Deutsches Institut für Bautechnik

Member of EOTA
www.eota.eu

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-19/0465 of 28 August 2019

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Hilti HIT-HY 170 with HAS-U
Product family to which the construction product belongs	Bonded fastener for use in concrete
Manufacturer	Hilti AG Feldkircherstraße 100 9494 Schaan FÜRSTENTUM LIECHTENSTEIN
Manufacturing plant	Hilti Corporation
This European Technical Assessment contains	18 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 330499-01-0601

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

Specific Part

1 Technical description of the product

The Injection system Hilti HIT-HY 170 is a bonded anchor consisting of a foil pack with injection mortar Hilti HIT-HY 170 and a steel element according to Annex A.

The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between metal part, injection mortar and concrete.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Characteristic resistance for static and quasi-static tension load	See Annex C1
Characteristic resistance for static and quasi-static shear load	See Annex C2
Displacements for static and quasi-static loads	See Annex C2
Characteristic resistance for seismic performance category C1	No performance assessed
Characteristic resistance for seismic performance category C2	See Annex C3
Durability	See Annex B2

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	**Performance**
Content, emission and/or release of dangerous substances	No performance assessed

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with the European Assessment Document EAD 330499-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 28 August 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Lange

Deutsches Institut für Bautechnik DIBt

Installed condition

Figure A1:
HAS-U… and AM 8.8

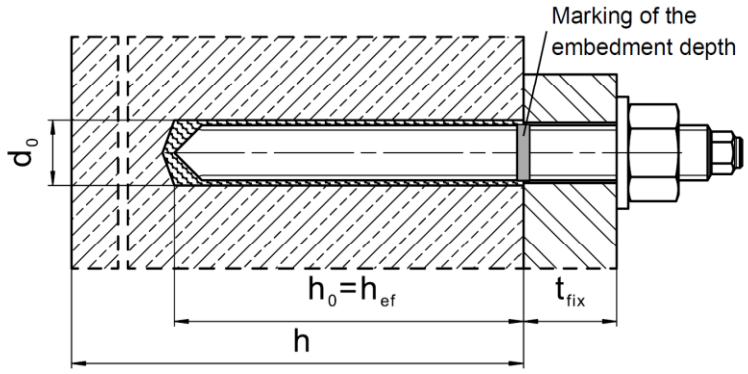
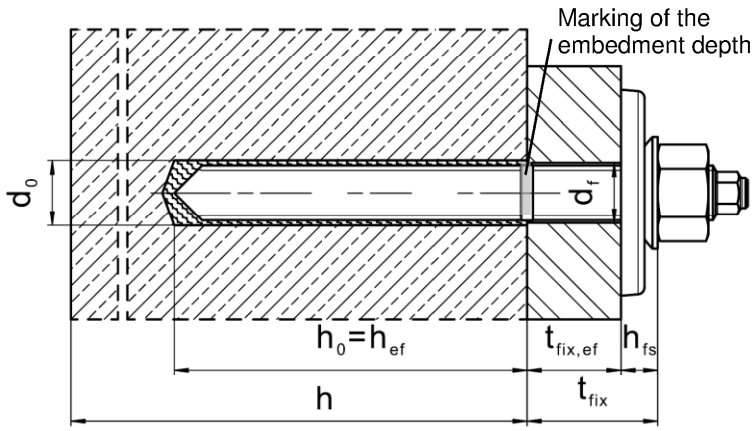


Figure A2:
HAS-U… and AM 8.8 with Hilti Filling Set



Injection system Hilti HIT-HY 170 with HAS-U…	Annex A1
Product description Installed condition	

