

HILTI

Hilti HIT

Gebrauchsanleitung

de

Installation instructions

en

Mode d'emploi

fr

Instrucciones de uso

es

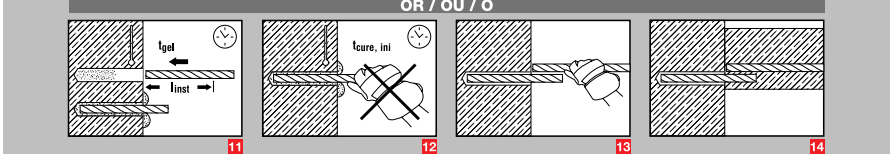
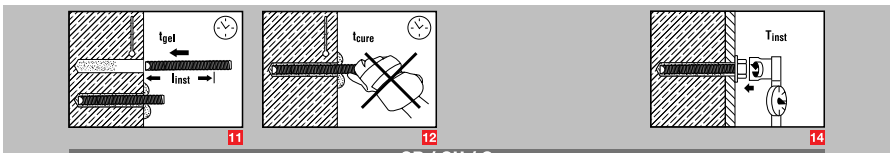
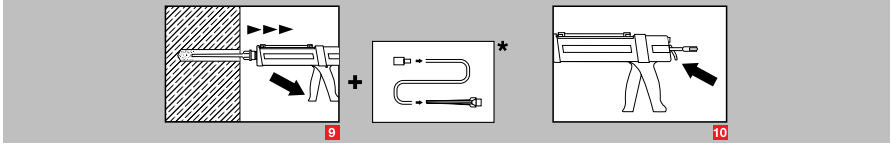
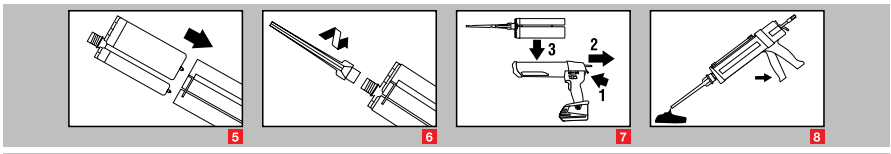
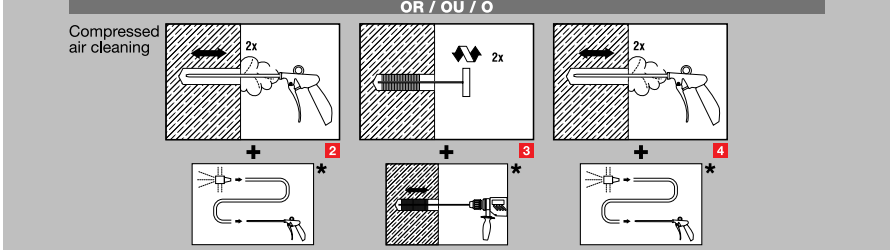
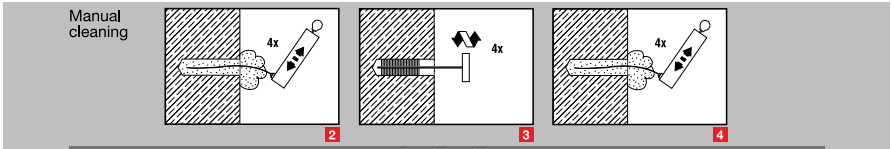
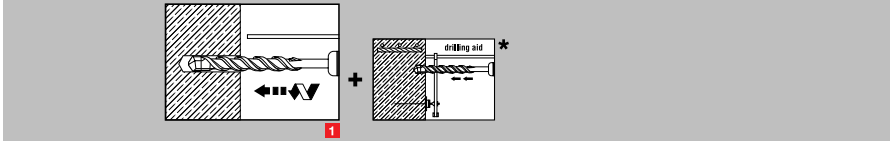
Gebruiksaanwijzing

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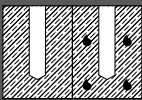
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**HIT-HY 150
HIT-HY 150 MAX
HIT-RE 500**

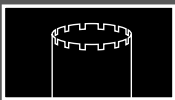



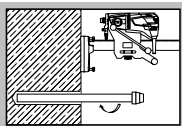
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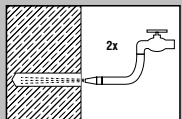
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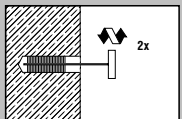


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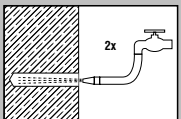
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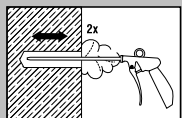


