



HIT-CT 1 injection mortar

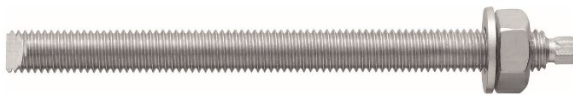
Anchor design (EOTA TR029 & EOTA TR045) / Rods&Sleeves / Concrete

Injection mortar system



Hilti HIT- CT 1

330 ml foil pack
(also available as
500 ml foil pack)



Anchor rods:
HAS-U
HAS-U HDG
HAS-U A4
HAS-U HCR
(M8 - M24)

Benefits

- **Clean-Tec** technology: HIT-CT 1 mortar contains no hazardous labels and protects users and the environment in the event of contact with the mortar.
- **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

Base material



Concrete
(non-cracked)

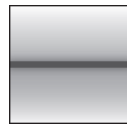


Dry concrete



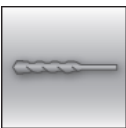
Wet concrete

Load condition

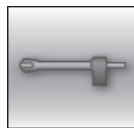


Static/
quasi-static

Installation conditions



Hammer
drilling



Hollow drill-
bit drilling

SAFESET

Hilti **SafeSet**
technology

Other information



European
Technical
Assessment



Hilti Clean
technology



CE
conformity



PROFIS
Rebar design
Software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment ^{a)}	CSTB, Marne la Vallée	ETA-11/0354 / 2019-09-06

a) All data given in this section according to ETA-11/0354 issue 2019-09-06.

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
 - One anchor material, as specified in the tables
 - Concrete C 20/25, $f_{ck,cube} = 25 \text{ N/mm}^2$
 - Temperate range I
- (min. base material temperature -40°C , max. long term/short term base material temperature: $+24^\circ\text{C}/40^\circ\text{C}$)

Embedment depth and base material thickness

Anchor- size		M8	M10	M12	M16	M20	M24
Typical embedment depth	h_{ef} [mm]	80	90	110	125	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	18,0	29,0	42,0	62,8	101,5	142,5
	HAS-U 8.8	24,1	31,1	45,6	62,8	101,5	142,5
	HAS-U A4	24,1	31,1	45,6	62,8	101,5	142,5
	HAS-U HCR	24,1	31,1	45,6	62,8	101,5	142,5
Shear V_{Rk}	HAS-U 5.8	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
	HAS-U A4	13,0	20,0	30,0	55,0	86,0	124
	HAS-U HCR	15,0	23,0	34,0	63,0	98,0	124

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	12,0	17,3	25,3	34,9	56,4	79,2
	HAS-U 8.8	13,4	17,3	25,3	34,9	56,4	79,2
	HAS-U A4	13,4	17,3	25,3	34,9	56,4	79,2
	HAS-U HCR	13,4	17,3	25,3	34,9	56,4	79,2
Shear V_{Rd}	HAS-U 5.8	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

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	8,6	12,3	18,1	24,9	40,3	56,5
	HAS-U 8.8	9,6	12,3	18,1	24,9	40,3	56,5
	HAS-U A4	9,6	12,3	18,1	24,9	40,3	56,5
	HAS-U HCR	9,6	12,3	18,1	24,9	40,3	56,5
Shear V_{Rec}	HAS-U 5.8	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

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

b) 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	
Nominal tensile strength f_{uk}	HAS-U 5.8	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	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	[mm ²]	36,6	58,0	84,3	157	245	353
Moment of resistance W	HAS-U	[mm ³]	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 A5 > 8% ductile Electroplated zinc coated $\geq 5\mu\text{m}$; (F) hot dip galvanized $\geq 45\mu\text{m}$
Threaded rod, HAS-U 8.8 (HDG)	Strength class 8.8; Elongation at fracture A5 > 12% ductile Electroplated zinc coated $\geq 5\mu\text{m}$; (F) hot dip galvanized $\geq 45\mu\text{m}$
Hilti Meter rod, AM 8.8 (HDG)	Strength class 8.8; Elongation at fracture A5 > 12% ductile Electroplated zinc coated $\geq 5\mu\text{m}$ (HDG) hot dip galvanized $\geq 45\mu\text{m}$
Washer	Electroplated zinc coated $\geq 5\mu\text{m}$, hot dip galvanized $\geq 45\mu\text{m}$
Nut	Strength class of nut adapted to strength class of threaded rod. Electroplated zinc coated $\geq 5\mu\text{m}$, hot dip galvanized $\geq 45\mu\text{m}$
Stainless Steel	
Threaded rod, HAS-U A4	Strength class 70 for $\leq M24$ 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 $\leq M20$ 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 $t_{cure}^{1)}$
$-5\text{ °C} < t_{BM} < 0\text{ °C}$	1 hour	6 hours
$0\text{ °C} \leq t_{BM} < 5\text{ °C}$	40 min	3 hours
$5\text{ °C} \leq t_{BM} < 10\text{ °C}$	25 min	2 hours
$10\text{ °C} \leq t_{BM} < 20\text{ °C}$	10 min	90 min
$20\text{ °C} \leq t_{BM} < 30\text{ °C}$	4 min	75 min
$30\text{ °C} \leq t_{BM} < 40\text{ °C}$	2 min	60 min