Deutsches Institut für Bautechnik DIBt

Product description: Injection mortar and steel elements

Injection mortar Hilti HIT-HY 170: hybrid system with aggregate

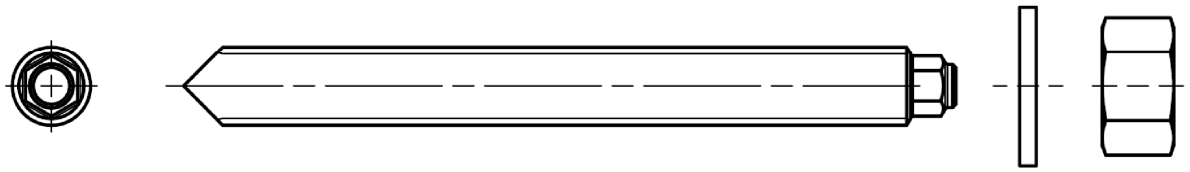
330 ml and 500 ml

Marking:
HILTI HIT
Production number and
Production line
Expiry date mm/yyyy

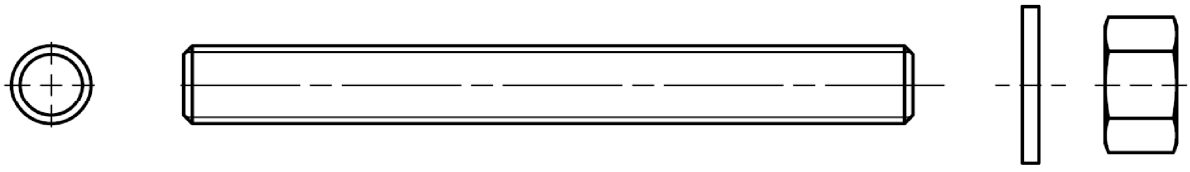
Product name: "Hilti HIT-HY 170"

Static mixer Hilti HIT-RE-M

Steel elements



HAS-U…: M8 to M24



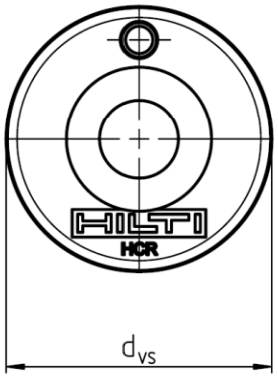
AM 8.8: M8 to M24

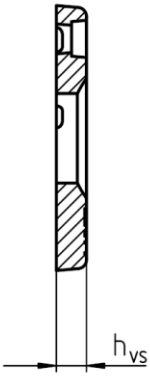
Injection system Hilti HIT-HY 170 with HAS-U…	Annex A2
Product description Injection mortar / Static mixer / Steel elements	

Deutsches Institut für Bautechnik DIBt

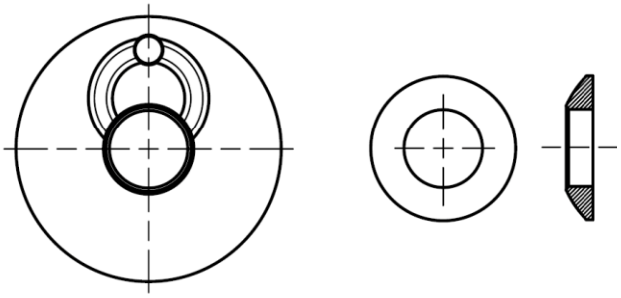
Hilti Filling Set to fill the annular gap between anchor and fixture

Sealing washer





Spherical washer



Hilti Filling Set			**M12**	**M16**
Diameter of sealing washer	d_{vs}	[mm]	44	56
Thickness of sealing washer	h_{vs}	[mm]	5	6
Thickness of Hilti Filling Set	h_{fs}	[mm]	10	11