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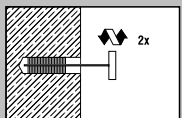


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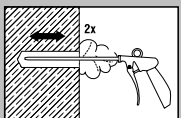
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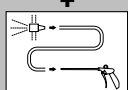


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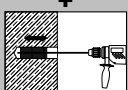
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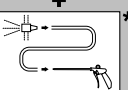
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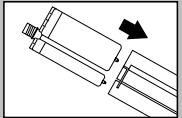
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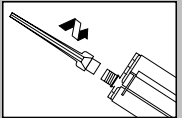


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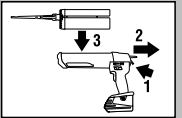


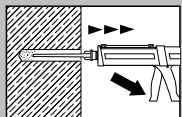
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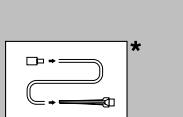


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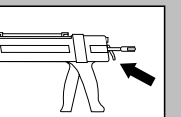


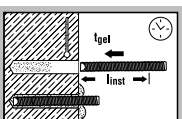
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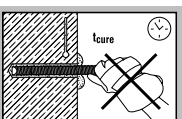
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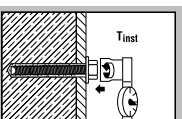
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t_{cure}

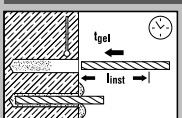
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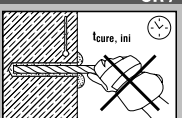
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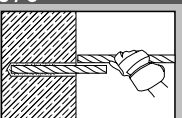
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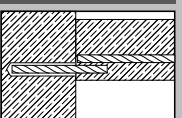


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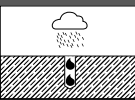


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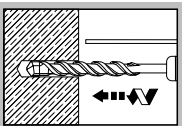
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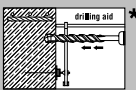


HIT-HY 150
HIT-HY 150 MAX
HIT-RE 500

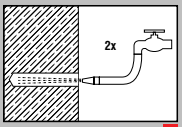




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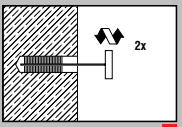


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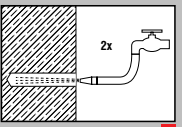
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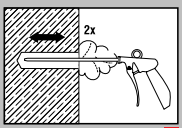
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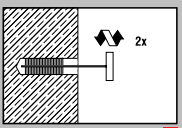
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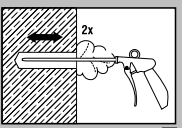
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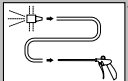
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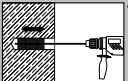


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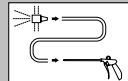
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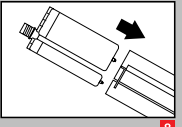
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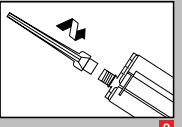
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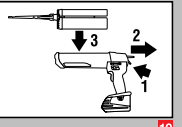
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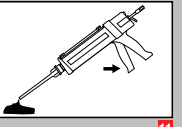
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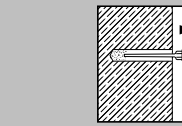
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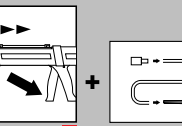
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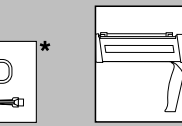
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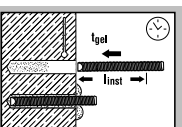


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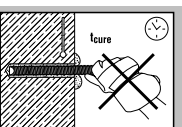


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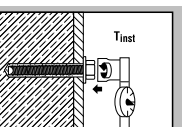
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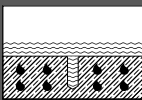


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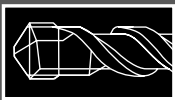


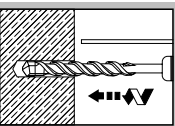
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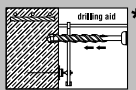


