Deutsches Institut für Bautechnik

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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-19/0161 of 19 October 2023

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 and HAS-U
Product family to which the construction product belongs	Metal Injection anchors for use in masonry
Manufacturer	Hilti Aktiengesellschaft 9494 SCHAAN FÜRSTENTUM LIECHTENSTEIN
Manufacturing plant	Hilti Werke
This European Technical Assessment contains	26 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	330076-01-0604, Edition 10/2022
This version replaces	ETA-19/0161 issued on 28 August 2019

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Specific Part

1 Technical description of the product

The Injection system Hilti HIT-HY 170 with HAS and HAS-U for masonry is a bonded anchor (injection type) consisting of a mortar foil pack with injection mortar Hilti HIT-HY 170, a perforated sieve sleeve and an anchor rod with hexagon nut and washer in the range of M8 to M12. The steel elements are made of zinc coated steel, stainless steel or high corrosion resistant steel.

The anchor rod is placed into a drilled hole filled with injection mortar and is anchored via the bond and/or mechanical interlock between steel element, injection mortar and masonry.

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 fastener 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 fastener 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)

Essential characteristic	Performance
Characteristic resistance for static and quasi-static loading	See Annexes B7, C1 to C8
Characteristic resistance and displacements for seismic loading	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire under tension and shear loading with and without lever arm. Minimum edge distances and spacing	No performance assessed

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 330076-01-0604 the applicable European legal act is: [97/177/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.

The following standards are referred to in this European Technical Assessment:

- EN 1993-1-4:2006 + A1:2015	Eurocode 3: Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels
- EN 10088-1:2014	Stainless steels - Part 1: List of stainless steels
- EN 10204:2004	Metallic products - Types of inspection documents
- EN 998-2:2016	Specification for mortar for masonry - Part 2: Masonry mortar
- EN 771-1:2011 + A1:2015	Specification for masonry units - Part 1: Clay masonry units
- EN 771-2:2011 + A1:2015	Specification for masonry units - Part 2: Calcium silicate masonry units
- EN 771-3:2011 + A1:2015	Specification for masonry units - Part 3: Aggregate concrete masonry units (Dense and lightweight aggregates)

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Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Baderschneider

Installed condition

Figure A1: **Hollow and solid brick with HAS… and HAS-U… and sieve sleeve HIT-SC (see Table B6)**

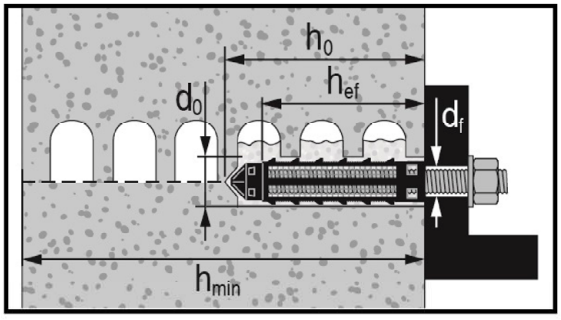
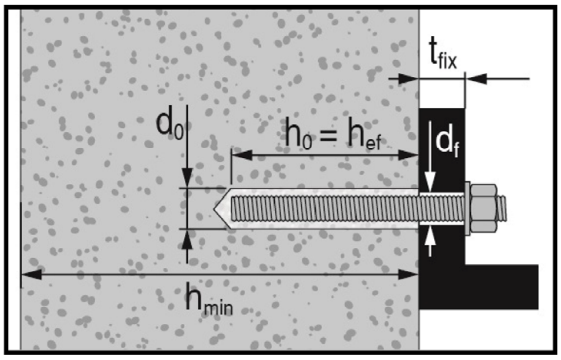


Figure A2: **Solid brick with HAS…and HAS-U… (see Table B7)**



Hilti HIT-HY 170 with HAS and HAS-U	
Product description Installed condition	**Annex A1**

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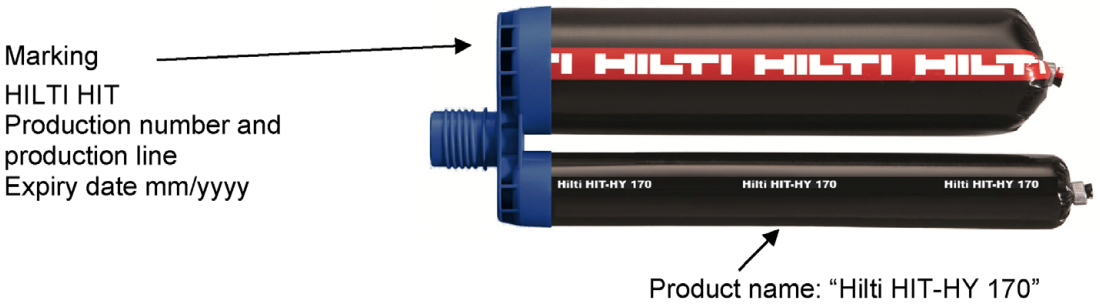
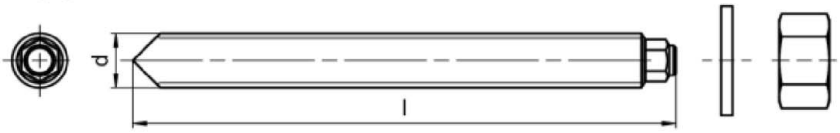
Product description: Injection mortar and steel elements