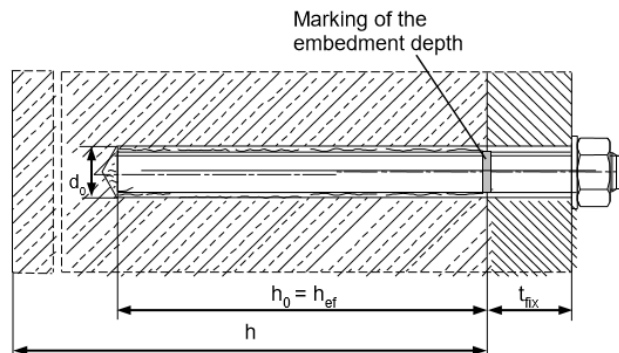
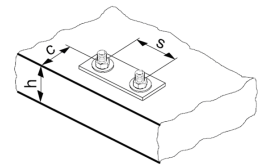
1) The curing time data are valid for dry base material only. In wet material the curing times must be doubled.

Setting details HAS-U

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]	$h_{ef} + 30 \text{ mm} \geq 100 \text{ mm}$			$h_{ef} + 2 d_0$		
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 ^{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	$s_{cr,N}$	$2 c_{cr,N}$					
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) $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ (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 ($h \geq h_{min}$)
- 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	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

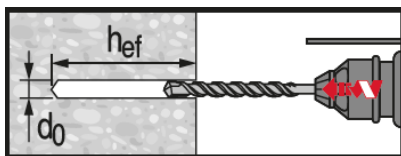
*For detailed information on installation see instruction for use given with the package of the product.



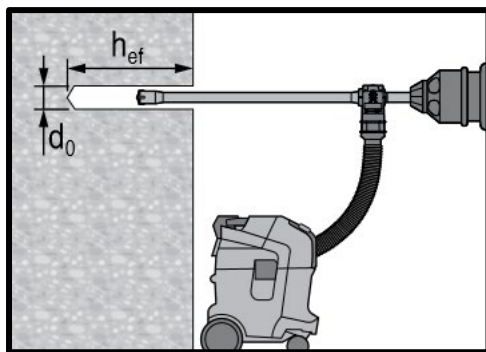
Safety regulations,

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



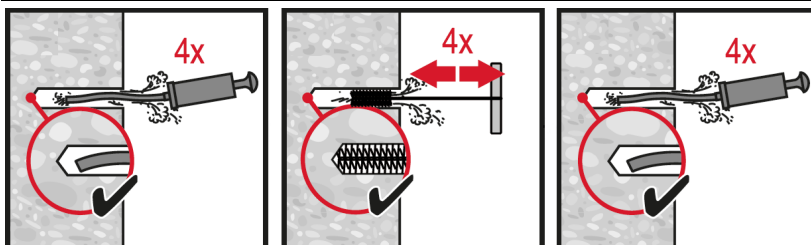
Hammer drilled hole (HD)



Hammer drilled hole with Hollow drill bit (HDB)

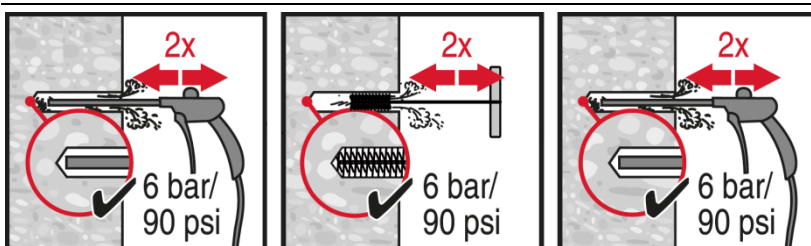
No cleaning required

Cleaning



Manual cleaning (MC)

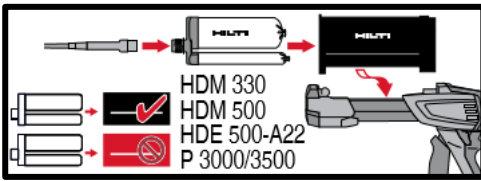
for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$.



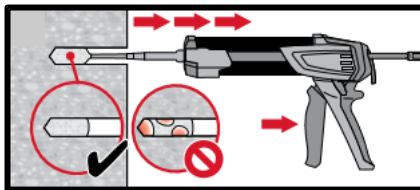
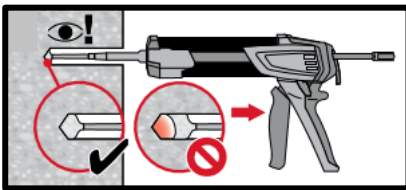
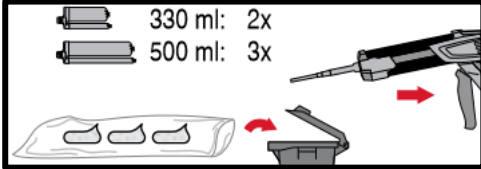
Compressed air cleaning (CAC)

for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d$.