Injection system Hilti HIT-HY 170 with HAS-U…

Product description
Steel elements

Annex A3

Deutsches Institut für Bautechnik DIBt

Table A1: Materials

Designation	Material
Metal parts made of zinc coated steel	
HAS-U 5.8 (HDG)	Strength class 5.8, f_{uk} = 500 N/mm²; f_{yk} = 400 N/mm² Elongation at fracture (l_0=5d) > 8% ductile Electroplated zinc coated ≥ 5 µm, (HDG) Hot dip galvanized ≥ 45 µm
HAS-U 8.8 (HDG)	Strength class 8.8 , f_{uk} = 800 N/mm², f_{yk} = 640 N/mm² Elongation at fracture (l_0=5d) > 12% ductile Electroplated zinc coated ≥ 5 µm, (HDG) Hot dip galvanized ≥ 45 µm
AM 8.8 (HDG)	Strength class 8.8, f_{uk} = 800 N/mm², f_{yk} = 640 N/mm² Elongation at fracture (l_0 = 5d) > 12% ductile, Electroplated zinc coated ≥ 5 µm, (HDG) hot dip galvanized ≥ 45 µm
Washer	Electroplated zinc coated ≥ 5 µm Hot dip galvanized ≥ 45 µm
Nut	Strength class of nut adapted to strength class of threaded rod Electroplated zinc coated ≥ 5 µm Hot dip galvanized ≥ 45 µm
Hilti Filling Set (F)	Filling washer: Electroplated zinc coated ≥ 5 µm, (F) hot dip galvanized ≥ 45 µm Spherical washer: Electroplated zinc coated ≥ 5 µm, (F) hot dip galvanized ≥ 45 µm Lock nut: Electroplated zinc coated ≥ 5 µm, (F) hot dip galvanized ≥ 45 µm
Metal parts made of stainless steel corrosion resistance class III according EN 1993-1-4:2006+A1:2015	
HAS-U A4	Strength class 70, f_{uk} = 700 N/mm², f_{yk} = 450 N/mm² Elongation at fracture (l_0=5d) > 8% ductile
Washer	Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2014
Nut	Strength class 70, f_{uk} = 700 N/mm², f_{yk} = 450 N/mm²; Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2014
Metal parts made of high corrosion resistant steel corrosion resistance class V according EN 1993-1-4:2006+A1:2015	
HAS-U HCR	For ≤ M20: f_{uk} = 800 N/mm², f_{yk} = 640 N/mm², For > M20: f_{uk} = 700 N/mm², f_{yk} = 400 N/mm², Elongation at fracture (l_0=5d) > 8% ductile
Washer	High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2014
Nut	For ≤ M20: f_{uk} = 800 N/mm², f_{yk} = 640 N/mm², For > M20: f_{uk} = 700 N/mm², f_{yk} = 400 N/mm², High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2014

Deutsches Institut für Bautechnik DIBt

Specifications of intended use

Anchorages subject to:

- Static and quasi static loading: M8 to M24.
- Seismic performance category C2: M12 and M16.

Base material:

- Compacted reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013 + A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206:2013 + A1:2016.
- Cracked and uncracked concrete.

Temperature in the base material:

- **At installation**
  0 °C to +40 °C for the standard variation of temperature after installation
- **In-service**
  Temperature range I: -40 °C to +40 °C
  (max. long term temperature +24 °C and max. short term temperature +40 °C)
  Temperature range II: -40 °C to +80 °C
  (max. long term temperature +50 °C and max. short term temperature +80 °C)

Table B1: Specifications of intended use

	HIT-HY 170 with …
Elements	HAS-U…, AM 8.8 
Hammer drilling with hollow drill bit TE-CD or TE-YD 	✓
Hammer drilling mode	✓
Static and quasi static loading in uncracked concrete	M8 to M24
Static and quasi static loading in cracked concrete	M10 to M16
Seismic performance category C2	M12 and M16

Injection system Hilti HIT-HY 170 with HAS-U…	**Annex B1**
Intended Use Specifications	

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (all materials).
- For all other conditions according EN 1993-1-4:2006+A1:2015-06 corresponding to corrosion resistance classes Table A1 Annex A4 (stainless steels).

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- The anchorages are designed in accordance with:
  EN 1992-4:2018 and EOTA Technical Report TR 055.

Installation:

- Use category: dry or wet concrete (not in flooded holes) for all drilling techniques.
- Drilling technique:
  - Hammer drilling,
  - Hammer drilling with Hilti hollow drill bit TE-CD, TE-YD
- Installation direction D3: downward, horizontal and upward (e.g. overhead) installation admissible for all elements.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

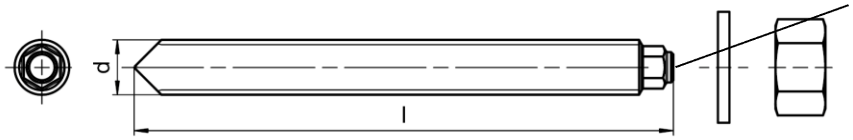
Injection system Hilti HIT-HY 170 with HAS-U…	**Annex B2**
Intended Use Specifications	