Injection mortar Hilti HIT-HY 170: hybrid system with aggregate
330 ml and 500 ml



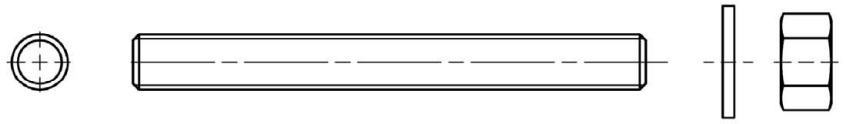
Static mixer Hilti HIT-RE-M

HAS-U-…:



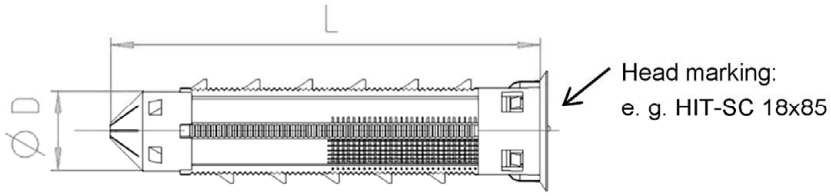
M8 to M12 **washer** **nut**

HAS…:



M8 to M12 **washer** **nut**

Sieve sleeve: HIT-SC 16 to 22



Hilti HIT-HY 170 with HAS and HAS-U	Annex A2
Product description Injection mortar / Static mixer / Steel elements / Sieve sleeve	

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Table A1: Materials

Designation	Material
Steel elements made of zinc coated steel	
HAS 8.8 (HDG) 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 ≥ 50 µm.
HAS 8.8 (HDG) 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 ≥ 50 µm.
Washer	Electroplated zinc coated ≥ 5 µm. Hot dip galvanized ≥ 50 µm.
Nut	Strength class of nut adapted to strength class of threaded rod. Electroplated zinc coated ≥ 5 µm, Hot dip galvanized ≥ 50 µm.
Steel elements made of stainless steel Corrosion resistance class (CRC) III according EN 1993-1-4	
HAS A4 HAS-U A4	Strength class 70 f_{uk} = 700 N/mm², f_{yk} = 450 N/mm². Elongation at fracture (l_0 = 5d) > 12% ductile.
Washer	Stainless steel EN 10088-1.
Nut	Strength class of nut adapted to strength class of threaded rod Stainless steel EN 10088-1.
Steel elements made of high corrosion resistant steel Corrosion resistance class (CRC) V according EN 1993-1-4	
HAS-U HCR	Strength class 80, f_{uk} = 800 N/mm², f_{yk} = 640 N/mm². Elongation at fracture (l_0 = 5d) > 12% ductile.
Washer	High corrosion resistant steel EN 10088-1.
Nut	Strength class of nut adapted to strength class of threaded rod. High corrosion resistant steel EN 10088-1.
Plastic parts	
Sieve sleeve HIT-SC	Frame: FPP 20T. Sieve: PA6.6 N500/200.

Hilti HIT-HY 170 with HAS and HAS-U	Annex A3
Product description Materials	

Specifications of intended use

Base materials:

- Solid brick masonry (use category b) according to Annex B3.
  Note: The characteristic resistances are also valid for larger brick sizes and larger compressive strengths of the masonry unit.
- Hollow brick masonry (use category c) according to Annex B5 and B6.
- Mortar strength class of the masonry: M2,5 at minimum according to EN 998-2.
- For masonry made of other solid, hollow or perforated bricks, the characteristic resistance of the anchor may be determined by job site tests according to TR 053:2022-07, under consideration of the β-factor given in Annex C1, Table C1.

Table B1: Overview use categories

Anchorages subject to:		**HIT-HY 170 with HAS… and HAS-U…**	
		In solid bricks	**In hollow bricks**
Hole drilling		Hammer mode	Rotary mode
Static and quasi static loading		Annex: C1 (steel), C3, C4	Annex: C1 (steel), C5, C6, C7, C8
Use category: dry or wet structure		Category **d/d** - **Installation and use** in structures subject to **dry** internal conditions. Category **w/d** - **Installation in dry or wet** substrate **and use** in structures subject to **dry** internal conditions Category **w/w** - **Installation and use** in structures subject to **dry or wet** environmental conditions	
Installation direction		Horizontal	
Use category		b (solid masonry)	c (hollow or perforated masonry)
Temperature in the base material at installation		+5 °C to +40 °C (Table B8)	0 °C to +40 °C (Table B9)
In-service temperature	Temperature range Ta:	-40 °C to +40 °C	(max. long term temperature +24 °C and max. short term temperature +40 °C)
	Temperature range Tb:	-40 °C to +80 °C	(max. long term temperature +50 °C and max. short term temperature +80 °C)

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
  (zinc coated steel, stainless steel or high corrosion resistant steel).
- For all other conditions according to EN 1993-1-4 corresponding to corrosion resistance classes according to Annex A3, Table A1.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and masonry 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 supports).
- Anchorages under static or quasi-static loading are designed in accordance with:
  TR 054:2022-07, Design method A.

  Applies to all bricks, if no other values are specified:
  $N_{Rk} = N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$

  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$

  For the calculation of pulling out a brick under tension loading $\mathbf{N_{Rk,pb}}$ or

  pushing out a brick under shear loading $\mathbf{V_{Rk,pb}}$ see EOTA Technical Report TR 054:2022-07.