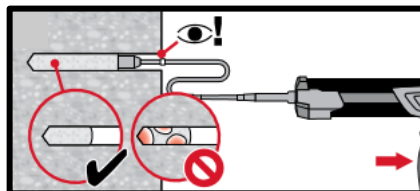
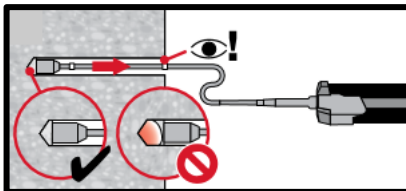
Injection



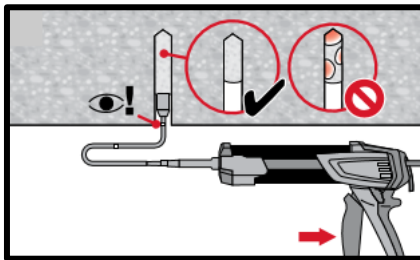
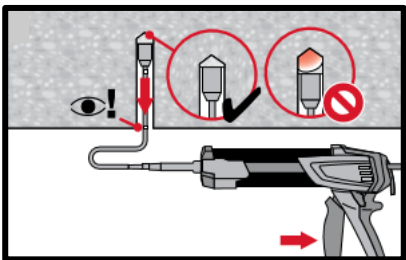
Injection system preparation



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

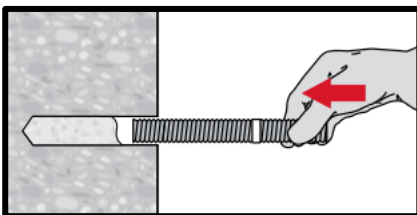


Injection method for drill hole depth
 $h_{ef} > 250 \text{ mm}$.

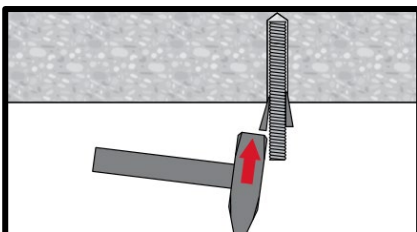


Injection method for overhead application

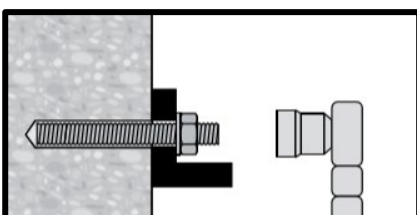
Setting the element



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 (EOTA TR029 & EOTA TR045) / Rebar elements / Concrete

Injection mortar system



Hilti HIT- CT 1
330 ml foil pack
(also available as
500 ml foil pack)



Rebar B500 B
($\phi 8$ - $\phi 25$)

Benefits

- **Clean-Tec** technology: HIT-CT 1 mortar contains no hazardous labels and protects users and the environment in the event of contact with the mortar.
- **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

Base material



Concrete
(non-cracked)

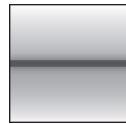


Dry concrete



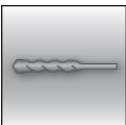
Wet concrete

Load condition

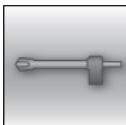


Static/
quasi-static

Installation conditions



Hammer
drilling



Hollow drill-
bit drilling

SAFESET

Hilti **SafeSet**
technology

Other information



European
Technical
Assessment



Hilti Clean
technology



CE
conformity



PROFIS
Rebar design
Software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment ^{a)}	CSTB, Marne la Vallée	ETA-11/0354 / 2019-09-06

b) All data given in this section according to ETA-11/0354 issue 2019-09-06.

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, $f_{ck,cube} = 25 \text{ N/mm}^2$
- Temperature range I
(min. base material temperature -40°C , max. long term/short term base material temperature: $+24^\circ\text{C}/40^\circ\text{C}$)

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

Anchor- size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Typical embedment depth [mm]	80	90	110	125	125	170	210
Base material thickness [mm]	110	120	145	160	165	220	274

For hammer drilled holes and Hilti hollow drill bit^{a)}:

Characteristic resistance

Anchor- size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Tensile N_{Rk}	14,1	21,2	31,1	41,2	47,1	85,5	131,9
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 M12-M25.

Design resistance

Anchor- size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Tensile N_{Rd}	7,8	11,8	17,3	22,9	26,2	47,5	73,3
Shear V_{Rd} [kN]	9,3	14,7	20,7	28,0	36,7	57,3	90,0

1) Hilti hollow drill bit available for element size M12-M25.

Recommended loads^{b)}

Anchor- size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$
Tensile N_{Rec}	5,6	8,4	12,3	16,4	18,7	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 M12-M25.

b) 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		φ8	φ10	φ12	φ14	φ16	φ20	φ25
Nominal tensile strength f_{uk}	[N/mm ²]	550	550	550	550	550	550	550
Yield strength f_{yk}	[N/mm ²]	500	500	500	500	500	500	500
Stressed cross-section A_s	[mm ²]	50,3	78,5	113,1	153,9	201,1	314,2	490,9
Moment of resistance W	[mm ³]	50,3	98,2	169,6	269,4	402,1	785,4	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

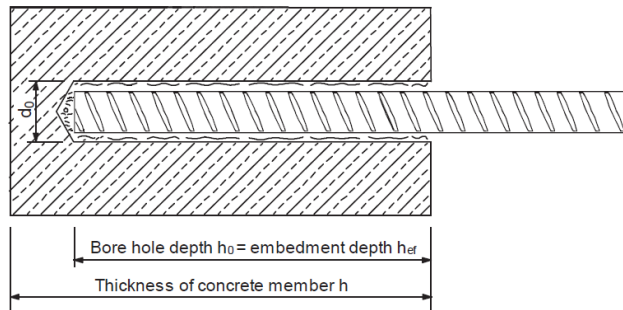
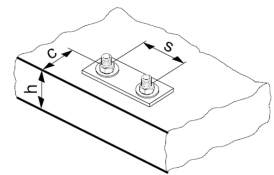
1) The curing time data are valid for dry base material only. In wet material the curing times must be doubled.