Deutsches Institut für Bautechnik DIBt

Table B2: Installation parameters of HAS-U… and AM 8.8

HAS-U… and AM 8.8			M8	M10	M12	M16	M20	M24
Diameter of element	d	[mm]	8	10	12	16	20	24
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	22	28
Range of effective embedment depth and depth of drilled hole	$h_{ef} = h_0$	[mm]	60 to 96	60 to 120	70 to 144	80 to 192	90 to 240	96 to 288
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26
Thickness of Hilti Filling Set	h_{fs}	[mm]	-	-	10	11	-	-
Effective fixture thickness with Hilti Filling Set	$t_{fix,ef}$	[mm]	$t_{fix,ef} = t_{fix} - h_{fs}$					
Minimum thickness of concrete member	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm			$h_{ef} + 2 \cdot d_0$		
Maximum torque moment	T_{max}	[Nm]	10	20	40	80	150	200
Minimum spacing	s_{min}	[mm]	40	50	60	75	90	115
Minimum edge distance	c_{min}	[mm]	40	45	45	50	55	60

HAS-U…



Marking:
Steel grade number and length identification letter: e.g. 8L

AM 8.8

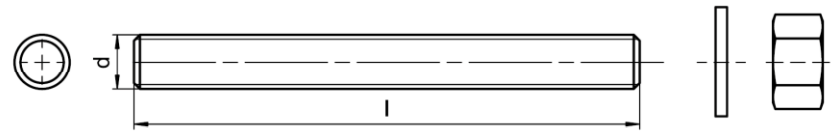


Table B3: Maximum working time and minimum curing time[1)]

Temperature in the base material T [2)]	Maximum working time t_{work}	Minimum curing time t_{cure}
0°C to 5°C	10 min	5 h
> 5°C to 10°C	8 min	2,5 h
> 10°C to 20°C	5 min	1,5 h
> 20°C to 30°C	3 min	45 min
> 30°C to 40°C	2 min	30 min

1) The curing time data are valid for dry base material only. In wet base material the curing times must be doubled.
2) The minimum temperature of the injection mortar Hilti HIT-HY 170 during installation is + 5°C

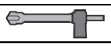
Injection system Hilti HIT-HY 170 with HAS-U…

Intended Use
Installation parameters of HAS-U… and AM 8.8
Maximum working time and minimum curing time

Annex B3

Deutsches Institut für Bautechnik DIBt

Table B4: Parameters of cleaning and setting tools

Elements	Drill and clean			Installation
HAS-U…, AM 8.8	Hammer drilling	Hollow drill bit TE-CD, TE-YD	Brush	Piston plug
				
size	d_0 [mm]	d_0 [mm]	HIT-RB	HIT-SZ
M8	10	-	10	-
M10	12	12 [1)]	12	12
M12	14	14 [1)]	14	14
M16	18	18	18	18
M20	22	22	22	22
M24	28	28	28	28

[1)] To be used in combination with Hilti vacuum cleaner with suction volume ≥ 61 l/s (VC 20/40 –Y in corded mode only).

Cleaning alternatives

Manual Cleaning (MC):
Hilti hand pump for blowing out drill holes with diameters $d_0 \leq 18$ mm and drill hole depths $h_0 \leq 10 \cdot d$

Compressed air cleaning (CAC):
Air nozzle with an orifice opening of minimum 3,5 mm in diameter.

Automatic Cleaning (AC):
Cleaning is performed during drilling with Hilti TE-CD and TE-YD drilling system including vacuum cleaner.