  $\mathbf{N_{Rk,s}}$, $\mathbf{V_{Rk,s}}$ and $\mathbf{M^0_{Rk,s}}$ see annexes C1

  Factors for job site tests and displacements see annex C1 – C8

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

Hilti HIT-HY 170 with HAS and HAS-U	Annex B2
Intended Use Specifications	

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Table B2: Overview brick types and properties

Brick type	Picture	Brick size [mm]	Compressive strength [N/mm²]	Bulk density [kg/dm³]	Annex
Solid clay brick EN 771-1		≥ 240x115x113	12	2,0	C3
Solid calcium silicate brick EN 771-2		≥ 240x115x113	12 / 28	2,0	C4
Hollow clay brick EN 771-1		300x240x238	12 / 20	1,4	C5
Hollow calcium silicate brick EN 771-2		248x240x238	12 / 20	1,4	C6
Hollow lightweight concrete brick EN 771-3		495x240X238	2 / 6	0,8	C7
Hollow normal weight concrete brick EN 771-3		500x200x200	4 / 10	1,0	C8

Hilti HIT-HY 170 with HAS and HAS-U

Intended Use
Brick types and properties

Annex B3

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Table B3: Overview fastening elements (including sizes) and corresponding brick types. Embedment depth h_{ef} = 80 mm

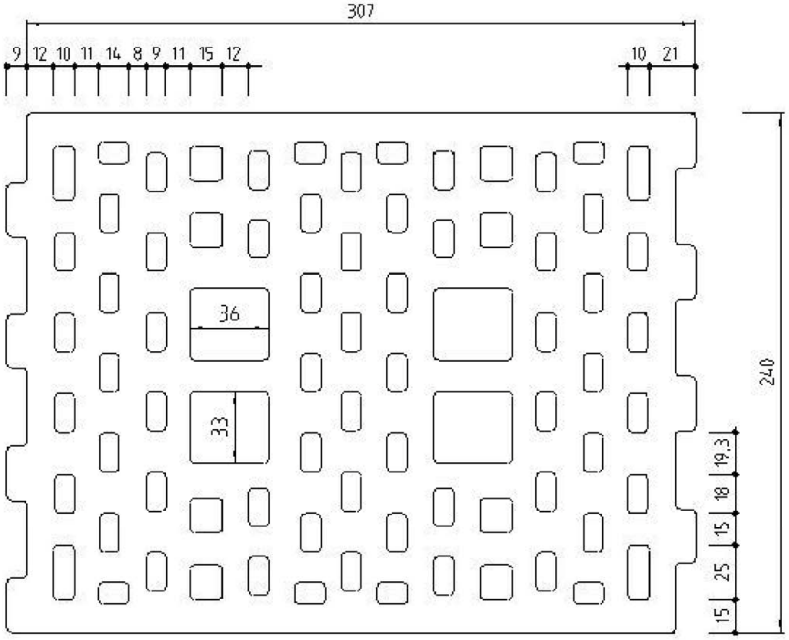
Brick type	Picture	HAS/HAS-U 	HAS/HAS-U + HIT-SC 	Annex
Solid clay brick EN 771-1		M8 to M12	M8 to M12	C3
Solid calcium silicate brick EN 771-2		M8 to M12	M8 to M12	C4
Hollow clay brick EN 771-1		-	M8 to M12	C5
Hollow calcium silicate brick EN 771-2		-	M8 to M12	C6
Hollow lightweight concrete brick EN 771-3		-	M8 to M12	C7
Hollow normal weight concrete brick EN 771-3		-	M8 to M12	C8

Hilti HIT-HY 170 with HAS and HAS-U	**Annex B4**
Intended Use Fastening elements and corresponding brick types	

Table B4: Details of hollow bricks

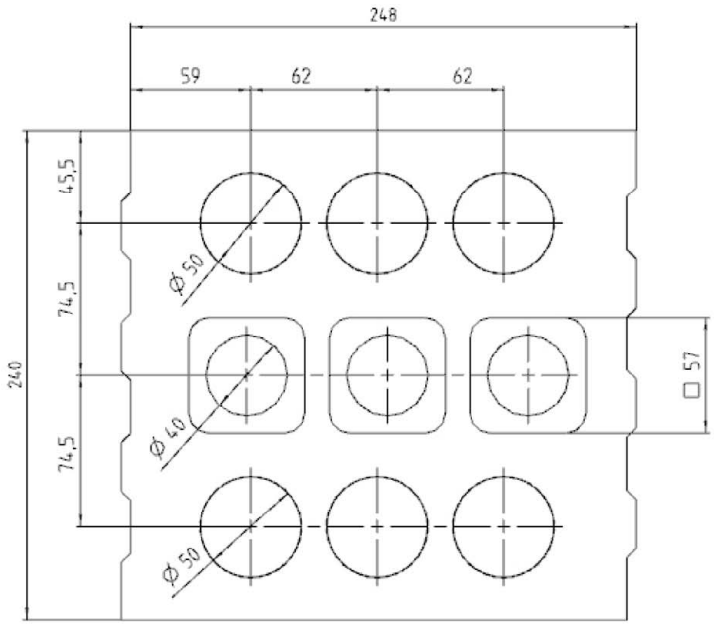
Hollow clay brick
EN 771-1

Rapis Ziegel
Hlz 12-1,4-10DF



Hollow calcium silicate brick
EN 771-2

KS Südbayern
KSL-R(P) 12-1,4-8DF



Hilti HIT-HY 170 with HAS and HAS-U	**Annex B5**
Intended Use Details of hollow bricks	