Setting details

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]	$h_{ef} + 30 \text{ mm}$ $\geq 100 \text{ mm}$			$h_{ef} + 2 d_0$			
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)}	$c_{cr,N}$ [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
- c) The critical edge distance for concrete cone failure depends on the embedment depth h_{ef} and the design bond resistance. The simplified formula given in this table is on the safe side.



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]	
$\phi 8$	10 / 12 ^{a)}	-	10 / 12 ^{a)}	- / 12
$\phi 10$	12 / 14 ^{a)}	14	12 / 14 ^{a)}	12 / 14 ^{a)}
$\phi 12$	14 / 16 ^{a)}	16 (14 ^{a)})	14 / 16 ^{a)}	14 / 16 ^{a)}
$\phi 14$	18	18	18	18
$\phi 16$	20	20	20	20
$\phi 20$	25	25	25	25
$\phi 25$	32	32	32	32

a) Each of the two given values can be used

Setting instructions

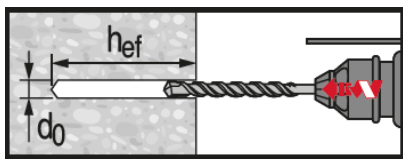
*For detailed information on installation see instruction for use given with the package of the product.



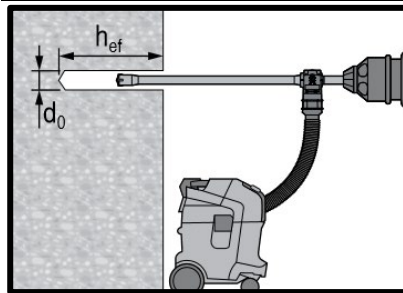
Safety regulations,

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-CT1.

Drilling



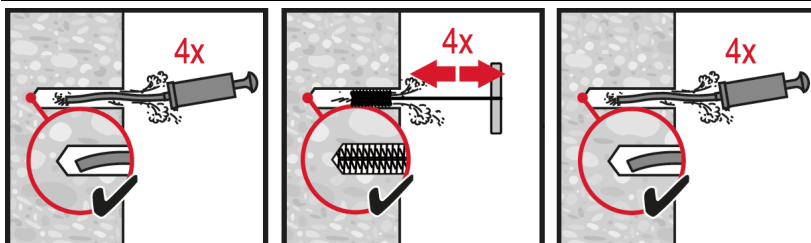
Hammer drilled hole (HD)



Hammer drilled hole with Hollow drill bit (HDB)

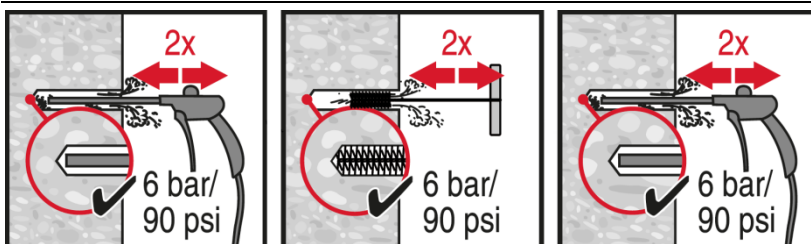
No cleaning required

Cleaning



Manual cleaning (MC)

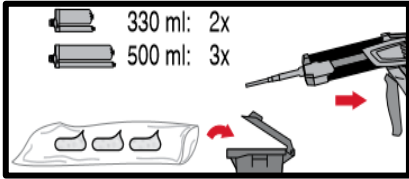
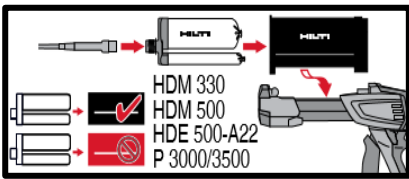
for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d_0$.



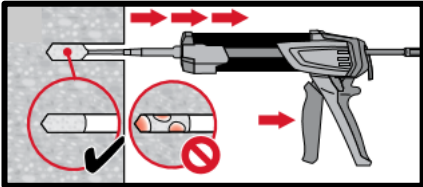
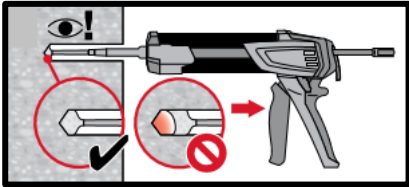
Compressed air cleaning (CAC)

for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d_0$.