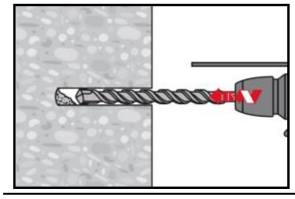
Injection system Hilti HIT-HY 170 with HAS-U…	Annex B4
Intended Use Cleaning and setting tools Cleaning alternatives	

Deutsches Institut für Bautechnik DIBt

Installation

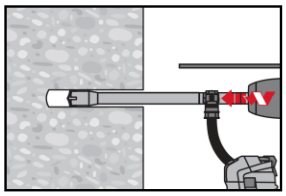
Hole drilling

a) Hammer drilling



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

b) Hammer drilling with Hilti hollow drill bit



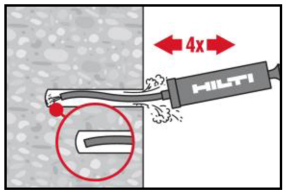
Drill hole to the required embedment depth with an appropriately sized Hilti TE-CD or TE-YD hollow drill bit attached to Hilti vacuum cleaner VC 20/40 (-Y) (suction volume ≥ 57 l/s) with automatic cleaning of the filter activated. This drilling system removes the dust and cleans the drill hole during drilling when used in accordance with the user's manual. When using TE-CD size 12 and 14 refer to Table B4. After drilling is completed, proceed to the "injection preparation" step in the installation instruction.

Drill hole cleaning

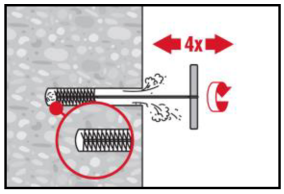
Just before setting an anchor, the drill hole must be free of dust and debris.
Inadequate hole cleaning = poor load values.

Manual Cleaning (MC)

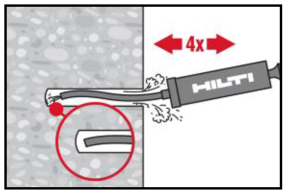
Non-cracked concrete.
For drill hole diameters $d_0 \leq 18$ mm and drill hole depths $h_0 \leq 10 \cdot d$



The Hilti manual pump may be used for blowing out drill holes up to diameters $d_0 \leq 18$ mm and embedment depths up to $h_{ef} \leq 10 \cdot d$.
Blow out at least 4 times from the back of the drill hole until return air stream is free of noticeable dust



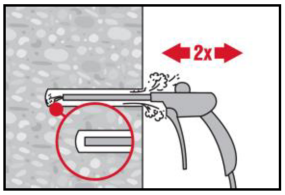
Brush 4 times with the specified brush (see Table B4) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the drill hole (brush Ø ≥ drill hole Ø) - if not the brush is too small and must be replaced with the proper brush diameter.



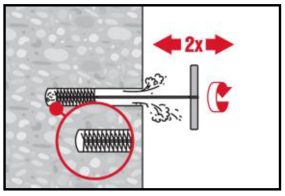
Blow out again with manual pump at least 4 times until return air stream is free of noticeable dust.

Deutsches Institut für Bautechnik DIBt

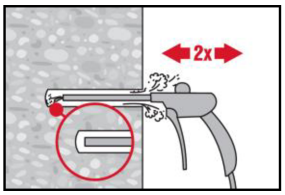
Compressed air cleaning (CAC) for all drill hole diameters d_0 and all drill hole depths h_0



Blow 2 times from the back of the hole (if needed with nozzle extension) over the hole length with oil-free compressed air (min. 6 bar at 6 m³/h) until return air stream is free of noticeable dust.

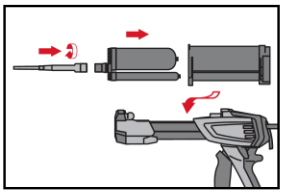


Brush 2 times with the specified brush (see Table B4) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the drill hole (brush Ø ≥ drill hole Ø) - if not the brush is too small and must be replaced with the proper brush diameter.

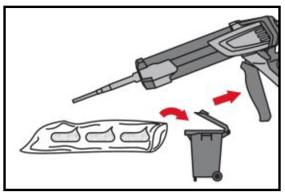


Blow again with compressed air 2 times until return air stream is free of noticeable dust.

Injection preparation



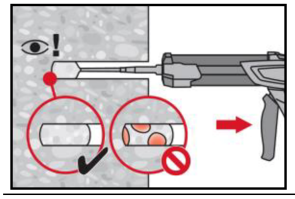
Tightly attach new Hilti mixing nozzle HIT-RE-M to foil pack manifold (snug fit). Do not modify the mixing nozzle.
Observe the instruction for use of the dispenser.
Check foil pack holder for proper function. Do not use damaged foil packs / holders.
Insert foil pack into foil pack holder and put holder into HIT-dispenser.