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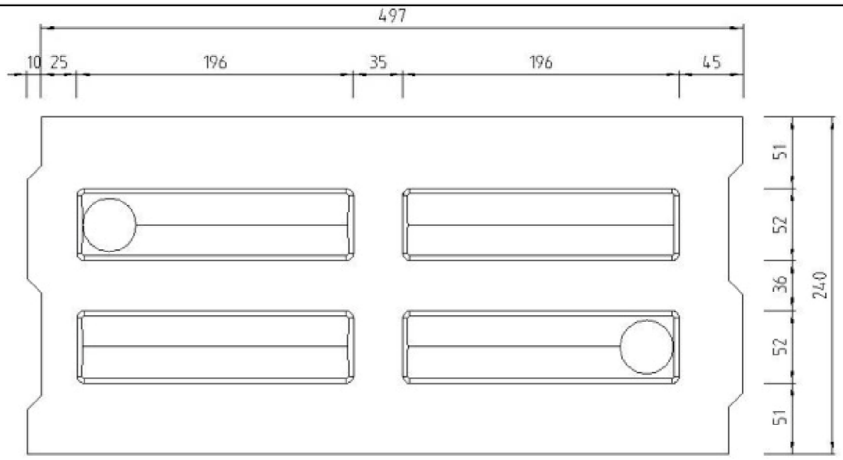
Table B1 continued

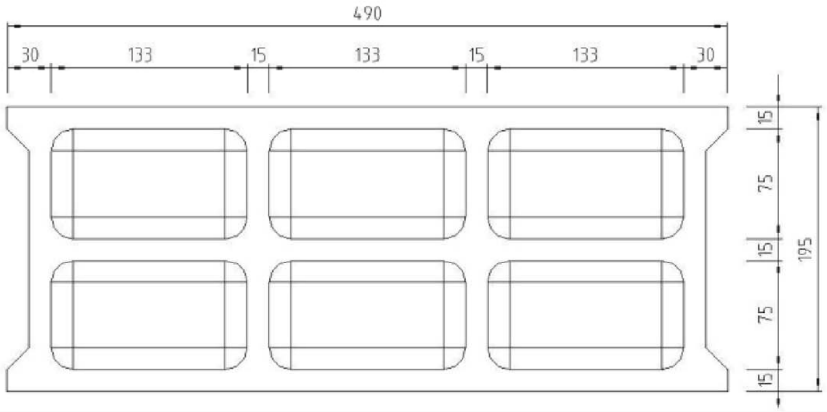
Hollow lightweight concrete brick
EN 771-3

Knobel Betonwerk
Hbl 6-0,8-500x240x238



Hollow normal weight concrete brick
EN 771-3

Parpaing creux
B40



Hilti HIT-HY 170 with HAS and HAS-U	Annex B6
Intended Use Details of hollow bricks	

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Table B5: Installation parameters of HAS… and HAS-U-… with sieve sleeve HIT-SC in hollow brick and solid brick (Figure A1)

HAS… and HAS-U…			**M8**	**M10**	**M12**
with HIT-SC			**16x85**	**16x85**	**18x85**
Nominal diameter of drill bit	d_0	[mm]	16	16	18
Drill hole depth	h_0	[mm]	95	95	95
Effective embedment depth	h_{ef}	[mm]	80	80	80
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9	12	14
Minimum wall thickness	h_{min}	[mm]	115	115	115
Brush HIT-RB	-	[-]	16	16	18
Maximum torque moment for all brick types except “parpaing creux”	T_{max}	[Nm]	3	4	6
Maximum torque moment for “parpaing creux”	T_{max}	[Nm]	2	2	3
Number of strokes HDM	-	[-]	6	6	8
Number of strokes HDE-500	-	[-]	5	5	6

Table B6: Installation parameters of HAS… and HAS-U-… in solid brick (Figure A2)

HAS… and HAS-U…			**M8**	**M10**	**M12**
Nominal diameter of drill bit	d_0	[mm]	10	12	14
Drill hole depth = Effective embedment depth	$h_0 = h_{ef}$	[mm]	80	80	80
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9	12	14
Minimum wall thickness	h_{min}	[mm]	115	115	115
Brush HIT-RB	-	[-]	10	12	14
Maximum torque moment	T_{max}	[Nm]	5	8	10

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Table B7: Maximum working time and minimum curing time for solid bricks [1)]

Temperature in the base material T	Maximum working time t_{work}	Minimum curing time t_{cure}
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.

Table B8: Maximum working time and minimum curing time for hollow bricks [1)]

Temperature in the base material T	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.