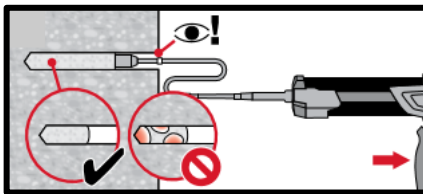
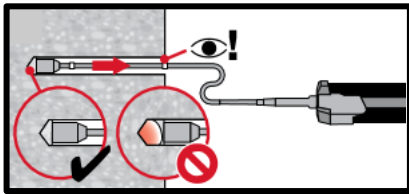
Injection



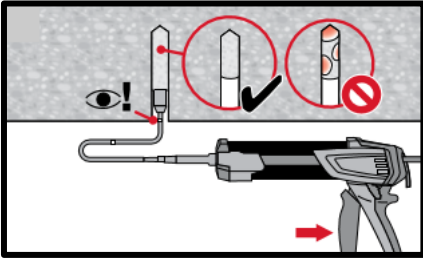
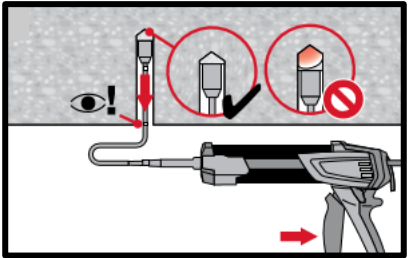
Injection system preparation



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

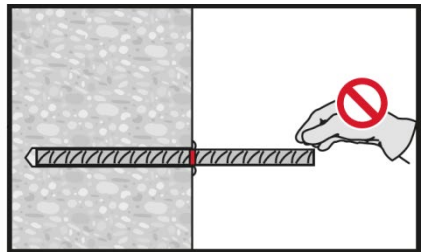
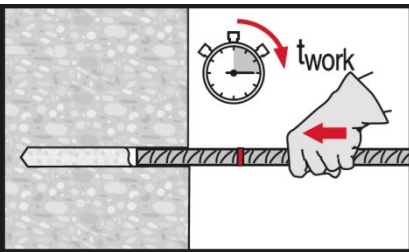


Injection method for drill hole depth
 $h_{ef} > 250 \text{ mm}$.

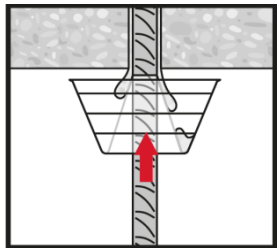
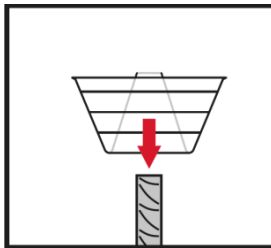
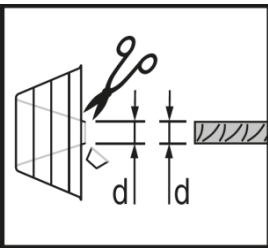


Injection method for overhead application

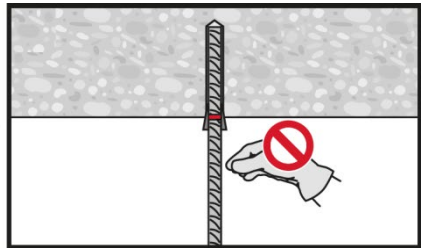
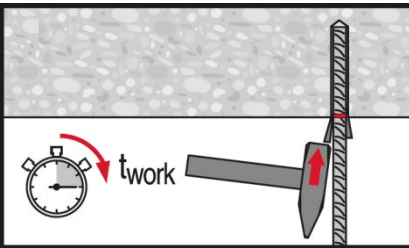
Setting the element



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 (EN 1992-1) / Rebar elements / Concrete

Injection mortar system



Hilti HIT- CT 1

330 ml foil pack
(also available as
500 ml foil pack)



Rebar B500 B
($\phi 8 - \phi 25$)

Benefits

- **Clean-Tec** technology: HIT-CT 1 mortar contains no hazardous labels and protects users and the environment in the event of contact with the mortar.
- **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
- For rebar diameters up to 25 mm
- Non-corrosive to rebar elements

Base material

Load conditions



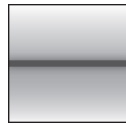
Concrete
(non-cracked)



Dry concrete



Wet
concrete



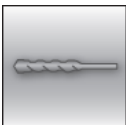
Static/
quasi-static



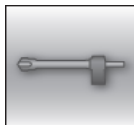
Fire
resistance

Installation conditions

Other information



Hammer
drilled holes



Hollow drill-
bit drilling

SAFESET

Hilti SafeSet
technology
with hollow
drill bit



European
Technical
Assessment



Hilti Clean
technology



CE
conformity



PROFIS
Rebar design
software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment ^{a)}	CSTB, Marne la Vallée	ETA-11/0390 / 2016-11-01
Fire report	CSTB, Marne la Vallée	n° 26059386 / 2015-10-23

c) All data given in this section according to the approvals mentioned above ETA-11/0390 issue 2016-11-01

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:

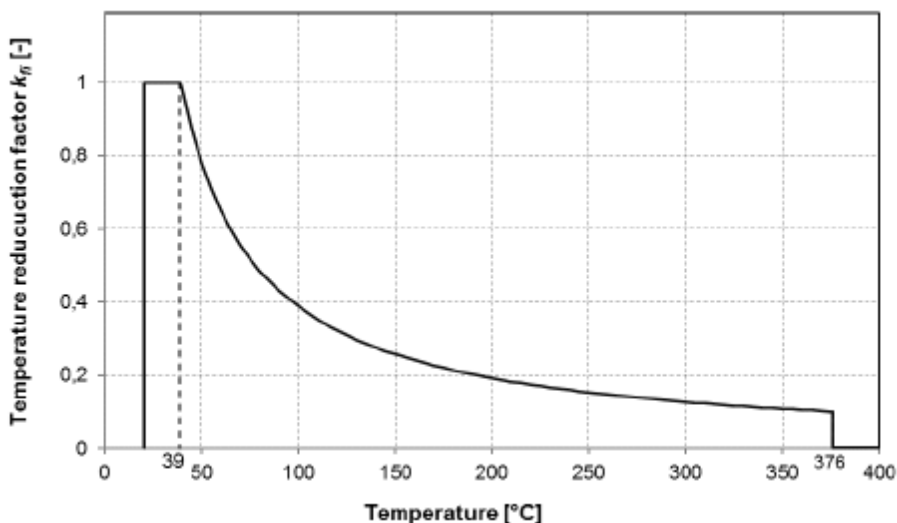
All allowed drilling methods									
Rebar - size	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
φ8 - φ25	1,0			1,2	1,4				

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

All allowed drilling methods								
Size	$f_{y,k}$ [N/mm ²]	$\ell_{b,min}^*$ [mm]			$\ell_{0,min}^*$ [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 $\ell_{b,min}$ (8.6) are calculated for good bond conditions with maximum yield strength $f_{yk}=1,15$ and $\alpha_6 = 1,0$

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

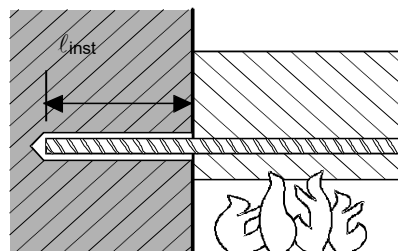
The design value of ultimate bond strength $f_{bd,fi}$ under fire exposure is calculated according to following equation:

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

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 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
$\phi 8$	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		14,7	13,1	10,2	7,9	
		310	16,8	16,8	16,8	15,7	12,8	10,4
		330				14,5	12,2	
		360				14,8	14,8	
		390	16,8	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		
$\phi 10$	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	26,2	23,3	20,6	18,5	14,9	12,0	
		330			23,8	21,8	18,2	15,2		
		360			25,0	21,4	18,5			
		380			26,2	26,2	26,2	23,6	20,6	
		410			26,2	26,2	23,9			
		440			26,2	26,2	26,2			
$\phi 12$	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	37,7	34,4	31,2	28,7	24,4	20,9	
		380			35,1	32,6	28,3	24,8		
		400			35,3	30,9	27,4			
		420			37,7	37,7	33,5	30,0		
		460			37,7	37,7	37,7	35,2		
		480			37,7	37,7	37,7	37,7		
$\phi 14$	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	51,3	47,7	44,0	41,1	36,1	31,9	
		430			48,5	45,7	40,6	36,5		
		450			48,7	43,7	39,5			
		470			51,3	51,3	46,7	42,6		
		510			51,3	51,3	51,3	48,6		
		530			51,3	51,3	51,3	51,3		
$\phi 16$	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	67,0	63,2	58,9	55,7	49,9	45,2	
		480			64,1	60,9	55,1	50,4		
		500			64,3	58,6	53,8			
		520			67,0	67,0	62,0	57,3		
		550			67,0	67,0	62,5			
		580			67,0	67,0	67,0			
$\phi 20$	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	104,7	98,5	93,2	89,1	81,9	76,0	
		570			99,7	95,6	88,4	82,5		
		600			102,1	94,9	89,0			
		620			104,7	104,7	99,2	93,3		
		650			104,7	104,7	99,8			
680	104,7	104,7			104,7					

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

Characteristic yield strength $f_{yk} = 500 \text{ N/mm}^2$

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.

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

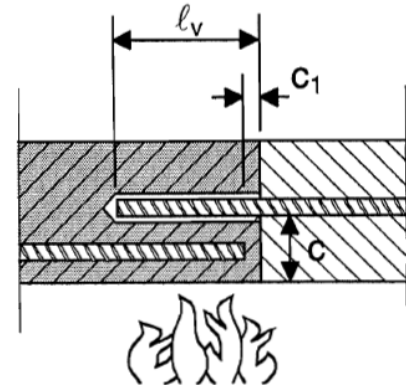
l_s = lap length

ϕ = nominal diameter of bar

$l_{inst} - c_f$ = selected overlap joint length; this must be at least l_s ,

but may not be assumed to be more than 80ϕ

$f_{bd, FIRE}$ = 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 [mm]	Max. bond stress, τ_c [N/mm ²]					
	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					3,3	2,4
260				3,5		2,6
270						2,8
280						3,1
290					3,5	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 naphthalene)	+
Ethyl acetate 100%	o	Salted solution 10%	+
Acetone 100%	-	Sodium chloride	
Ammoniac 5%	o	Suspension of concrete (sat.)	+
Diesel 100%	+	Chloroform 100%	+
Gasoline 100%	+	Xylene 100%	+
Ethanol 96%	o		
Machine oils 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}
$-5\text{ °C} < t_{BM} < 0\text{ °C}$	60 min	6 h
$0\text{ °C} \leq t_{BM} < 5\text{ °C}$	40 min	3 h
$5\text{ °C} \leq t_{BM} < 10\text{ °C}$	25 min	2 h
$10\text{ °C} \leq t_{BM} < 20\text{ °C}$	10 min	90 min
$20\text{ °C} \leq t_{BM} < 30\text{ °C}$	4 min	75 min
$30\text{ °C} \leq t_{BM} < 40\text{ °C}$	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