HIT-RE 500

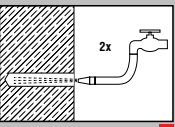




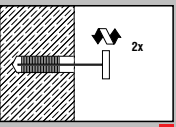
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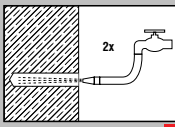
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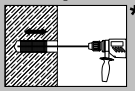
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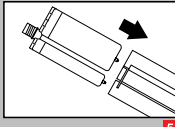
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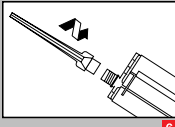
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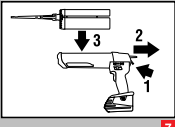
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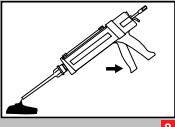
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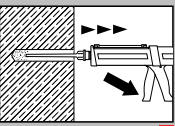
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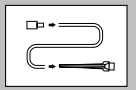
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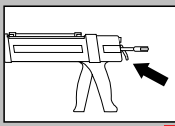
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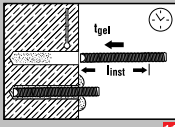
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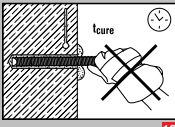
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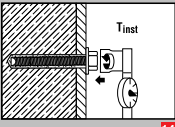
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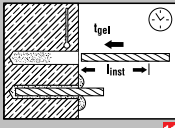


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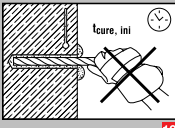


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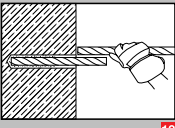
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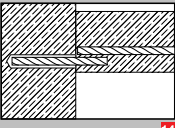
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Hilti HIT (-HY 150, -HY 150 MAX and -RE 500)

Installation Instructions for fastenings in concrete

Observe these instructions for use and safety precautions before using Hilti HIT systems.

International and national approvals takes precedence for approval governed applications.

Observe the Instructions for Use provided with each foil pack and the dispenser in use.

For application specific information, refer to the Hilti technical literature.

For the availability of the Hilti products referenced in this document, please contact your local Hilti representative.

Abbreviations:

d_o	= Borehole diameter
d_s	= Element diameter
c	= Concrete cover over the post installed element (rebar applications)
C_{drill}	= Distance of borehole axis to concrete surface
ϵ_{inst}	= Embedment depth
ℓ_m	= Mortar level mark
$t_{cure, full}$	= Full curing time
$t_{cure, ini}$	= Initial curing time
t_{gel}	= Gel / working time
\emptyset	= Drill bit diameter
MSDS	= Material Safety Data Sheet
HIT	= Hilti Injection Technology

Tables:

Table I	= Installation methods
Table II	= Accessories selector
Table III	= Brushing extension selector
Table IV	= Blowing extension selector
Table V	= Injection extension selector
Table VI	= Dispenser selector

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4. Injection of mortar	15
5. Installation of the element	17

Safety Regulations:



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Review the Material Safety Data Sheet (MSDS) before use!

Wear well-fitting safety glasses, protective gloves and suitable protective clothing when working with Hilti HIT.



Read the Installation Instructions for Use.

The following guidance will help you to find your way in these installation instructions.

Step 1

Depending on the drilling method and the base material condition (dry or water saturated / water filled / underwater), choose one of the four installation methods. See Table I for the overview of the installation methods.

Step 2

The sequence of the single steps in the overall procedures is numbered and has to be followed accordingly. The icons are explained in detail in the text part of these instructions.

Step 3

Depending on the application condition and borehole diameter, special accessories may be required. For the proper choice of the accessories please refer to Table II.

Step 4

In order to reach the bottom of the borehole for a selected installation procedure, the following tables will list the appropriate elongations:

- Table III for the elongations used for brushing
- Table IV for the elongations used for air cleaning
- Table V for the elongations used for injecting

Step 5

Table VI lists the most appropriate HIT dispenser.

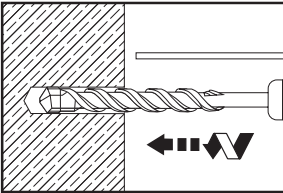
1. Borehole drilling

The drilling method has an influence on the setting procedure. See Table I.

In these installation instructions two different drilling methods, i.e. hammer drilling and diamond coring, are considered. For detailed information about additional drilling methods please contact Hilti.

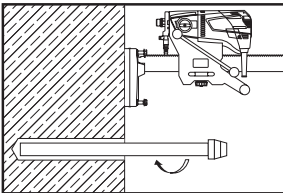
Hammer drilling

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

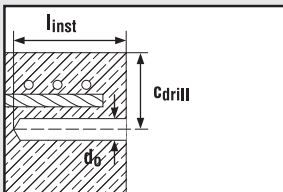
Diamond coring



- Core drill hole to the required embedment depth using an appropriately sized diamond core drill bit. Remove all core fragments from the hole after drilling.