Table B9: Cleaning tools

Manual Cleaning (MC): Hilti hand pump for blowing out drill holes	
Compressed air cleaning (CAC) [1)]: air nozzle with an orifice opening of minimum 3,5 mm in diameter for blowing out drill hole	
Steelbrush HIT-RB: See table B6 and B7 depending on drill hole diameter for MC and CAC	

[1)] Compressed Air Cleaning (CAC) is also allowed

Hilti HIT-HY 170 with HAS and HAS-U	Annex B8
Intended Use Maximum working time and minimum curing time. Cleaning tools	

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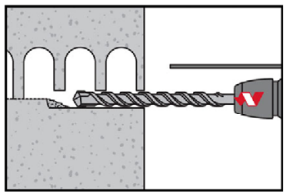
Installation

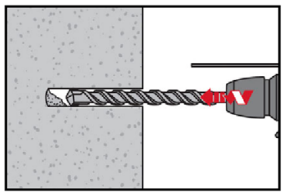
Hole drilling

If no significant resistance is felt over the entire depth of the hole when drilling (e.g. in unfilled butt joints), the anchor should not be set at this position.

Drilling mode



In hollow and solid bricks (use category c): rotary mode
Drill hole to the required embedment depth with a hammer drill set in rotary mode using an appropriately sized carbide drill bit.

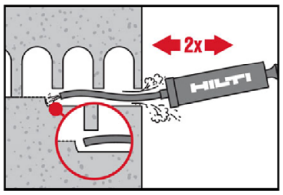


In solid bricks (use category b): hammer mode
Drill hole to the required embedment depth with a hammer drill set in hammer mode using an appropriately sized carbide drill bit.

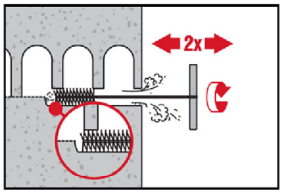
Drill hole cleaning

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

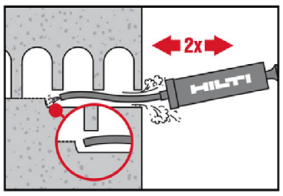
Manual Cleaning (MC): For hollow and solid bricks



Blow out at least 2 times from the back of the drill hole with the Hilti hand pump until return air stream is free of noticeable dust.



Brush 2 times with the specified steel brush (table B6 and table B7) by inserting the steel brush Hilti HIT-RB to the back of the hole 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 the Hilti hand pump at least 2 times until return air stream is free of noticeable dust.

Hilti HIT-HY 170 with HAS and HAS-U	Annex B9
Intended Use Installation instructions	

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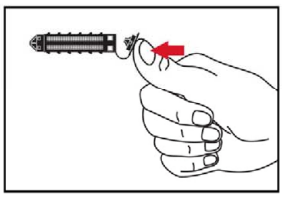
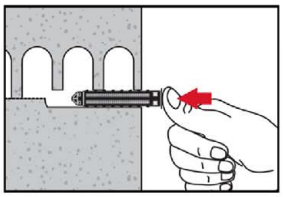
Injection preparation in masonry with holes or voids: installation with sieve sleeve HIT-SC

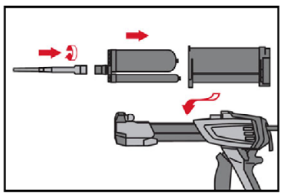


Sieve sleeve HIT-SC
Close lid.

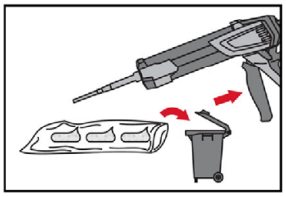


Insert sieve sleeve manually.

For all applications



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 and foil pack.
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.

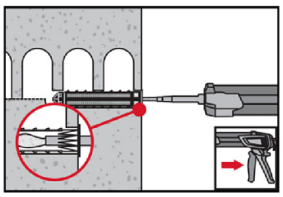


Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded. Discarded quantities are:

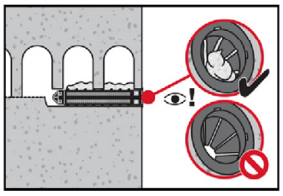
2 strokes	for 330 ml foil pack,
3 strokes	for 500 ml foil pack.

Inject adhesive without forming air voids

Installation with sieve sleeve HIT-SC



Sieve sleeve HIT-SC
Insert mixer approximately 1 cm through the lid. Inject required amount of adhesive (see table B6). Adhesive must emerge through the lid.



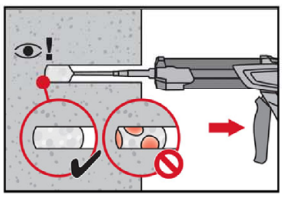
Control amount of injected mortar. Adhesive has to protrude into the lid.

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

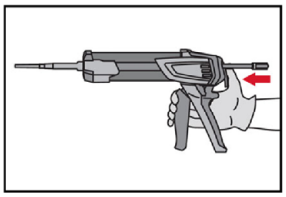
Hilti HIT-HY 170 with HAS and HAS-U	**Annex B10**
Intended Use Installation instructions	

Deutsches Institut für Bautechnik DIBt

Solid bricks: installation without sieve sleeve



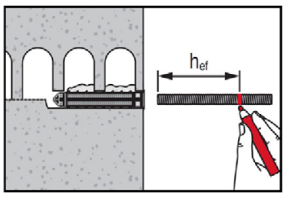
Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull.
Fill holes approximately 2/3 full to ensure that the annular gap between the anchor and the base material is completely filled with adhesive along the embedment length.



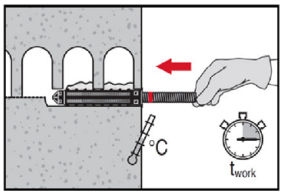
After injection is completed, depressurize the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

Setting the element:

Before use, verify that the element is dry and free of oil and other contaminants.

