20	104,7	220	35,9	29,2	23,8	19,7	13,1	9,8
		280	48,9	42,2	36,8	32,7	25,5	19,7
		340	61,9	55,2	49,8	45,7	38,5	32,6
		400	74,9	68,2	62,8	58,8	51,5	45,6
		460	87,9	81,2	75,8	71,8	64,5	58,6
		540	*104,7*	98,5	93,2	89,1	81,9	76,0
		570		*104,7*	99,7	95,6	88,4	82,5
		600			*104,7*	102,1	94,9	89,0
		620				*104,7*	99,2	93,3
		650					*104,7*	99,8
		680						*104,7*

*For additional values please check CSTB report n°26048096.
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.

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



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-CT 1 injection adhesive in relation to fire resistance class and required minimum concrete coverage c.

Clear concrete cover c	Max. bond stress, τ_c [N/mm²]					
[mm]	R30	R60	R90	R120	R180	R240
20	0,4					
30	0,6					
40	0,9	0,5				
50	1,2	0,6	0,4			
60	1,6	0,8	0,5	0,4		
70	2,0	1,0	0,7	0,5	0,4	
80	2,6	1,3	0,9	0,6	0,4	0,4
90	3,2	1,5	1,0	0,8	0,5	0,4
100		1,8	1,2	0,9	0,6	0,5
110		2,2	1,4	1,1	0,7	0,5
120		2,6	1,7	1,3	0,9	0,6
130		3,0	1,9	1,4	1,0	0,7
140			2,2	1,6	1,1	0,9
150			2,5	1,8	1,2	1,0
160			2,9	2,1	1,4	1,1
170			3,3	2,4	1,5	1,2
180				2,7	1,7	1,3
190				3,0	1,9	1,4
200	3,5			3,3	2,1	1,6
210					2,3	1,7
220		3,5			2,6	1,9
230					2,8	2,0
240			3,5		3,1	2,2
250				3,5	3,3	2,4
260						2,6
270						2,8
280					3,5	3,1
290						3,3
300						3,5

Materials

Material quality

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

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-CT 1: 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-CT 1 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 anchoring (ex: railway applications, subway).

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

Service temperature range

Hilti HIT-CT 1 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	-40 °C to +80 °C	+50°C	+80 °C

Max short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as 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 [1)]

Temperature of the base material T_{BM}	Working time t_{gel}	Curing time t_{cure}
-5 °C < t_{BM} < 0 °C	60 min	6 h
0 °C ≤ t_{BM} < 5 °C	40 min	3 h
5 °C ≤ t_{BM} < 10 °C	25 min	2 h
10 °C ≤ t_{BM} < 20 °C	10 min	90 min
20 °C ≤ t_{BM} < 30 °C	4 min	75 min
30 °C ≤ t_{BM} < 40 °C	2 min	60 min

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

Setting information

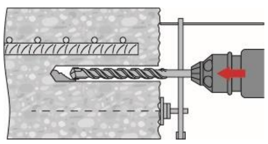
Installation equipment

Rebar – size	ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ18	ϕ20	ϕ22	ϕ24	ϕ25
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									

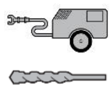
a) Compressed air gun with extension hose for all drill holes deeper than 250 mm (for ϕ 8 to ϕ 12) or deeper than 20·ϕ (for ϕ > 12 mm)

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)** and HD with Hilti hollow drill bit **(HDB)**	ϕ ≤24	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 ≤24	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	

Drilling and cleaning parameteres

Rebar	Hammer drilling (HD)	Hollow Drill Bit (HDB) a)	Compressed air drilling (CA)	Brush HIT-RB	Air nozzle HIT-RB
	d_0 [mm]			size [mm]	
					
ϕ8	10	-	-	10	-
	12	12	-	12	12
ϕ10	12	12	-	12	12
	14	14	-	14	14
ϕ12	14	14	-	14	14
	16	16	-	16	16
	-	-	17	18	16
ϕ14	18	18	-	18	18
	-		17	18	16
ϕ16	20	20	20	20	20
ϕ18	22	22	22	22	22
ϕ20	25	25	-	25	25
	-	-	26	28	25
ϕ22	28	28	28	28	28
ϕ24	32	32	32	32	32
ϕ25	32	32	32	32	32

a) No cleaning required

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

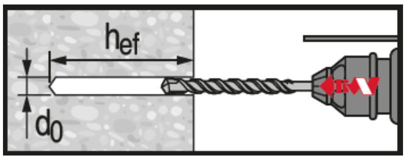
Rebar – size [mm]	Dispenser (HDM 330, HDM 500, HDE 500)
	$\ell_{v,max}$ [mm]
ϕ8 - ϕ16	700
ϕ18 - ϕ25	500