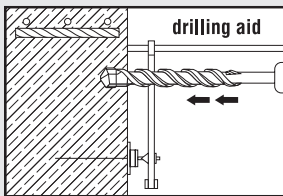
Special Case: Splicing applications for reinforcement bars (rebars)

To be in accordance with the design assumptions, concrete cover, parallel drilling to the surface and splice length must be carefully ensured during the installation.



Splicing applications for rebars

- Measure and verify concrete cover c .
- $c_{\text{drill}} = c + d_s/2$
- Drill parallel to concrete surface and to existing rebar.
- Where required use drilling aid.



Drilling aid

Hammer drilling: use drilling aid for holes with $\ell_{\text{inst}} > 20 \text{ cm}$ (8") (check specific approval for details).

Three different options may be considered a drilling aid:

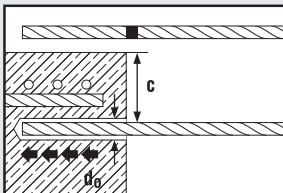
- Hilti drilling aid HIT-BH
- Secure the drilling aid etc. with HKD-S M10×40 or HST M10/10 (HDI 3/8" or KB3 3/8").
- Drill parallel to the guide rod.

Precaution: Put a clearly visible mark on the guide rod.

B) Slat or spirit level

C) Visual control

Diamond core rigs serve as drilling aids and need to be properly anchored prior to coring.



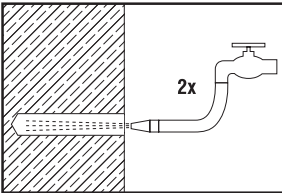
Embedment mark

Mark the embedment depth on the rebar (e.g. with tape) → ℓ_{inst} .

2. Borehole preparation

For use in case of: diamond cored boreholes, holes filled with standing water and / or under water applications, observe the following steps prior to the borehole cleaning procedure.

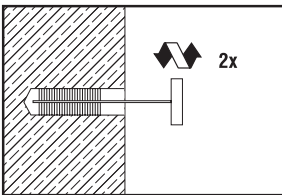
Flushing



- **Flush** hole by inserting a water hose (water-line pressure) to the back of the hole until water runs clear. Perform this step twice.

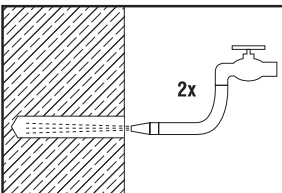
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Brushing



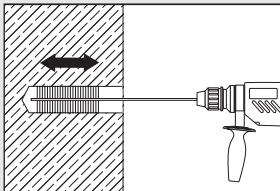
- Brush the hole 2 times with the specified brush size (brush $\varnothing \geq$ borehole \varnothing) by inserting the round steel brush to the back of the hole in a twisting motion.
- The brush shall produce natural resistance as it enters the anchor hole. If this is not the case, use a new brush or a brush with a larger diameter.
- See Table II for the corresponding round steel brush / drill bit combination.
- If required, extend the reach of a steel brush, HIT-RB, by attaching it to an extension HIT-RBV in order to reach the back of the borehole.
- Attach the other extension end into the brush handle HIT-RBH, according to Table III.

Flushing



- **Flush the borehole again** until water runs clear. Perform this step twice.

Special Case: Machine Brushing



- Brush extensions HIT-RBS for machine brushing shall be used to accommodate cleaning of boreholes deeper than 250 mm (10") (for $d_s = 8$ mm (3/8")... 12 mm (1/2") or deeper than $20 \times d_s$ (for $d_s > 12$ mm (1/2")), respectively.
- Select the corresponding brush extension HIT-RBS according to Table III.
- Attach the round steel brush, HIT-RB, on to one end of the brush extension(s) HIT-RBS, in order to reach the back of the borehole.
- Secure the other extension end into the TE-C/TE-Y (-T) holder.

Tips:

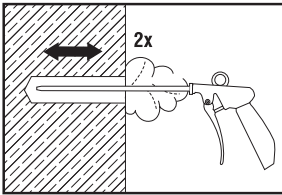
- Start machine brushing operation slowly.
- Start brushing operation once brush is inserted in borehole.

3. Borehole cleaning

Load performances of chemical anchors are strongly influenced by the cleaning method. **Inadequate borehole cleaning = poor load values.** For safety relevant applications, please verify with the design engineer which cleaning method was assumed in the design phase. The borehole must be free of dust, debris, water when applicable, ice, oil, grease and other contaminants prior to mortar injection.