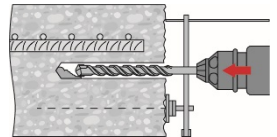
Rebar – size	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 18$	$\phi 20$	$\phi 22$	$\phi 24$	$\phi 25$
Rotary hammer	TE2(-A) – TE30(-A)					TE40 – TE80				
Other tools	Blow out pump ($h_{ef} \leq 10 \cdot d$)					-				
	Compressed air gun ^{a)} Set of cleaning brushes ^{b)} , dispenser, piston plug									

a) Compressed air gun with extension hose for all drill holes deeper than 250 mm (for $\phi 8$ to $\phi 12$) or deeper than $20 \cdot \phi$ (for $\phi > 12$ mm)







b) Automatic brushing with round brush for all drill holes deeper than 250 mm (for $\phi 8$ to $\phi 12$) or deeper than $20 \cdot \phi$ (for $\phi > 12$ 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)	$\phi \leq 24$	$30 + 0,06 \cdot l_v \geq 2 \cdot \phi$	$30 + 0,02 \cdot l_v \geq 2 \cdot \phi$
	$\phi = 25$	$40 + 0,06 \cdot l_v \geq 2 \cdot \phi$	$40 + 0,02 \cdot l_v \geq 2 \cdot \phi$
Compressed air drilling (CA)	$\phi \leq 24$	$50 + 0,08 \cdot l_v$	$50 + 0,02 \cdot l_v$
	$\phi = 25$	$60 + 0,08 \cdot l_v \geq 2 \cdot \phi$	$60 + 0,02 \cdot l_v \geq 2 \cdot \phi$



Drilling and cleaning parameters

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 $l_{v,max}$

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

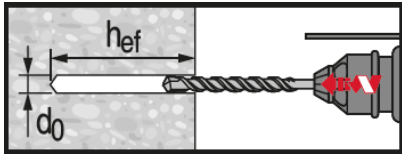
Setting instructions

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

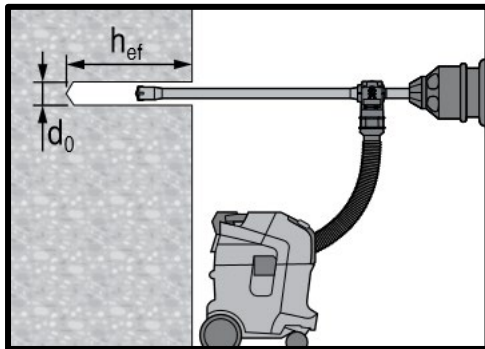


Safety regulations.

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.

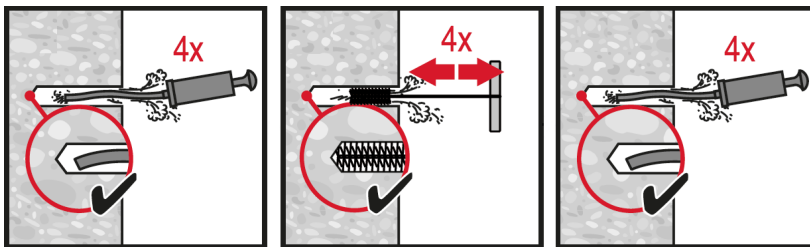


Hammer drilled hole (HD)



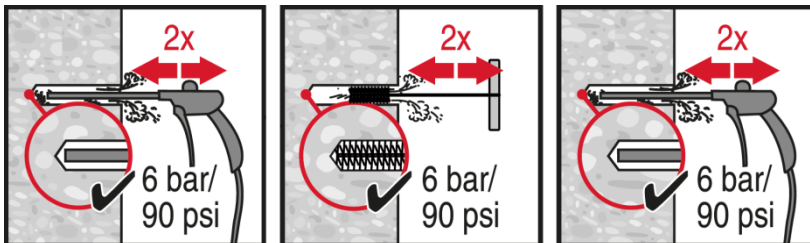
Hammer drilled hole with Hollow drill bit (HDB)

No cleaning required



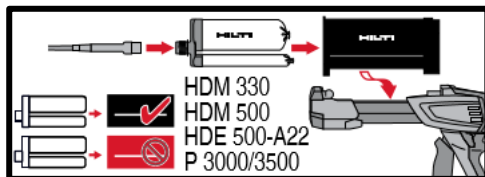
Manual cleaning (MC)

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

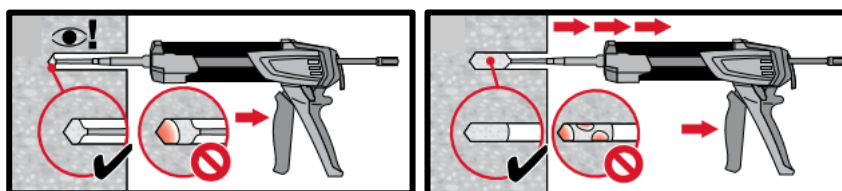
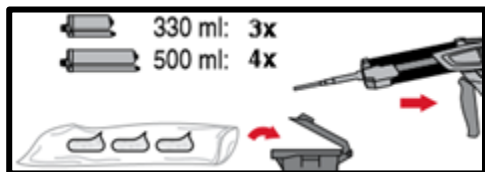


Compressed air cleaning (CAC)

for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d$.