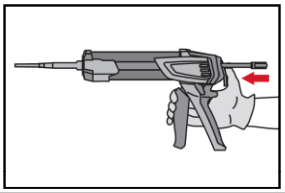
Discard initial adhesive. The foil pack opens automatically as dispensing is initiated.
Depending on the size of the foil pack an initial amount of adhesive has to be discarded.
Discarded quantities are

2 strokes	for 330 ml foil pack,
3 strokes	for 500 ml foil pack

Inject adhesive from the back of the drill hole without forming air voids.



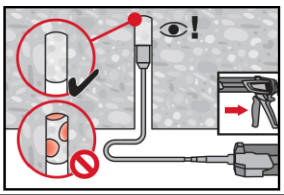
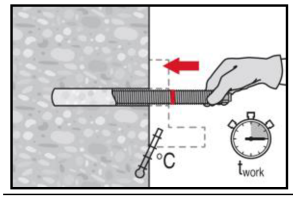
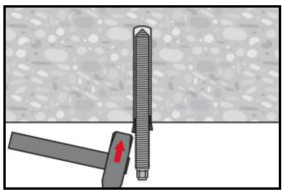
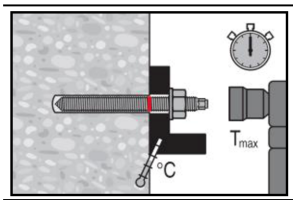
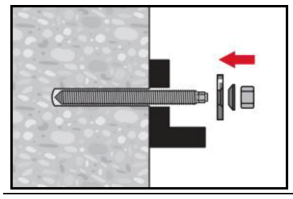
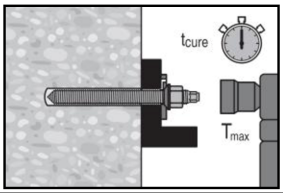
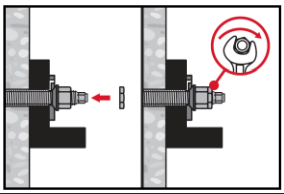
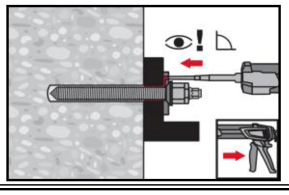
Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull.
Fill approximately 2/3 of the drill hole to ensure that the annular gap between the anchor and the concrete is completely filled with adhesive along the embedment length.
In water saturated concrete it is required to set the fastener immediately after cleaning the drillhole.



After injection is completed, depressurize the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

Injection system Hilti HIT-HY 170 with HAS-U…	
Intended Use Installation instructions	**Annex B6**

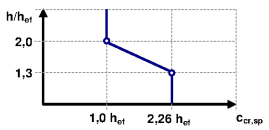
Deutsches Institut für Bautechnik DIBt

	Overhead installation and/or installation with embedment depth h_{ef} > 250mm. For overhead installation the injection is only possible with the aid of extensions and piston plugs. Assemble HIT-RE-M mixer, extension(s) and appropriately sized piston plug HIT-SZ (see Table B4). Insert piston plug to back of the hole and inject adhesive. During injection the piston plug will be naturally extruded out of the drill hole by the adhesive pressure
Setting the element	
	Before use, verify that the element is dry and free of oil and other contaminants. Mark and set element to the required embedment depth until working time t_{work} (see table B3) has elapsed.
	For overhead installation use piston plugs and fix embedded parts with e.g. wedges (HIT-OHW).
	Loading the anchor: After required curing time t_{cure} (see Table B3) the anchor can be loaded. The applied installation torque shall not exceed the values T_{max} given in Table B2.
Installation of Hilti Filling Set	
	Use Hilti Filling Set with standard nut. Observe the correct orientation of filling washer and spherical washer.
	The applied installation torque shall not exceed the values T_{max} given in Table B2.
	Optional: Installation of lock nut. Tighten with a ¼ to ½ turn.
	Fill the annular gap between the anchor rod and fixture with 1-3 strokes of Hilti injection mortar HIT-HY 170. Follow the installation instructions supplied with the foil pack. After required curing time t_{cure} the anchor can be loaded.