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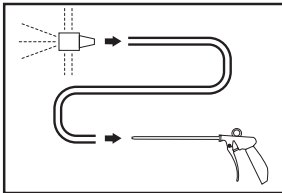
Compressed air



- Blow from the back of the borehole with oil-free compressed air [min. 90 psi at 3.5 CFM (6 bar at 6 m³/hour)] until return air stream is free of noticeable dust. Perform this step 2 times.
- For boreholes deeper than 250 mm (10") (for $d_s = 8 \text{ mm}$ (3/8") ... 12 mm (1/2")) or deeper than $20 \times d_s$ (for $d_s > 12 \text{ mm}$ (1/2")), respectively, use the appropriate air nozzle Hilti HIT-DL (oil free compressed air $\geq 6 \text{ bar}$) – see Table II for the corresponding air nozzle / drill bit combination.
- Connect the selected air nozzle with the appropriate air cleaning extension:

HIT-DL 12–16 (HIT-DL 1/2" – 11/16") with HIT-DL 10/0.8 or HIT-DL V10/1
HIT-DL 18–32 (HIT-DL 3/4" – 1 3/8") with HIT-DL 16/0.8 or HIT-DL B and/or HIT-VL 16/0.7 and/or HIT-VL 16.

See Table II for the corresponding air nozzle / drill bit combination.



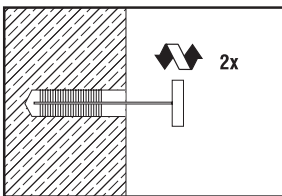
For applications with an effective embedment depth $\ell_{\text{inst}} > 0.7 \text{ m}$ (28"), please connect two or more blowing extensions HIT-DL with the connect- or HIT-DL K (See Table IV).

For element diameter $> 25 \text{ mm}$ (1") the compressor must be rated to supply a minimum air flow of at least 140 m³/hour (82 CFM).

Tips:

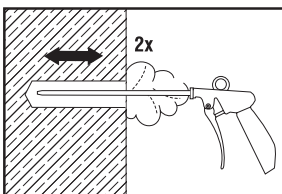
- Keep away from dust cloud, do not inhale concrete dust.
- Hilti recommends a dust collector or other equipment to be used to collect the dust during the blowing operation.

Brushing

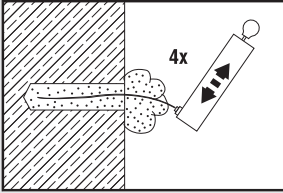


- Brush the borehole with an appropriately sized round steel brush. Perform this step 2 times.
- See above for details.

Compressed air

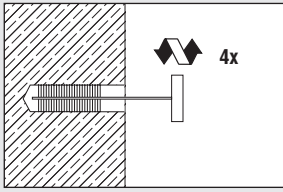


- Blow out the hole again from the back of the hole with compressed air until return air stream is free of noticeable dust. Perform this step 2 times.

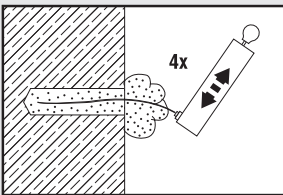
Special Case: Manual Cleaning**Blowing out**

- The Hilti manual pump may be used for blowing out boreholes up to diameters $d_s \leq 16$ mm (5/8") and borehole depths up to $\ell_{inst} \leq 250$ mm (10") (please contact Hilti for further references).
- Blow out at least 4 times from the back of the borehole.

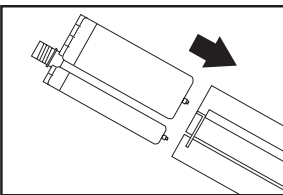
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**Brushing**

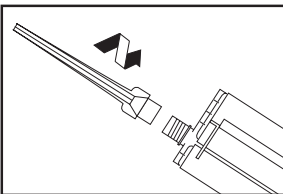
- Brush the borehole 4 times with an appropriately sized round steel brush. See above for details.

**Blowing out**

- Blow out at least 4 times from the back of the borehole. See above for details.

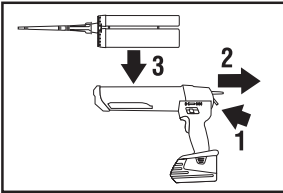
4. Injection of mortar**Insert foil pack in foil pack holder**

- Observe the instructions for use of the dispenser.
- Check foil pack holder for proper function.
- Put foil pack into foil pack holder.
- Do not use damaged foil packs/ holders.

Tightly attach mixer to foil pack manifold

- Use the static mixer that is delivered with the mortar.
- Attach the static mixer tightly on to the manifold before starting to dispense.
- Do not modify the static mixer.