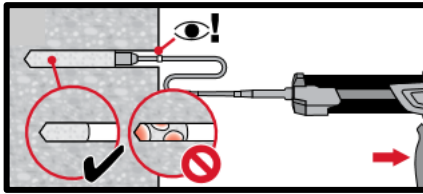
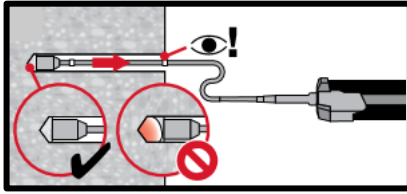


Injection system preparation.

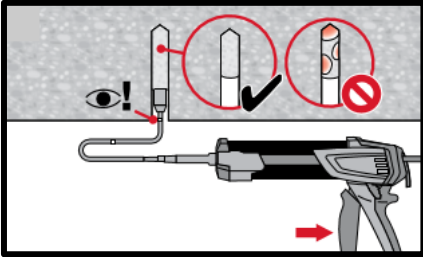
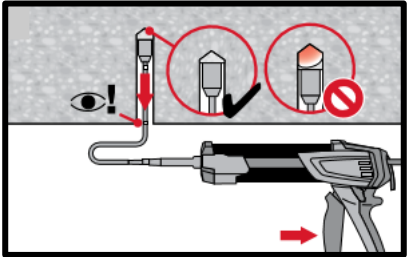


Injection method for drill hole depth

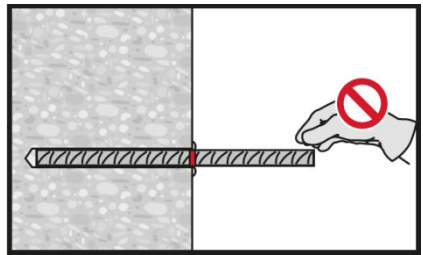
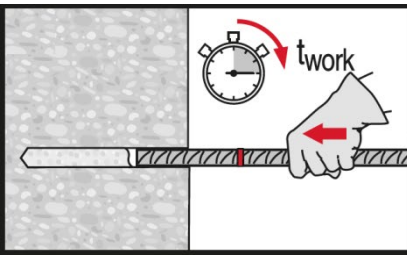
$h_{ef} \leq 250$ mm.



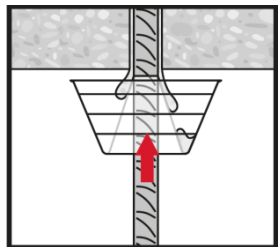
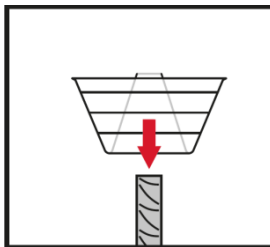
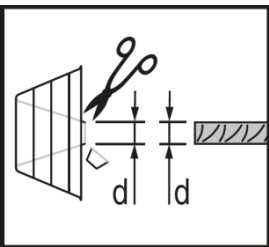
Injection method for drill hole depth $h_{ef} > 250\text{mm}$.



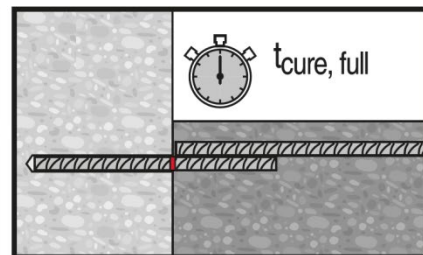
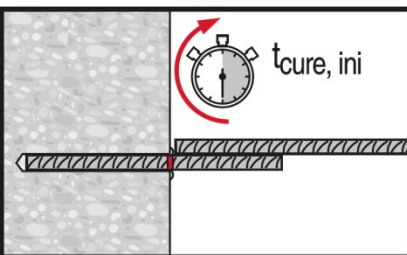
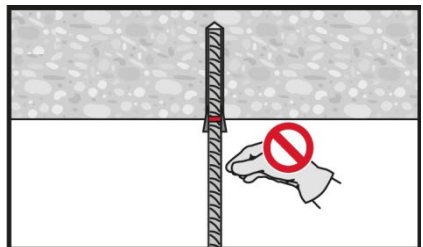
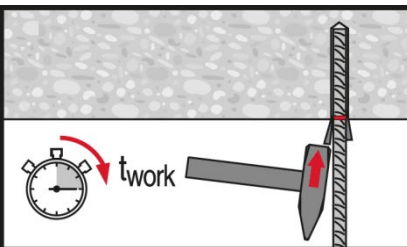
Injection method for overhead application.



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} ".