Setting instructions

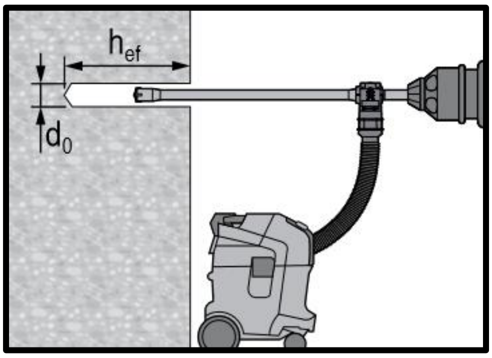
***For detailed information on installation see instruction for use given with the package of the product.**

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-CT1.

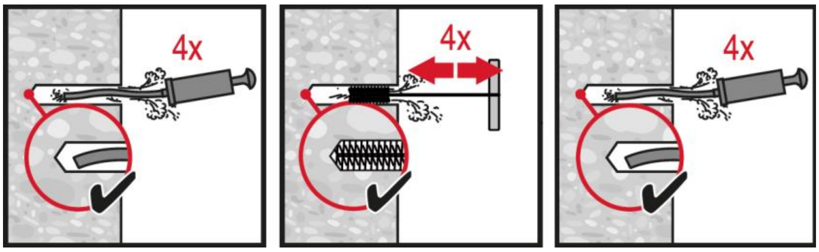


Hammer drilled hole (HD)

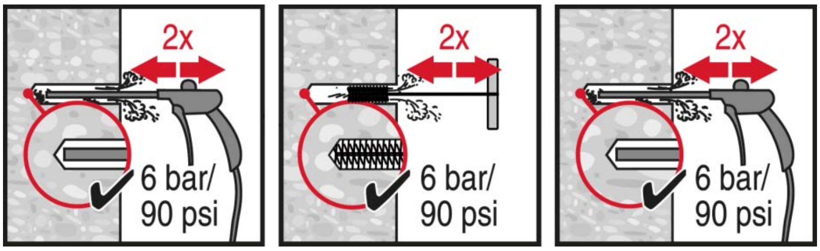


Hammer drilled hole with Hollow drill bit (HDB)

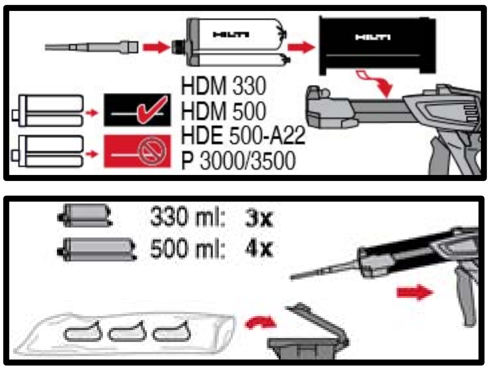
No cleaning required



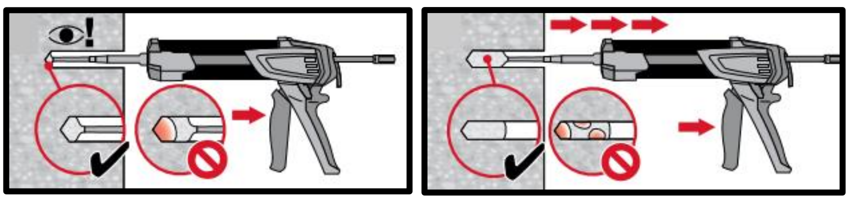
Manual cleaning (MC)
for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$ in uncracked concrete.



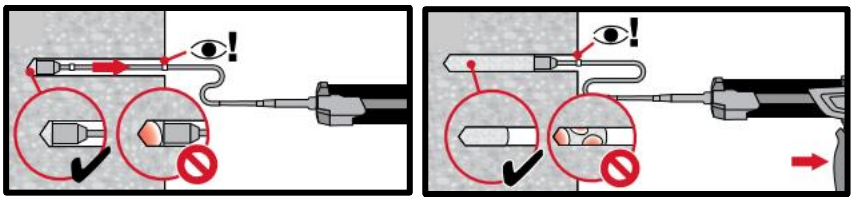
Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 12 \cdot d$.