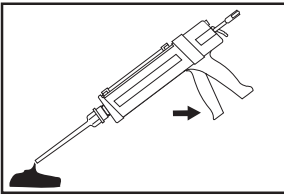
Insert foil pack holder with foil pack into dispenser



- Push release trigger (1), retract plunger (2) and insert foil pack holder with foil pack into the appropriate Hilti dispenser (3).
- See Table VI for the selection of the most suitable HIT dispenser.

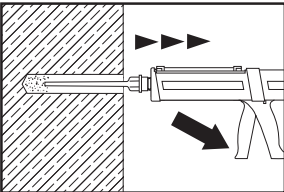
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Discard initial amount of mortar



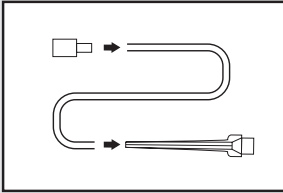
- Observe the Instructions for Use of the mortar for the amount of mortar that has to be discarded.
- The foil pack is self opening when dispensing begins.
- Do not pierce the foil pack manually (this can cause system failure).
- After changing a mixer, the first trigger pulls must be discarded.
- For each new foil pack a new static mixer must be used.

Inject mortar into borehole starting from the back of the borehole without forming air voids



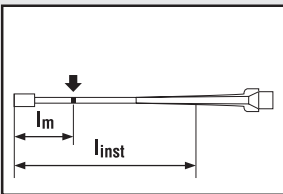
- Inject the mortar from the back of the borehole by slowly withdrawing the mixer incrementally after each trigger pull, after controlling that the depth of the borehole corresponds to the design value.
- **Important! Use extensions for deep holes**, as explained under special case.
- Fill holes approximately 2/3 full, or as required to ensure that the annular gap between the anchor/rebar and the concrete is completely filled with mortar over the entire embedment length.

Special Case: Injection with elongations and piston plug

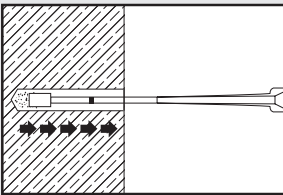


- The use of the piston plug is recommended for overhead applications or boreholes deeper than 250 mm (10"). For underwater applications the installation is only possible with the aid of piston plugs.
- Connect the selected injection piston plug with the appropriate injection extension:
HIT-SZ 12–16 (HIT-SZ 1/2" – 5/8") with HIT-VL 9/1.0
HIT-SZ 18–32 (HIT-SZ 11/16" – 1 3/4") with HIT-VL 16 or HIT-VL 16/0.7
- See Table II for the corresponding piston plug / drill bit combination.
- For applications with an effective embedment depth $\ell_{inst} > 800$ mm (31"), please connect two or more injection extensions HIT-VL using the connector HIT-VL K (See Table V). In case of use of two or more rigid injection extensions HIT-VL 16/0.7, use a flexible tube HIT-VL 16 (0.5 m /20") prior to the connection to the static mixer.

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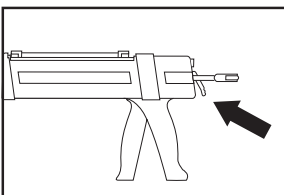


- To aid installation, mark the required mortar level ℓ_m and embedment depth ℓ_{inst} with tape or marker on the mixer extension.
- Quick estimation: $\ell_m = 1/3 \cdot \ell_{inst}$.



- The injection of mortar with a piston plug HIT-SZ (IP) helps to prevent the creation of air voids.
- The mixer extension with the piston plug should be inserted to the back of the borehole without resistance.
- **During the injection the piston plug will be naturally pushed out the borehole by the mortar pressure.**
- Attention! By pulling the mixer extension with piston plug, the piston plug may be rendered inactive and air voids may occur.

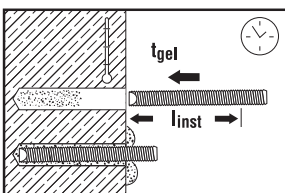
Depressurize the dispenser



- After injecting the mortar depressurize the dispenser by pressing the release button. This will prevent further mortar from escaping out of the mixer.

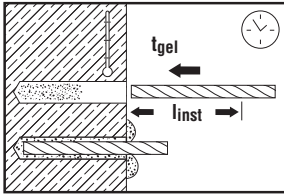
5. Installation of the element

Insert element into the borehole



- Mark the anchor/rebar at the required embedment depth.
- Set the anchor/rebar to the required embedment depth. **Embedment depth must equal to the design specification.**
- Before use, verify that the anchor/rebar is dry and free of oil or other residue.
- To ease installation, anchor/rebar may be slowly twisted as they are inserted.
- After installing an anchor/rebar the annular gap must be completely filled with mortar.