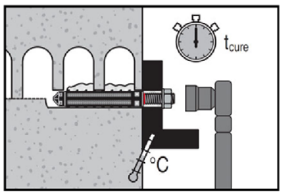


HAS… and HAS-U… in hollow and solid bricks:
Pre-setting (Figure A1 to Figure A2)
Mark the element to the required embedment depth h_{ef} acc. to Table B6 and Table B7.



Set element to the required embedment depth until working time t_{work} has elapsed. The working time t_{work} is given in Table B8 and Table B9.

Loading the anchor



After required curing time t_{cure} (see Table B8 and Table B9) the anchor can be loaded.
The applied installation torque shall not exceed the values T_{max} given in Table B6 and Table B7.

Hilti HIT-HY 170 with HAS and HAS-U	
Intended Use Installation instructions	**Annex B11**

Deutsches Institut für Bautechnik DIBt

Table C1: β-factor for job-site testing under tension loading

Use categories		**w/w and w/d**		**d/d**	
Temperature range		**Ta** [1)]	**Tb** [1)]	**Ta** [1)]	**Tb** [1)]
Base material	**Elements**				
Solid clay brick EN 771-2	HAS/HAS-U	0,97	0,83	0,97	0,83
	HAS/HAS-U + HIT-SC +				
Solid calcium silicate brick EN 771-2	HAS/HAS-U	0,96	0,84	0,97	0,84
	HAS/HAS-U + HIT-SC +	0,69	0,62	0,91	0,82
Hollow clay brick EN 771-1	HAS/HAS-U + HIT-SC +	0,97	0,83	0,97	0,83
Hollow calcium silicate brick EN 771-2	HAS/HAS-U + HIT-SC +	0,69	0,62	0,91	0,82
Hollow light weight concrete brick EN 771-3	HAS/HAS-U + HIT-SC +	0,89	0,81	0,97	0,86
Hollow normal weight concrete brick EN 771-3	HAS/HAS-U + HIT-SC +	0,97	0,80	0,97	0,80

[1)] Temperature range Ta / Tb see Annex B1.

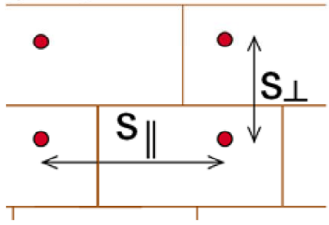
Table C2: Characteristic resistance to steel failure for HAS… and HAS-U… under tension and shear loading in masonry

HIT-HY 170 with HAS… and HAS-U…			**M8**	**M10**	**M12**
Steel failure tension loads					
Characteristic steel resistance	$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$		
Steel failure shear loads without lever arm					
Characteristic steel resistance strength class 5.8	$V_{Rk,s}$	[kN]	$0,6 \cdot A_s \cdot f_{uk}$		
Characteristic steel resistance strength class 8.8, 70 and 80	$V_{Rk,s}$	[kN]	$0,5 \cdot A_s \cdot f_{uk}$		
Steel failure shear loads with lever arm					
Characteristic bending moment	$M^0_{Rk,s}$	[kN]	$1,2 \cdot W_{el} \cdot f_{uk}$		

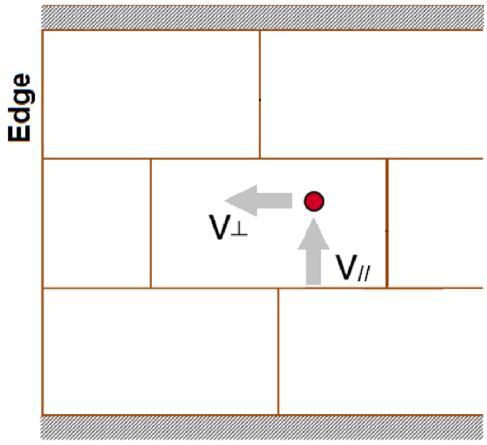
Hilti HIT-HY 170 with HAS and HAS-U	**Annex C1**
Performances β-factors for job-site testing under tension load Characteristic resistances under tension and shear load – steel failure	

Spacing dependent on edge distances for all anchor combinations:

Spacing

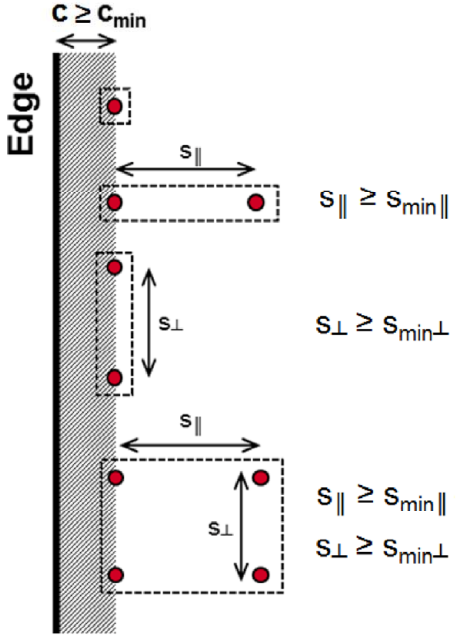


Shear load direction



Shear// (parallel to the free edge)
Shear⊥ (perpendicular to the free edge)

Edge distance [a] and spacing



[a] A vertical joint not filled with mortar is considered an edge and $c \geq c_{min}$ should be observed.