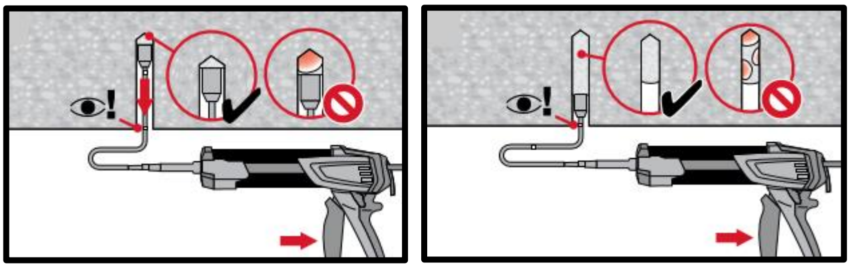
Injection system preparation.



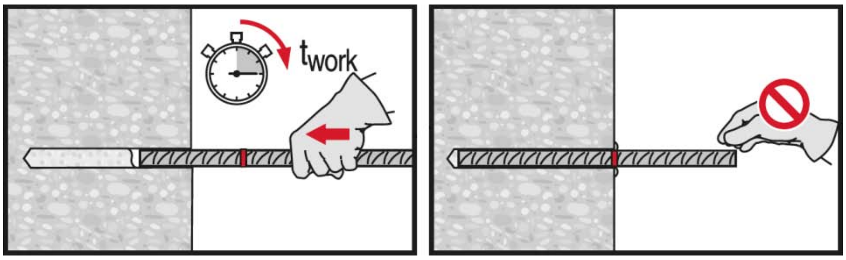
Injection method for drill hole depth $h_{ef} \leq 250$ mm.



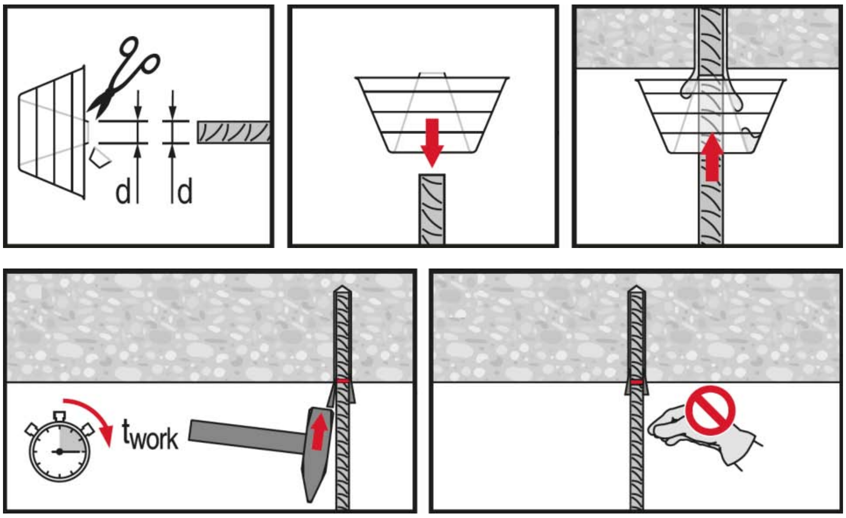
Injection method for drill hole depth h_{ef} > 250mm.



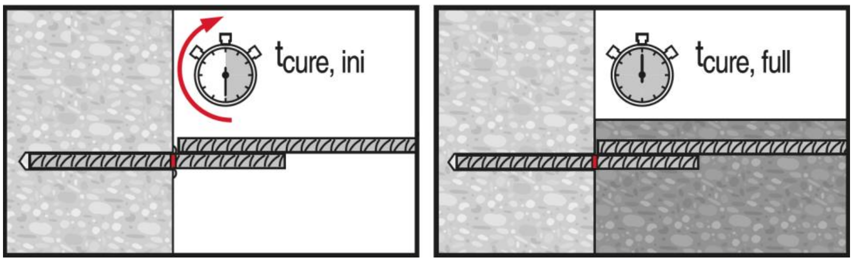
Injection method for overhead application.



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}“.