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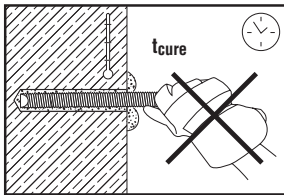


- **Observe the gel time “ t_{gel} ”**, which varies according to the temperature of base material. Please refer to the Instructions for Use of the mortar for details about t_{gel} .
- Minor adjustments to the anchor/rebar may be performed during the gel time. For the gel time see relevant information in the manual of the mortars.

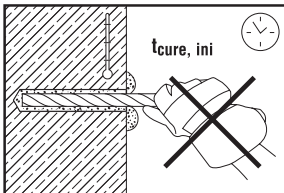
Attention!

- For overhead applications take special care when inserting the anchor/rebar.
- Excess mortar will be forced out of the borehole. Collect and remove it safely to protect the installer and the anchor/rebar. Avoid dripping of the mortar.
- Position the anchor/rebar and secure it from falling during the curing time.

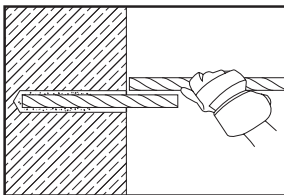
Do not disturb the element



- Once the gel time “ t_{gel} ” has elapsed, do not disturb the element until “ t_{cure} ” has passed. Please refer to the Instructions for Use of the mortar for details about “ t_{cure} ”.
- For rebar applications, do not disturb the element until “ $t_{cure,ini}$ ” has passed, if the mortar in use is characterised by “ $t_{cure,ini}$ ”, please refer to the Instructions for Use of the mortar for details about “ $t_{cure,ini}$ ”.

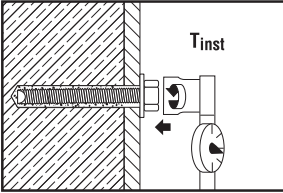


Preparation work may continue for rebar applications



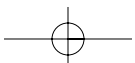
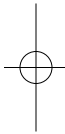
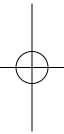
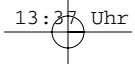
- Between “ $t_{cure,ini}$ ” and “ $t_{cure,full}$ ” the mortar has a limited load bearing capacity. Do not apply the design load on the rebar during this time.


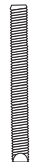



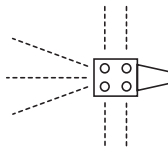
Apply load/torque



- After " $t_{cure,full}$ " has passed load/torque " T_{inst} " may be applied. Please refer to the Instruction for Use of the mortar for details about " $t_{cure,full}$ " and " T_{inst} ".

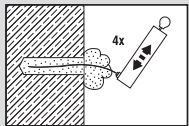
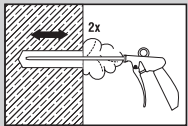
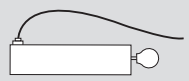
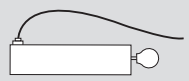
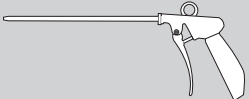
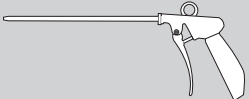
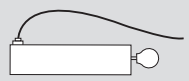
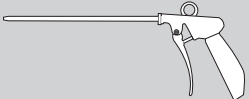

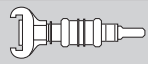





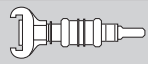





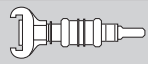




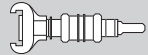
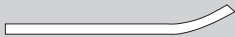
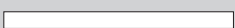

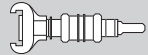
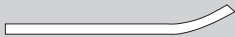
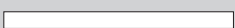

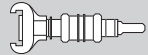
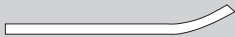
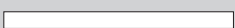

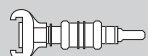

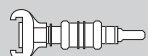

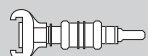

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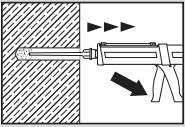
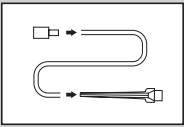



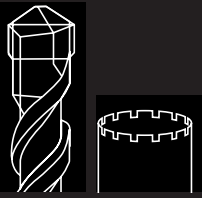
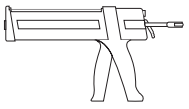
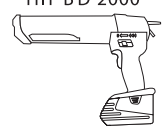
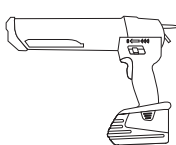
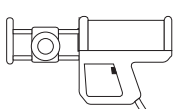
II									
	HAS	HIS	Rebar	HIT-RB		HIT-SZ (IP)		HIT-DL	
									