Injection system Hilti HIT-HY 170 with HAS-U…	
Intended Use Installation instructions	**Annex B7**

Deutsches Institut für Bautechnik DIBt

Table C1: Essential characteristics for HAS-U… and AM 8.8 under tension load in concrete

HAS-U… and AM 8.8				M8	M10	M12	M16	M20	M24
Installation safety factor		γ_{inst}	[-]	1,0					
Steel failure									
Characteristic resistance		$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$					
Partial factor grade 5.8		$\gamma_{Ms,N}$ [1)]	[-]	1,5					
Partial factor grade 8.8		$\gamma_{Ms,N}$ [1)]	[-]	1,5					
Partial factor HAS-U A4		$\gamma_{Ms,N}$ [1)]	[-]	1,86					
Partial factor HAS-U HCR		$\gamma_{Ms,N}$ [1)]	[-]	1,5					2,1
Combined pullout and concrete cone failure									
Characteristic bond resistance in uncracked concrete C20/25									
Temperature range I:	24 °C/40 °C	$\tau_{Rk,ucr}$	[N/mm²]	10,0					
Temperature range II:	50 °C/80 °C	$\tau_{Rk,ucr}$	[N/mm²]	7,5					
Characteristic bond resistance in cracked concrete C20/25									
Temperature range I:	24 °C/40 °C	$\tau_{Rk,cr}$	[N/mm²]	-	5,5			-	
Temperature range II:	50 °C/80 °C	$\tau_{Rk,cr}$	[N/mm²]	-	4,0			-	
Influence factors ψ on bond resistance τ_{Rk}									
Cracked and uncracked concrete: Factor for concrete strength		ψ_c	C30/37	1,04					
			C40/50	1,07					
			C50/60	1,09					
Cracked and uncracked concrete: Sustained load factor		ψ^0_{sus}	24 °C / 40 °C	0,95					
			50 °C / 80 °C	0,79					
Concrete cone failure									
Factor for uncracked concrete		$k_{ucr,N}$	[-]	11,0					
Factor for cracked concrete		$k_{cr,N}$	[-]	7,7					
Edge distance		$c_{cr,N}$	[mm]	$1,5 \cdot h_{ef}$					
Spacing		$s_{cr,N}$	[mm]	$3,0 \cdot h_{ef}$					
Splitting failure									
Edge distance $c_{cr,sp}$ [mm] for	$h / h_{ef} \geq 2,0$			$1,0 \cdot h_{ef}$					
	$2,0 > h / h_{ef} > 1,3$			$4,6\ h_{ef} - 1,8\ h$					
	$h / h_{ef} \leq 1,3$			$2,26\ h_{ef}$					
Spacing		$s_{cr,sp}$	[mm]	$2 \cdot c_{cr,sp}$					

1) In absence of national regulations.

Injection system Hilti HIT-HY 170 with HAS-U…

Performances
Essential characteristics under tension load in concrete

Annex C1

Deutsches Institut für Bautechnik DIBt

Table C2: Essential characteristics for HAS-U… and AM 8.8 under shear load in concrete

HAS-U… and AM 8.8			M8	M10	M12	M16	M20	M24
Steel failure without lever arm								
Characteristic resistance	$V_{Rk,s}$	[kN]	$0,5 \cdot A_s \cdot f_{uk}$					
Partial factor grade 5.8	$\gamma_{Ms,V}$ [1)]	[-]	1,25					
Partial factor grade 8.8	$\gamma_{Ms,V}$ [1)]	[-]	1,25					
Partial factor HAS-U A4	$\gamma_{Ms,V}$ [1)]	[-]	1,56					
Partial factor HAS-U HCR	$\gamma_{Ms,V}$ [1)]	[-]	1,25					1,75
Ductility factor	k_7	[-]	1,0					
Steel failure with lever arm								
Bending moment	$M^0_{Rk,s}$	[Nm]	$1,2 \cdot W_{el} \cdot f_{uk}$					
Ductility factor	k_7	[-]	1,0					
Concrete pry-out failure								
Pry-out factor	k_8	[-]	2,0					
Concrete edge failure								
Effective length of fastener	l_f	[mm]	$\min(h_{ef}; 12 \cdot d_{nom})$					
Outside diameter of fastener	d_{nom}	[mm]	8	10	12	16	20	24

1) In absence of national regulations.