The characteristic values of resistance of an anchor group are calculated by using the group-factors α_g according to Annexes C3 to C8:

Group of two anchors: $N^g_{Rk} = \alpha_{g,N} \cdot N_{Rk}$ and $V^g_{RK,b} = V^g_{RK,c,II} = V^g_{RK,c\perp} = \alpha_{g,V} \cdot V_{Rk}$ (with the relevant α_g)

Group of four anchors: $N^g_{Rk} = \alpha_{g,N\,II} \cdot \alpha_{g,N\perp} \cdot N_{Rk}$ and $V^g_{RK,b} = V^g_{RK,c,II} = V^g_{RK,c\perp} = \alpha_{g,V\,II} \cdot \alpha_{g,V\perp} \cdot V_{Rk}$

Hilti HIT-HY 170 with HAS and HAS-U	Annex C2
Performances Anchor spacing	

Deutsches Institut für Bautechnik DIBt

Brick type: Solid clay brick Mz, 2DF

Table C3: Description of brick

Brick type		[-]	Solid Mz, 2DF
Bulk density	ρ	[kg/dm³]	≥ 2,0
Compressive strength	f_b	[N/mm²]	≥ 12
Code		[-]	EN 771 - 1
Producer		[-]	-
Brick dimensions		[mm]	≥ 240 x 115 x 113
Minimum wall thickness	h_{min}	[mm]	≥ 115

Table C4: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	$c_{min} = c_{cr}$ [mm]	115
Spacing	$s_{min\,II} = s_{cr\,II}$ [mm]	240
	$s_{min\,\perp} = s_{cr\,\perp}$ [mm]	115

Table C5: Group factor for group fastenings

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}

Table C6: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]**			
HAS/HAS-U	M8, M10, M12	80	12	3,0	2,5	3,0	2,5
HAS/HAS-U + HIT-SC +	M8, M10, M12	80	12	4,0	3,5	4,0	3,5

Table C7: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN]**			
All anchors	M8. M10, M12	80	12	3,5			

Table C8: Displacements

h_{ef} [mm]	N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
80	0,9	0,2	0,4	1,0	1,0	1,5

Hilti HIT-HY 170 with HAS and HAS-U

Performances solid clay brick Mz, 2DF
Installation parameters and group factor.
Characteristic values of resistance under tension and shear loads. Displacements

Annex C3

Deutsches Institut für Bautechnik DIBt

Brick type: Solid calcium silicate brick KS, 2DF

Table C9: Description of brick

Brick type		[-]	Solid KS, 2DF	
Bulk density	ρ	[kg/dm³]	≥ 2,0	
Compressive strength	f_b	[N/mm²]	≥ 12 or ≥ 28	
Code		[-]	EN 771 - 2	
Producer		[-]	-	
Brick dimensions		[mm]	≥ 240 x 115 x 113	
Minimum wall thickness	h_{min}	[mm]	≥ 115	

Table C10: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	$c_{min} = c_{cr}$ [mm]	115
Spacing	$s_{min\ II} = s_{cr\ II}$ [mm]	240
	$s_{min\ \perp} = s_{cr\ \perp}$ [mm]	115

Table C11: Group factor for group fastenings

Group factor	$\alpha_{g,N\ II}\ \alpha_{g,V\ II}\ \alpha_{g,N\ \perp}\ \alpha_{g,V\ \perp}$ [-]	2 at c_{cr} and s_{cr}

Table C12: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]**			
HAS/HAS-U 	M8, M10, M12	80	12	5,5	5,0	6,0	5,0
			28	8,5	7,5	8,5	7,5
HAS/HAS-U + HIT-SC 	M8, M10, M12	80	12	4,0	3,5	5,5	5,0
			28	6,0	5,5	8,0	7,5

Table C13: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN]**			
All anchors	M8, M10, M12	80	12	4,0			
			28	6,0			

Table C14: Displacements

h_{ef} [mm]	N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
80mm	2,3	0,2	0,4	1,5	1,2	1,8

Hilti HIT-HY 170 with HAS and HAS-U

Performances solid silica brick KS, 2DF
Installation parameters and group factor.
Characteristic values of resistance under tension and shear loads. Displacements

Annex C4

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Hlz, 10DF

Table C15: Description of brick

Brick type		[-]	Hlz 12-1,4-10 DF
Bulk density	ρ	[kg/dm³]	≥ 1,4
Compressive strength	fb	[N/mm²]	≥ 12 or ≥ 20
Code		[-]	EN 771 - 1
Producer		[-]	Rapis (D)
Brick dimensions		[mm]	300 x 240 x 238
Minimum wall thickness	h_{min}	[mm]	≥ 240

Drawing of the brick see Table B4

Table C16: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	$c_{min} = c_{cr}$ [mm]	150
Spacing	$s_{min\,II} = s_{cr\,II}$ [mm]	300
	$s_{min\,\perp} = s_{cr\,\perp}$ [mm]	240

Table C17: Group factor for group fastenings

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}

Table C18: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading at edge distance c ≥ c_{cr}

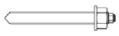
Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]**			
HAS/HAS-U +  +	HIT-SC  M8, M10, M12	80	12	3,0	2,5	3,0	2,5
			20	3,5	3,0	3,5	3,0

Table C19: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading at edge distance c ≥ c_{cr}