Ø [mm]	Ø [mm]	Ø [mm]	Ø [mm]		Item no.		Item no.		Item no.
10	8			10	380917	–	–	–	–
12	10		8	8/12	336548	8/12	351989	8/12	371715
14	12	8	10	10/14	336549	10/14	351990	10/14	371716
16			12	12/16	336550	12/16	351991	12/16	371717
18	16	10	14	14/18	336551	14/18	351992	14/18	371718
20			16	16/20	336552	16/20	351993	16/20	371719
22		12	18	18/22	370774	18/22	269618	16/20	371719
24	20			24	380918	24	269619	16/20	371719
25			20	20/25	336553	20/25	351994	20/25	371720
28	24	16	22	28	380919	28	269620	20/25	371720
30	27			30	380920	30	269621	20/25	371720
32		20	25	25/32	336554	25/32	351995	25/32	371721
35	30		28	35	380921	35	269622	25/32	371721
37	33		30	37	382259	37	271499	25/32	371721
40	36		32	40	382260	40	269623	25/32	371721
42				42	382261	42	269624	25/32	371721
45	39		36	45	382262	45	269625	25/32	371721
47				47	382264	47	269626	25/32	371721
52				52	382265	52	271476	25/32	371721
55			40	55	382266	55	271477	25/32	371721
Ø [inch]	Ø [inch]	Ø [inch]	Ø [inch]		Item no.		Item no.		Item no.
7/16	3/8			7/16"	273203	–	–	–	–
1/2			#3	1/2"	273204	1/2"	274019	1/2"	38237
9/16	1/2			9/16"	273205	9/16"	274020	9/16"	38238
5/8			#4	5/8"	273207	5/8"	274021	9/16"	38238
11/16		3/8		11/16"	273209	11/16"	274022	11/16"	38239
3/4	5/8		#5	3/4"	273210	3/4"	274023	3/4"	38240
7/8	3/4	1/2	#6	7/8"	273211	7/8"	274024	7/8"	38241
1	7/8		#7	1"	273212	1"	274025	1"	38242
1 1/8	1	5/8	#8	1 1/8"	273214	1 1/8"	274026	1"	38242
1 1/4		3/4		1 1/4"	273216	1 1/4"	274027	1"	38242
1 3/8	1 1/4		#9	1 3/8"	273217	1 3/8"	274028	1 3/8"	38243
1 1/2			#10	1 1/2"	273218	1 1/2"	274029	1 3/8"	38243
1 3/4	1 1/2		#11	1 3/4"	273219	1 3/4"	274030	1 3/8"	38243

<div style="background-color: #cccccc; padding: 5px;"> l_{inst} </div>										
	Item	Item no.	Item	Item no.						
0–250 mm (0"–10")		1 HIT-RBH 229138		1 HIT-RBS 10/0.35 371722						
						TE-C ¹⁾ 263437				
								TE-Y ¹⁾ 263439		
										HIT-RBS 10/0.7 336645
	TE-Y ¹⁾ 263439									
250–800 mm (10"–31")		1 HIT-RBH 229138		1–2 HIT-RBS 10/0.35 371722						
						TE-C ¹⁾ 263437				
								TE-Y ¹⁾ 263439		
										HIT-RBS 10/0.7 336645
	TE-Y ¹⁾ 263439									
>800 mm (> 31")		HIT-RBV 238727		HIT-RBS 10/0.7 336645						
					TE-C ¹⁾ 263437					
							TE-Y ¹⁾ 263439			
									HIT-RBS 10/0.7 336645	
	TE-Y ¹⁾ 263439									
>800 mm (> 31")		1–x Brush RBS 10/0.7 336645		HIT-RBS 10/0.7 336645						
					TE-C ¹⁾ 263437					
							TE-Y ¹⁾ 263439			
									HIT-RBS 10/0.7 336645	
	TE-Y ¹⁾ 263439									

¹⁾ Depending on drilling machine ¹⁾ Ça depend du perforateur ¹⁾ Depende del marillo perforador

IV l_{inst}																																		
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VI TE/DD-bit 		HIT-MD 2000/2500  HIT-B D 2000 	HIT-ED 3500 	HIT P 8000 
Ø drill bit		max l _{inst}		
mm	cm	cm	cm	
10	100	180	320	
12				
14				
16				
18				
20				
22	70	100		
24				
25		80		
28				
30				
32	50	60		
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37		40		
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45	-			
47				
52				
55				

HILTI

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Fax: +423 / 234 29 65
www.hilti.com

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