Table C3: Displacement under tension load

HAS-U… and AM 8.8			M8	M10	M12	M16	M20	M24
Non-cracked concrete								
Displacement	δ_{N0}	[mm/(N/mm²)]	0,07	0,07	0,07	0,08	0,08	0,09
Displacement	$\delta_{N\infty}$	[mm/(N/mm²)]	0,07	0,07	0,07	0,08	0,08	0,09
Cracked concrete								
Displacement	δ_{N0}	[mm/(N/mm²)]	-	0,07	0,07	0,06	-	-
Displacement	$\delta_{N\infty}$	[mm/(N/mm²)]	-	0,11	0,11	0,11	-	-

Table C4: Displacement under shear load

HAS-U… and AM 8.8			M8	M10	M12	M16	M20	M24
Displacement	δ_{V0}	[mm/(N/mm²)]	0,06	0,06	0,05	0,04	0,04	0,03
Displacement	$\delta_{V\infty}$	[mm/(N/mm²)]	0,09	0,08	0,08	0,06	0,06	0,05

Injection system Hilti HIT-HY 170 with HAS-U…

Performances
Essential characteristics under shear load in concrete
Displacements

Annex C2

Deutsches Institut für Bautechnik DIBt

Table C5: Essential characteristics for HAS-U… under tension loads for seismic performance category C2

HAS-U… and AM 8.8				M12	M16
Steel failure					
HAS-U 8.8 (HDG), AM 8.8 (HDG)		$N_{Rk,s,seis}$	[kN]	67	126
Combined pullout and concrete cone failure					
Temperature range I:	24 °C/40 °C	$\tau_{Rk,seis}$	[N/mm²]	2,0	1,9
Temperature range II:	50 °C/80 °C	$\tau_{Rk,seis}$	[N/mm²]	1,4	1,3

Table C6: Essential characteristics for HAS-U… under shear loads for seismic performance category C2

HAS-U… and AM 8.8			M12	M16
Steel failure without lever arm with Hilti Filling Set				
HAS-U 8.8, AM 8.8	$V_{Rk,s,seis}$	[kN]	28	46
Steel failure without lever arm without Hilti Filling Set				
HAS-U 8.8, AM 8.8	$V_{Rk,s,seis}$	[kN]	24	40
HAS-U 8.8 HDG, AM 8.8 HDG	$V_{Rk,s,seis}$	[kN]	18	30

Table C7: Displacements under tension load for seismic performance category C2

HAS-U… and AM 8.8			M12	M16
Displacement DLS	$\delta_{N,seis(DLS)}$	[mm]	0,2	0,2
Displacement ULS	$\delta_{N,seis(ULS)}$	[mm]	0,6	0,4

Table C8: Displacements under shear load for seismic performance category C2

HAS-U… and AM 8.8			M12	M16
Installation with Hilti Filling Set				
Displacement DLS	$\delta_{V,seis(DLS)}$	[mm]	1,6	1,2
Displacement ULS	$\delta_{V,seis(ULS)}$	[mm]	4,5	3,2
Installation without Hilti Filling Set				
Displacement DLS HAS-U 8.8, AM 8.8	$\delta_{V,seis(DLS)}$	[mm]	2,9	3,2
Displacement DLS HAS-U 8.8 HDG, AM 8.8 HDG	$\delta_{V,seis(DLS)}$	[mm]	2,2	2,3
Displacement ULS HAS-U 8.8, AM 8.8	$\delta_{V,seis(ULS)}$	[mm]	5,4	9,2
Displacement ULS HAS-U 8.8 HDG, AM 8.8 HDG	$\delta_{V,seis(ULS)}$	[mm]	4,1	4,3

Injection system Hilti HIT-HY 170 with HAS-U…	**Annex C3**
Performances Essential characteristics for seismic performance category C2 and displacements.	