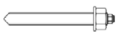
Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN]**			
HAS/HAS-U +  +	HIT-SC  M8, M10, M12	80	12	2,0			
			20	3,0			

Table C20: Displacements

h_{ef} [mm]	N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
80	0,9	0,2	0,3	0,9	1,0	1,5

Hilti HIT-HY 170 with HAS and HAS-U

Performances hollow clay brick Hlz, 10DF
Installation parameters and group factor.
Characteristic values of resistance under tension and shear loads. Displacements

Annex C5

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow calcium silicate brick KSL, 8DF

Table C21: Description of brick

Brick type		[-]	KSL-12-1,4-8 DF
Bulk density	ρ	[kg/dm³]	≥ 1,4
Compressive strength	f_b	[N/mm²]	≥ 12 or ≥ 20
Code		[-]	EN 771 – 2
Producer		[-]	KS Südbayern (D)
Brick dimensions		[mm]	248 x 240 x 238
Minimum wall thickness	h_{min}	[mm]	≥ 240

Drawing of the brick see Table B4

Table C22: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	$c_{min} = c_{cr}$ [mm]	125
Spacing	$s_{min\,II} = s_{cr\,II}$ [mm]	248
	$s_{min\,\perp} = s_{cr\,\perp}$ [mm]	240

Table C23: Group factor for group fastenings

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}

Table C24: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]**			
HAS/HAS-U + +	HIT-SC M8, M10, M12	80	12	3,0	2,5	3,5	3,0
			20	4,0	3,5	5,0	4,5

Table C25: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN]**			
HAS/HAS-U + +	HIT-SC M8, M10, M12	80	12	8,5			
			20	12,0			

Table C26: Displacements

h_{ef} [mm]	N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
80	1,8	0,2	0,3	3,4	2,5	3,8

Hilti HIT-HY 170 with HAS and HAS-U

Performances hollow silica brick KSL, 8DF
Installation parameters and group factor.
Characteristic values of resistance under tension and shear loads. Displacements

Annex C6

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow lightweight concrete brick Hbl, 16DF

Table C27: Description of brick

Brick type		[-]	Hbl-4-0,7
Bulk density	ρ	[kg/dm³]	≥ 0,8
Compressive strength	f_b	[N/mm²]	≥ 2 or ≥ 6
Code		[-]	EN 771-3
Producer		[-]	Knobel (D)
Brick dimensions		[mm]	495 x 240 x 238
Minimum wall thickness	h_{min}	[mm]	≥ 240

Drawing of the brick see Table B5

Table C28: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	$c_{min} = c_{cr}$ [mm]	250
Spacing	$s_{min\,II} = s_{cr\,II}$ [mm]	240
	$s_{min\,\perp} = s_{cr\,\perp}$ [mm]	240

Table C29: Group factor for group fastenings

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}

Table C30: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]**			
HAS/HAS-U + +	HIT-SC	M8, M10, M12	80	2	1,2	0,9	1,5	1,2
				6	2,0	1,5	2,5	2,0

Table C31: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN]**			
HAS/HAS-U + +	HIT-SC	M8, M10, M12	80	2	2,5			
				6	4,0			

Table C32: Displacements

h_{ef} [mm]	N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
80	2,4	0,2	0,4	3,4	1,3	1,9

Hilti HIT-HY 170 with HAS and HAS-U

Performances hollow lightweight concrete brick Hbl 16DF
Installation parameters and group factor.
Characteristic values of resistance under tension and shear loads. Displacements

Annex C7

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow normal weight concrete brick - parpaing creux

Table C33: Description of brick

Brick type		[-]	B40
Bulk density	ρ	[kg/dm³]	≥ 1,0
Compressive strength	f_b	[N/mm²]	≥ 4 or ≥ 10
Code		[-]	EN 771-3
Producer		[-]	Fabemi (F)
Brick dimensions		[mm]	500 x 200 x 200
Minimum wall thickness	h_{min}	[mm]	≥ 200

Drawing of the brick see Table B5

Table C34: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	$c_{min} = c_{cr}$ [mm]	200
Spacing	$s_{min\ II} = s_{cr\ II}$ [mm]	200
	$s_{min\ \perp} = s_{cr\ \perp}$ [mm]	200

Table C35: Group factor for group fastenings

Group factor	$\alpha_{g,N\ II}$ $\alpha_{g,V\ II}$ $\alpha_{g,N\ \perp}$ $\alpha_{g,V\ \perp}$ [-]	2 at c_{cr} and s_{cr}

Table C36: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]**			
HAS/HAS-U + +	HIT-SC M8, M10, M12	80	4	0,9	0,9	0,9	0,9
			10	1,2	1,2	1,5	1,5

Table C37: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading at edge distance c ≥ c_{cr}

Use category				**w/w = w/d**		**d/d**	
Service temperature range				**(Ta)**	**(Tb)**	**(Ta)**	**(Tb)**
Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN]**			
HAS/HAS-U + +	HIT-SC M8, M10, M12	80	4	2,5			
			10	4,0			

Table C38: Displacements

h_{ef} [mm]	N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
80	1,0	0,6	1,2	2,3	0,6	0,9

Hilti HIT-HY 170 with HAS and HAS-U

Performances hollow normal weight concrete brick - parpaing creux
Installation parameters and group factor.
Characteristic values of resistance under tension and shear loads. Displacements

Annex C8